

## FORMAL LOGIC AND PRACTICAL REASONING\*

In the past couple of decades several different accounts of the logic of practical reasoning have been proposed.<sup>1</sup> The account I have recommended on a number of occasions is clearly the simplest, because it requires no special logical principles, holding that, in respect of deduction, practical reasoning is adequately understood as involving only standard assertoric principles. My account has recently encountered various objections, the most dismissive of which is that it is too simple to deal with complicated cases of practical inference. I am not daunted by these objections. My aim here is to offer some observations that will make the merits of my account easier to appreciate.

Generally speaking, practical reasoning is the sort of reasoning that is directed to action. More specifically, it is reasoning that ideally terminates in a decision to act, one that will result in action when the actor (the agent) judges that the circumstances are appropriate. If, for example, I decide to clean my garage on the next rainy day, the thought "It's rainy today" will prompt the appropriate cleaning behavior—if, that is, I do not change my mind, forget what I have decided, or the like. As I shall explain, further refinements are necessary for a philosophically useful description of practical reasoning. To get the ball rolling, it will be helpful to say something about the more elementary notion of reasoning itself.

When we reason, we premise something and draw a conclusion from it. Premising is not the same as asserting, affirming, or in some way endorsing, for in conditional proofs or *reductio* arguments our premises are mere assumptions or suppositions. To be sure, in the larger whole in which a step in reasoning occurs, we do characteristically affirm or endorse. If an assumption P leads us to infer Q, we might then conclude affirmatively that P only if Q—or, if Q is an obvious contradiction, we might conclude affirmatively that not-P. It is clear that a line of reasoning, practical or not, may consist of numerous inferences, each of which is a step in reasoning. A practical step would be one in which a move is made from premises to conclusion at least one part of which is practical—that is, the sort of "proposition" (thought or utterance) that, if appropriately affirmed or endorsed, would express an intention to do something. (Compare: "Supposing p, I'll do A; but supposing q, I'll do B.") It is also clear that a line of practical reasoning might well include inferential steps that are wholly assertoric, having nothing to do with intentions or decisions.

If reasoning is a human activity involving premising, concluding, and consequent asserting or, as some say, "endorsing," how is reasoning related to formal logic? This is a complicated matter, but the following remarks are philosophically crucial. First, formal logic provides principles by which deductive reasoning is appropriately evaluated. According to the tradition going back to Aristotle, deductive reasoning is good or bad by virtue of its form or structure: if it is good, its structure is such that its conclusion is guaranteed to have a positive semantic value (true, in the case of assertoric inferences) if its premises have such a value. To decide whether an instance of deductive reasoning is good, or valid, we must therefore decide whether it has a valid formal structure. To be able to decide such a thing, we must have the appropriate training in formal logic; the latter provides the criteria, the principles of criticism, by which deductive inferences are appropriately evaluated. Such training can be expected to improve our logical performance in inference because it improves our mental habits of

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inference; it discourages us, for example, from affirming the consequent or denying the antecedent in inferences involving conditionals, and it encourages us to make inferences that conform, say, to De Morgan's laws.

As far as purely assertoric inference is concerned, an argument is formally valid just when it is an instance of a valid inference form, the latter being a form all of whose instances have true conclusions if they have true premises.<sup>3</sup> Assertoric validity is, therefore, formally grounded truth-preservation: our inferences are formally valid just when our conclusions (by virtue of their form) are bound to be true if our premises are true. If, like most philosophers today, we adopt this formal approach to validity, we can allow that certain inferences whose conclusions are not formal consequences of their premises may be considered valid in a derivative sense if the conjunction of those premises with certain conceptual truths formally imply those conclusions. The inference "a is larger than b and b is larger than c; therefore, a is larger than c" would be an obvious example of such a derivatively valid inference.

Formal validity, as I have explained it, makes clear sense only in relation to some formal theory of deduction. The doctrine of the syllogism was the only such theory available to logicians for more than two thousand years. Although the stoics had a fragmentary theory of sentential (or propositional) logic, even Leibniz, in the seventeenth century, could point to only a few valid forms of necessary, nonsyllogistic reasoning.<sup>4</sup> Since strong claims about the primacy of syllogistic logic have been made by philosophers who employed what we today would classify as sentential inferences (*modus ponens* being an obvious example) it is important to realize that sentential inferences can often be reconstructed syllogistically. Consider the paradigm,

1. If it is raining, the streets are wet.
2. It is raining.
3. Therefore, the streets are wet.

As everyone who has taught the syllogism as a basic deductive theory knows, this paradigm can be represented syllogistically (with some awkwardness) as follows:

1. All times when it is raining are times when the streets are wet.
2. All present times are times when it is raining.
3. Therefore, all present times are times when the streets are wet.

This last point, though trivial and perhaps obvious, is important philosophically, for it reminds us that, in many cases, the validity of an inference can be assessed by different formal principles. Absolutely speaking, there is no such thing as "the" logical structure of an inference.

If assertoric deductive validity is to be understood in terms of formally insured truth preservation, how is practical deductive validity to be understood? This is an extremely general question, but a reasonable answer can be given if we conceive of practical inferences very narrowly as actual or potential inferences that involve practical premises or conclusions in an essential way. This narrow conception of a practical inference requires some explanation. I begin with the notion of an actual or potential inference.

Not every sequence of premises and conclusions corresponds to an actual or potential inference in the ordinary sense I am concerned with here. A striking exception, as I see it, is a sequence of imperatives. One can indeed define a notion of imperatival implication (or validity) according to which the following sequence of imperatives counts as a deductively valid argument:

1. Do A if p!
2. p.
3. Therefore, do A!

My contention is that statements and imperatives corresponding to this pattern are not, in fact, inferences in the ordinary sense because such sequences do not correspond to actual patterns of reasoning. People who utter imperatives do, of course, engage in appropriate practical reasoning, and those to whom imperatives are directed also engage in such reasoning. But as I argued at length in my book *Reason and Action*, the inferential steps in practical and even assertoric reasoning do not include imperatives, optatives, and the like.<sup>5</sup> If Mary decides that the best way of getting Tom to write an essay is to order him to write one, she might say "Tom, write an essay!"; but her imperative here is not the conclusion of a practical inference; it is the implementation of an intention that stands in the same relation to the latter as winking stands to an intention to wink.

To say, as I have, that there are, in fact, no imperatival inferences is not to deny that imperatives may imply or be implied by imperatives or even indicatives. On the other hand, to support the idea that such implications exist one must clarify the relevant notion of implication. In doing this, the crucial things to identify are the semantical values appropriate to such implications. If one specifies, for example, that a pure imperative (one not containing an indicative or an interrogative) has the positive value 1 just when it is appropriately obeyed and that a disjunctive imperative "A! or B!" has the value 1 when either of its ingredient disjuncts have this value, then there is no question that "A!" implies\* "A! or B!", where "implies\*" has the specified meaning. One can, of course, argue about whether this sense of "implies" is helpful, excessively contrived, or possibly even misleading. Yet given the relevant clarification, a definite, unambiguous answer can be given to the question whether one imperative does or does not imply another in the sense in question.

The other notion required for the narrow conception of practical inference I am concerned with is that of an inference containing, essentially, a practical premise or conclusion. As I mentioned at the outset, a realistic line of practical reasoning normally includes assertoric as well as practical steps. What is logically special about such reasoning (if anything is) are the practical steps, which are characterized by a significantly nonredundant, nonassertoric element. As I have mentioned, I believe such elements have the syntactical structure of verbal expressions of intention, decisions and choices (owing to the manner in which they are formed) being special cases of these elements. I want to emphasize, though, that practical premises and conclusions are not always, in fact, verbal expressions of some reasoner's actual intentions, for in logical discussions we may contemplate premise-conclusions sequences that correspond to possible rather than actual practical inferences.

When I speak of the "verbal expression" of an intention, I use the words "verbal expression" to refer to sentential structures (verbal formulas) that typically result from intentions and formulate (put into words) what a speaker intends or possibly intends. My use of "expression" here is standard; it is, obviously, a dead metaphor that still carries the suggestion of something pressed out of a person -- perhaps something pressed out of a person's head. One who believes that snow is white would express this belief in words by saying "Snow is white"; one would ascribe that belief to oneself by saying "I believe that snow is white." Similarly, one who intends to write a letter would express that intention in words by saying "I will write a letter" or "I'm going to write a letter"; one would ascribe that intention to oneself by saying "I intend to write a letter." People who speak this way use English more carefully, perhaps, than the proverbial man on the corner. To fix upon a canonical form by which intentions are expressed, I shall use "I will . . ." as apposed to "I shall . . .," the latter

being a mere future indicative in literary English.<sup>6</sup> Another standard formula for expressing intentions in literary English is the slightly stilted "It shall be that ..." As I see it, purely practical premises and conclusions (those not containing nonpractical conjuncts, disjuncts, etc.) are canonically expressible by "I will . . .," "It shall be that," or, for first-person group intentions, "We will..."

Since in my view practical reasoning, narrowly understood, involves premises or conclusions that include actual or potential expressions of intention, I can (with some reluctance) describe such reasoning as governed by a "logic of intentions." One of my critics, Hector-Neri Castañeda, employs this mode of description,<sup>7</sup> but in reluctantly allowing it I want to disavow the basic tenets of his view. These tenets include the idea that practical premises and conclusions are or may be "intentions," which are quasi-propositional entities that he represents by "shall"-sentences or by infinitive clauses such as "I to do A." An intention, so conceived, can also be denoted, Castañeda thinks, by an expression such as "what Jones intended to accomplish in doing that." I seriously doubt that there are intentions in his sense, and I am utterly confident that practical premises and conclusions - those that occur in real-life reasoning - never have the syntactical structure of "I to do A."

It is worth noting here that a standard assumption leading to the belief that there are propositional intentions arises from a grammatical blunder. The assumption is that the "what" in "I know what Jones intended" is a relative pronoun meaning "that which," a pronoun that forms a singular term, "what Jones intended," referring to a proposition-like entity. But this assumption is false: the "what" here, as J. L. Austin in effect observed thirty years ago in his famous 'Other Minds' paper, is an interrogative pronoun, one translated by the Latin *quid*, not *quod*.<sup>8</sup> The expression "what Jones intended" does not denote a thing ("that which") Jones intended; it is a syncategorematical expression that, in a context such as "I know what Jones intended," helps convey the idea that a speaker knows the answer to the question "What did Jones intend?" The relevant answer might be "Jones intended to write a letter" - and this answer, if it expresses anything, expresses a belief that Jones was in a certain psychological state. This state could, in turn, be expressed at an appropriate time by a Jonesean utterance or thought "I will write a letter," and this utterance or thought could be a practical premise or conclusion.

If practical reasoning is characterized by premises or conclusions that express intentions rather than beliefs, what can be said about its formal logic? It is helpful to approach this question by a brief discussion of Aristotle's account of practical reasoning, which I think was fundamentally correct, requiring supplementation rather than radical revision. Two apparently differing accounts of such reasoning can be found in his *Nicomachean Ethics*. The first occurs in passages where Aristotle speaks of the inferences scholars have called "practical syllogisms." In explaining how incontinence (= *akrasia*) happens, Aristotle speaks of cases in which two beliefs result in another belief; such cases are examples of inference. If the resulting belief is, he says, theoretical, it is necessary for the soul to "affirm what has been concluded"; if, on the other hand, the conclusion concerns "production," it is necessary, he says, for the soul "to act at once on what has been concluded." He then offers the famous example:

If, e.g., everything sweet must be tasted, and this, some one particular thing, is sweet, it is necessary for someone who is able and unhindered also to act on this at the same time.<sup>9</sup>

Aristotle's example here is not entirely happy, since it seems to have what Anscombe has called an "insane" initial premiss.<sup>10</sup> Nevertheless, it is an example of a valid deductive inference (its conclusion being "This must be tasted"), and Aristotle's theory of deductive validity was restricted to the syllogism. To apply his theory to an arbitrary deductive inference,

Aristotle would have to reconstruct it as a syllogism.<sup>11</sup> As one can see from the example I presented earlier, surface awkwardness often results from such reconstructions. Aristotle's practical inference was explicitly concerned with (roughly) means-end reasoning, and its conclusion clearly specified an action necessary for the production or realization of a desired end. If one is to treat such an inference syllogistically, one must reconstruct the premise identifying the end to be realized by an appropriate universal statement. Suppose one has a sweet apple and a sour lemon before one, and one's aim is to taste something sweet. This aim could be specified by the universal affirmative premise "Everything sweet here must be tasted," for the only thing here that is sweet is the apple. The awkwardness of Aristotle's example might thus be owing to the exigencies of applying his logical theory.

However this last point may be, it is clear that Aristotle's example of a practical inference conforms to his logical theory. Its validity is demonstrable by that theory, which applies to arguments having both "theoretical" (or assertoric) and practical conclusions. As far as formal logic is concerned, practical inferences are not set apart from other deductive inferences; their peculiarity is nonlogical or material, lying in the subject matter of their major premise and their conclusion. The right kind of major premise identifies (in a special way) an end to be realized, and the right kind of conclusion expresses a belief about something to be done that will realize (or is necessary for) the end, the belief being of a kind that will (because of "appetite," as it turns out) normally result in the appropriate behavior. I shall argue that this is fundamentally the right line to take toward the logic of practical inference. .

Aristotle's other, contrasting account of practical reasoning can be found in Book III, where he is specifically concerned with the general subject of deliberation. The crucial passage to note is this:

We first lay down the end [we have], and then examine the ways and means to achieve it. If it appears that any of several [possible] means will reach it, we consider which of them will reach it most easily and most finely; and if only one [possible] means reaches it, we consider how that means will reach it, and how the means itself is reached, until we come to the first cause, the last thing to be discovered.<sup>12</sup>

On the face of it, the kind of reasoning described here is not purely deductive, though parts of it are. If a certain means is necessary to realize an end, the decision to adopt that means is deductively inferable from the premises at hand. On the other hand, if there are alternative means of achieving an end, the fact that one means will reach it "most easily and most finely" does not provide a formally deductive basis for adopting it. One who prefers easy and fine means to ends may reasonably choose to adopt such a means, but his or her choice here will not be deductively inferable (syllogistically or otherwise) from a premise identifying the end and a premise comparing the alternative means of attaining it.

For our purposes, the crucial point here can be expressed in general terms as follows. A line of deliberation as Aristotle describes it may or may not be reconstructed as a deductively valid inference. If alternative means to some end (fundamental or derivative) are not considered, the deliberation may perhaps be reconstructed as a sorites, that is, a chain of syllogisms each of which has a structure similar to the one I mentioned in connection with Aristotle's so-called practical syllogism. If, on the other hand, the deliberation requires that a choice be made (at some stage) between alternative means to some end, then the deliberation cannot be so reconstructed -- unless, that is, some higher-order premise about the general preferability of means is artificially introduced. Choices are not, generally speaking, deduced from available information; they are logically free acts that ideally express the agent's subjective preferences and are subject to evaluation as reasonable, rash, well-considered, or whatever. This is not to deny that some deductive inference normally precedes the act of choice, or that choice terminates a rational process that is legitimately called

"reasoning." The point is simply that choices are not (at least normally) deduced from the information in the light of which they are made.

As I mentioned, I think Aristotle was fundamentally right (at least on the right track) in his account of practical reasoning -- both in what he said about means-end ("syllogistic") inference and about the process of deliberation. The inadequacies of his account can be summed up under three general assertions: (a) his syllogistic account of deductive inference is insufficient to deal with the varieties of deductive inference that we recognize today; (b) his account of deliberation is inadequate to deal with what is now known as "decision-making under uncertainty," where probabilistic considerations are crucial; and (c) his account of the sort of premises or conclusions that move us to act is inadequately developed. Filling in these inadequacies is, as I see it, the major task of anyone concerned with the logic (broadly speaking) of practical inference. In what follows I shall make remarks pertinent to assertion (a). As regards (b), I advise the uninformed reader to consult the new edition of Richard Jeffrey's *Logic of Decision*,<sup>13</sup> the most helpful book on the subject that I know of. As regards (c), my views are set forth at length in my *Reason and Action*, to which I have already referred.

As far as assertion (a) is concerned, my view is that the best available account of the formal logic of practical inference is provided by ordinary assertoric logic, as we know it today. I shall first explain the basis for my view and then briefly defend it against some recent objections.

As I have explained, the distinctive premises or conclusions of practical inferences have the canonical structure of "I (we) will do A" or "It shall be that p." These statement forms contrast with the forms "I (we) shall do A" and "It will be that p," which in the idiolect I here adopt are mere future indicatives. Since practical reasoning, as I see it, is characterized by the presence of the first two canonical forms, the formal logic of such reasoning can be developed from a consideration of the formal logic of those forms. The main thing to ascertain here are the semantical values appropriate to practical statements. If the appropriate values are truth and falsity, we can expect that the relevant logic is ordinary assertoric logic, for that logic is based on these alethic values. If the values are different, we have to know what they are.

Critics of the approach I take generally contend that the semantic values appropriate to volitional statements (as I shall call them) can't be truth and falsity because such statements express intentions and we do not speak of intentions as true or false. Taken as an argument, this observation is far too sketchy to prove much of anything. The question is "Is there any serious objection to speaking of volitional statements as being true or false?" I think not.

Suppose we grant that volitional statements do express intentions and that intentions have some special values. What could such values be? The only plausible answer I know of is that they are *realized* (=R) or *unrealized* (= U), since we naturally think of intentions as realized or not. If we accept this suggestion, we can quickly see that a volitional statement has the value R just when its corresponding indicative is true, and has the value U just when its corresponding indicative is false. Thus, "I will do A" is R just when "I shall do A" is T (or true). Given this, there is no need (as far as logic is concerned) to distinguish the values R and T (or U and F, = falsity). If we assign a volitional statement the semantical value of its corresponding indicative, the implications that would otherwise be calculable by reference to R-preservation can be immediately determined by ordinary assertoric logic. From this perspective, the difference between the volitional "I will do A" and the indicative "I shall do A" is comparable, logically, to that between "p and q" and "p but q" or even "p although q." Empirically and (perhaps) expressively different statement forms are regarded as *logically* indiscernible.

If we regard the difference between "will" and "shall" as analogous to that between "and" and "but" or even "although," then neither word would remain in the canonical language of a deductive logic adequate for both assertoric and practical inference. Since "and" is a logical word in the vernacular, its counterpart, perhaps "&" but maybe " $\wedge$ ", would be present in canonical notation; the counterpart would be used to represent the logical skeleton of "Tom smiled and Mary frowned," "Tom smiled but Mary frowned," and even "Tom smiled although Mary frowned." But "will" and "shall" are not (on the assumption I am making) logical words, and a canonical counterpart is not, therefore, needed for them. Nevertheless, if we allow a semi-formal treatment of inferences in the vernacular, we can say, if I am right, that inferences conforming to the following patterns are all valid:

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|-----------------------------------|---|
| 1. P but Q.<br>So, P and Q.       | 5. I will do A.<br>So, I shall do A.            |
| 2. P but Q.<br>So, Q but P.       | 6. I shall do A.<br>So, I will do A.            |
| 3. Q, although P.<br>So, Q and P. | 7. I will do A if P..<br>P.<br>So, I will do A. |
| 4. Q and P.<br>So, P although Q.  | 8. I shall do A if P<br>P.<br>So, I will do A.  |

No one at home with modern logic would be troubled by inferences 1 through 4, but even people tempted by what I said about the natural semantical values for volitional statements (practical premises or conclusions) might find inferences 5 through 8 somewhat dubious. I want, therefore, to make some remarks specifically about them. Objections to my view of the logic of practical inference ultimately reduce to objections concerning the validity of such argument forms.

Consider 5 and 6. Since people who utter or think "I will do such and such" (in my sense) express an intention while those who think or utter "I shall do such and such" express a mere belief, one might suppose the validity of 5 and 6 would have the consequence that people who believe they will do such and such invariably intend to do so, and vice versa. But this supposition is seriously erroneous. If I think something of the form "P and Q," I am (by virtue of the validity of pattern 4) logically entitled to conclude "Q although P," but I am certainly not required to think or say this - any more than I am thereby required to think, say, or otherwise entertain any one of the infinitely many other conclusions (some fantastically complicated) that also follow from this simple thought. The validity of the inference shows that I may (logically speaking) conclude "Q although P" and that, if my premise is true, my conclusion is guaranteed to be true. Yet if my premise is true, I may not wish to affirm this conclusion—not because it isn't true but because it is very misleading in what it suggests or conveys. Consider the parallel: "I was pleased by the book that Mary gave me" implies "I was pleased by the book although Mary gave it to me," but people who assert the first would probably not want to assert the second, for the second clause of the latter would normally express (but not assert) a negative attitude toward getting something from the person Mary.

The parallel to which I have just called attention is particularly apt here because, as I see it, the practical statement "I will do A" expresses a volitional attitude (an intention) without thereby asserting that the speaker has such an attitude. If I say "I will do my best" I express the intention of doing my best but I do not assert that I have such an intention. What

I say, in the narrow sense, when I utter "I will do my best" is (to put it roughly) that certain efforts on my part are forthcoming -- something I could equally say by the nonvolitional "I shall do my best." When I express a volitional attitude by a sentential utterance, I not only say something that I could say in other, nonvolitional words; I produce an utterance that, at the very least, shows others what my volitional attitude happens to be.

In some recent critical remarks on Castañeda's view of practical reasoning I outlined some of the considerations that have brought me to the conclusion that intending is a species of believing - a psychological state in which the believing involves a propensity to do things that will, perhaps according to other beliefs, make that believing true.<sup>14</sup> I don't propose to defend my conclusion here, but it is worth pointing out that one might naturally defend one's expressed belief about the future by expressing an appropriate intention. If I am asked why I am so confident that the tree in my garden will be cut down by tomorrow, I could reasonably reply that it will be cut down by tomorrow because I *will* cut it down later today. In making this response I am tacitly relying on the connection between "Q because P," "P, so Q," and the valid argument form 5 that I listed above.

If the view that intending is a special kind of believing adds intuitive appeal to the validity of the form 5, it might appear to detract from the appeal of 6. But this appearance is, again, utterly deceptive. Intending may be believing (or a special form of such) but 5 is not valid because the belief is certain to exist if the intention exists. The point, rather, is that the belief has the semantical value of the intention if the intention is, roughly, the belief with a causal property. If one merely believes that a certain thing will occur (perhaps an action on one's own part) one need not, logically, intend that it occur. But this fact, which (as I said) casts no doubt on the validity of the pattern 6, is compatible with Robert Binkley's "axiom of resignation" or Sellars' "So Be It" principle, which supports the reasonableness of accepting what one takes to be inevitable.<sup>15</sup> Actually accepting the inevitable is not, of course, required by the axiom of resignation; it is merely allowed as logically all right. The intuitive plausibility of the axiom does, however, lend plausibility to the adoption of a semantical interpretation for practical premises (or volitional statements) that has the validity of 6 as a consequence. Yet what is logically all right is not, as I have pointed out, all right *tout court*. In standard assertoric logic "P" is logically equivalent to "P even if Q," but one would not want to assert "I'll go to the party even if Mary is there" on the basis of one's avowal "I'll go to the party."

Some philosophers would object to my semantical interpretation on the ground that it tacitly violates the "commitment condition of validity," the importance of which has been emphasized by R. M. Hare and, more recently, by D. S. Clarke, Jr.<sup>16</sup> According to this condition, an inference is valid only if anyone who endorses the premises thereby commits himself (or herself) to endorsing the conclusion in the same manner. By "the same manner of endorsement" I mean that if one accepts the premises as true, one commits oneself to accepting the conclusion as true; if one commits oneself to realizing the premises, one commits oneself to realizing the conclusion, and so on. If sound, this condition undermines my interpretation because, in validating patterns such as 5 and 6, my interpretation allows speakers to be committed to endorsing the premises and conclusions of valid arguments in different ways. As I see it, however, there is no reason to accept this peculiar condition of validity, and it is reasonably rejected on the basis of the considerations I have urged in support of my view.

Castañeda, in his comments on my contribution to a volume of essays written in his honor, has objected to my view for a different reason. He allows that it is "very plausible when we focus on simple cases" but he claims that it cannot deal with complex cases for which "comprehensive theories already on the market" (such as his and that of Sellars) are specially adapted.<sup>17</sup> Since the complex cases he discusses are distinguished by the patterns of "shall's

and "will"s that they contain, the remarks I have already made are adequate to treat them if we pay due attention to the manner in which vernacular forms are to be translated into logical symbolism.

In ordinary English, sentences conforming to the following patterns are allowed as roughly interchangeable: "I will do A if p, and I will do B if q" and "I will do the following: A if p, and B if q." Since the standard strategy for evaluating inferences belonging to ordinary assertoric discourse would recommend taking the merely indicative (nonvolitional) statement "He will do the following: A if p, B if q" as short for the conjunction "He will do A if p, and he will do B if q," it is reasonable to adopt the same strategy in dealing with complex sentences containing the volitional prefix "I will do the following." If we do this, then the complex cases Castañeda has in mind are reducible to compounds in which volitional and nonvolitional statements are joined together by logical connectives and the scope of quantifiers. The following would be an example of such a compound: " $(\exists x)(I \text{ will give } x \text{ to Mary, and Mary will no doubt sell } x \text{ to Tom})$ ." The conclusions that, according to my view, are formally warranted by this last compound are adequately identified by the remarks I have made thus far: "shall"s and "will"s are, logically speaking, interchangeable, and all other inferences conform to principles of standard assertoric logic. Two conclusions thus inferable from this last compound are " $(\exists x)(I \text{ shall give } x \text{ to Mary})$ " and " $(\exists y)(\exists z)(\text{Mary shall give } y \text{ to } z)$ ." These conclusions involve, among other things, permitted moves from the volitional "will" to the merely indicative "shall" and from the (third-person) indicative "will" to the corresponding volitional "shall." I have explicitly dealt with the validity of these moves. What else has to be said?

In view of these last observations I conclude that, contrary to Castañeda's claim, my theory is quite capable of dealing with the complex cases of practical inference to which he has called attention. Castañeda might insist, of course, that my theory does not handle complex cases in the right way. The issue between my theory and his does not really pertain to complexity, however. In a recent discussion he constructs an example of an argument that he declares is an "invalid *modus tollens*."<sup>18</sup> Expressed in accordance with my conventions regarding "will" and "shall," his example is this:

1. If I finish this essay at time t, I will visit Aune at t.
2. In fact I shall not visit (shall not succeed in visiting) Aune at time t.
3. Hence, I shall not in fact finish this essay at t.

A moment's thought shows that, if the simple pattern I labeled 6 (the "So Be It" inference) is valid, this example is valid as well. Thus, the fundamental issue between Castañeda and me concerns what might be called the logical or formal indistinguishability of "shall" and "will." The words are of course distinguishable—they differ in meaning just as "and" and "although" or "but" differ in meaning—but their differences are not, I hold, logical or formal.

Castañeda does offer a brief argument in support of his claim that his example is an instance of an "invalid" *modus tollens*. His argument is this (and only this):

Clearly, even though one maintains the conditional intention (1), but (known or unknown, it does not really make an iota of difference) it is the case that one will be prevented from carrying out the conditioned intention, one may yet have fulfilled the conditioning circumstance. The two components of intention (1) do not enjoy logical (i.e. implicational) parity.

The "conditioning circumstance" in the example is that of finishing the essay at time t. Castañeda's argument seems to be that the example is invalid because even though (a) one maintains the conditional intention expressed by (1) and (b) one is prevented from carrying

out the "conditioned intention" of visiting Aune at time  $t$ , " one may yet have "fulfilled the conditioning circumstance," that is, have finished the essay at  $t$ .

Castañeda's criticism here is extremely peculiar. The normal procedure in showing the invalidity of an argument form is to provide a counter instance to it: an instance with patently true premises and a false conclusion. Of course, this normal procedure is applicable to deductive arguments of an ordinary, assertoric kind, and it is arguable that it is not applicable to practical inferences, which have special, nonassertoric premises to which truth or falsity are not obviously attributable. Still, a reasonable effort to show invalidity should offer something like a counter-instance: we should have a case in which the premises have (if not truth) a plausibly positive semantic value and the conclusion a plausibly negative value. Castañeda has not offered anything like this. In his example the first premise is merely said to be "maintained" by the speaker, and this "value" is not only peculiar to the first premise (the second has something to do with being "carried out," and the conclusion has something to do with fulfillment) but it is an exceedingly unlikely candidate for a semantic value, because negative as well as positive values are normally considered applicable to premises that are accepted by this or that thinker.

As I explained earlier, I believe that  $R$  and  $U$  (= realized and unrealized) are the natural, most plausible values for expressions of intention; and since these values are reducible to truth and falsity, I think the ordinary semantics of assertoric inference are equally applicable to practical inference. This view is confirmed, I believe, by a consideration of the So Be It inference pattern and by its converse, which underlies such claims as "It will be done because I will do it. " Given these semantical values, one cannot dispute the validity of the practical arguments I claim to be valid. What one can perhaps dispute here is the plausibility or reasonableness of choosing  $R$  and  $U$  (or  $T$  and  $F$ ) as semantical values for practical premises and conclusions. On the other hand, a coherent, well developed argument to this effect has not yet, to my knowledge, been worked out.

Because I don't want to sweep possible difficulties under my philosophical rug, I should say something about certain considerations, urged by Castañeda, that might appear to apply to this last matter. The considerations I have in mind arise from the grammatical fact that volitional clauses cannot occur nondeviantly in the antecedents of conditional statements.<sup>19</sup> Thus, although "I will go to the library if you wish" is acceptable English, "If I will go, you must go with me" is deviant if the "will" it contains is taken as indicating volition. One consequence of this fact is that a conditional expression of intention cannot grammatically undergo the logical operation of transposition. Given "I will do  $A$  if  $p$ ," one cannot grammatically conclude " $\sim p$  if I won't do  $A$ ," "won't" expressing negative volition. This observation suggests that the "if" in such conditionals differs from the truth-functional "if" that allows transposition.

The argument here, though interesting, is a non sequitur. The fact that the volitional "will" cannot appear in the antecedent of a conditional statement does not show that the conditional statements in which it can and does occur are not truth-functional, or that a special "if" occurs in conditional expressions of intention. What does follow, perhaps, is that the transpositional equivalent of a conditional expression of intention is not itself an expression of intention, conditional or otherwise. This observation is not wild; it is supported by similar observations about verbal expressions of attitudes. Consider this variation on one of the examples I mentioned earlier: "I will go to the party even though Mary is there. " In uttering this sentence one would normally be understood as expressing a negative attitude towards being at a party attended by Mary. Nevertheless, many logical equivalents of this sentence express no such attitudes: an example is "It is not the case that either I won't go or Mary is not there." In fact, this last sentence, though logically equivalent to an expression of intention, namely "I will go even though . . . ," is not itself a plausible expression of intention. Since

Castañeda has argued for years against Wilfrid Sellars' claim that expressions of intention cannot occur within the scope of logical connectives,<sup>20</sup> he will have to admit that the grammatical fact about "conditioning clauses" to which he has called attention has no decisive implications for the formal logic of practical reasoning.

Earlier in the paper I noted that the validity of an inference may ("in principle" I should add) be assessed by different logical principles. My claim here is that the validity of purely deductive practical inferences may satisfactorily be assessed by ordinary assertoric logical principles. Thus far I have argued in favor of the validity of several questionable inference patterns (patterns 5 through 8) that are valid according to the semantical principles I have proposed. I now want to support the view that my principles give the right results by arguing that those principles rule in a representative sample of inference-patterns that most people would regard as obviously valid and also rule out a key pattern of inference that deserves to be ruled out.

Here are some representative inferences that any logic of practical inference should be able to validate:

- |      |   |       |  |
|------|---|-------|--|
| (I)  | I will do A if p.<br>p.<br>So, I will do A.   | (III) | I will do A or p.<br>~p.<br>So, I will do A. |
| (II) | I will do A if p.<br>I won't do A.<br>So, ~p. | (IV)  | I will do A and B.<br>So, I will do A.       |

These inferences are very easily proved valid on the semantical interpretation I have proposed. Here, however, is a patently invalid inference whose validity is easily disproved according to my principles:

- (V) I will bring about E.  
If I do A I shall bring about E.  
Therefore, I will do A.

This last inference pattern represents a kind of means-end reasoning, but it is clearly deductively invalid because the means identified by the second premise may be a poor means to the stated end E. Even if I realized my end of getting some money by the act of robbing a miserly uncle, the decision to perform that act may be irrational. As Aristotle would say, some other available act might be "better and finer." According to my principles, the pattern (V) amounts to the fallacy of affirming the consequent.

The virtues of my approach illustrated in this last paragraph do not, of course, prove that it is satisfactory; they show that it does at least the obvious work expected of it. Philosophers who, like Castañeda, wish to show that the approach is defective in some way should endeavor to show some clear defect with the semantics; vague claims that it cannot deal with complex cases are not helpful in this regard. Since my approach is vastly simpler and much more direct than that of, say, Castañeda, Binkley, or Sellars, and can also do the work theirs purport to do, I think it is clearly preferable to them.<sup>21</sup>

A final remark: Although I believe that the purely deductive aspects of practical reasoning are adequately clarified by the ordinary assertoric principles I have been discussing, I want to emphasize that these deductive aspects are not the most significant, the most characteristic, or even the philosophically most interesting aspects of such reasoning. As I

have explained, the practical reasoning leading to a choice is only partly deductive: the choice made is not deduced from the premises (or information) at hand but is rendered reasonable or unreasonable by reference to it. The general theory by which choices are assessed as reasonable or rash must consider degrees of belief (or subjective probability estimates) and systems of preferences; such a theory far transcends the limits of formal logic.

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## NOTES

<sup>1</sup>I survey these accounts in Aune (1977, Chs. 3 & 4; 1978, pp. 19-24; 1983, pp. 223-230). See also Notes 5, 14, and 15 below.

<sup>2</sup> D. S. Clarke, Jr (1985) has argued that practical inferences are characterized by conclusions of the form "I ought to (or should) do A" (see pp. 21-32). I can allow that conclusions of this kind may sometimes appear as conclusions of what I call (below) "derivatively valid" practical inferences. When an "ought" statement, "I ought to do A, " expresses a "prima facie" requirement, it can be understood as meaning something like " $(\exists B)((I \text{ will do } B) \wedge (I \text{ can do } B \text{ only if I do } A))$ ". In such a case "I ought to A " is practical because it is short for a formula containing, essentially, an expression of intention.

<sup>3</sup> This account of validity is not applicable to valid arguments containing formulas with free variables. To accommodate such arguments one may use "true of" or "satisfies" in place of "true," saying that the premises of every instance of a valid argument form are true of (or satisfied by) a domain of objects only if the conclusion is.

<sup>4</sup> See G. W. Leibniz (1981, pp. 479-484).

<sup>5</sup> See Aune (1977, pp. 173-176).

<sup>6</sup> The use of "shall" and "will" in what might be called "literary English" is discussed thoroughly in Wilson Follett *et al* (1966, Appendix 1, pp. 369-891).

<sup>7</sup> Castañeda 's latest writings on the subject can be found in Castañeda (1983).

<sup>8</sup>See J. L. Austin (1961, p. 64).

<sup>9</sup> Aristotle (1985, 1147a30, p. 181).

<sup>10</sup>Anscombe (1957, p. 59).

<sup>11</sup>In his notes on the *Nicomachean Ethics* (see Aristotle [1985, p. 411]) Irwin says that Aristotle's practical syllogism does not conform to his requirements for a syllogism "in the full technical sense" because it has a "particular" premise. I can't speak with authority on Aristotle's view of a syllogism, but logicians in the Aristotelian tradition standardly treated singular premises such as "This is sweet" as A-propositions ( = here "All this is sweet").

<sup>12</sup>Aristotle, *Nicomachean Ethics*, 112b16; Irwin, p. 63.

<sup>13</sup> Jeffrey (1983).

<sup>14</sup> See Aune (1983).

<sup>15</sup>See Binkley (1965) and Sellars (1983). I discuss Binkley's axiom and Sellars principle in Aune (1977, Ch. 4).

<sup>16</sup>See D. S. Clarke, Jr (1985, p. 103). I formulate the commitment condition somewhat differently than Clarke does, but my formulation is true to the use he makes of the principle. He says that the effect of his condition is "to require all sentence constituents of mixed inferences to recur within the inference in the same mood" (*ibid.*)

<sup>17</sup>See Castañeda 's reply to me in Tomberlin (1983, esp. pp. 439f).

<sup>18</sup>*Ibid.*, p. 428. The next quotation from Castañeda essay is taken from this page.

<sup>19</sup> Castañeda has emphasized this point in numerous essays, some written more than twenty years ago. For an early statement see Castañeda (1963); for his most recent statement see Castañeda (1983).

<sup>20</sup> Castañeda 's latest arguments against Sellars on this point can be found in Tomberlin (1983, pp. 419-423).

<sup>21</sup>I compare these three theories with my own in Aune (1977, Chi. 4).

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