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Practical Reasoning and Inference

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I have been thinking about reasoning—particularly practical reasoning—for many years. During that time I have often talked to Jonathan Dancy about the subject, with great enjoyment and benefit. Dancy has accurately criticized many of my arguments. Many of his criticisms appear in his paper 'From Thought to Action'. Because of them, and also because of criticisms I have received from other philosophers,[1] my views about reasoning have changed a lot. This chapter corrects the account of reasoning contained in my most recent paper on the subject, 'The unity of reasoning?' (Broome 2009).[2]

I hope Dancy will recognize that my account has improved, but I know he will still disagree with it. I think practical reasoning is much more like theoretical reasoning than he does. This chapter aims to bring out the parallels between these two types of reasoning.

I shall start by describing reasoning in general, but only briefly and without much argument. Then I shall go on to the question of correctness in reasoning. Some reasoning is correct and some incorrect: what makes the difference? There is where I think the disagreement between Dancy and me is sharpest. It will be the chapter's main focus.[3]

1. Theoretical reasoning

As I use the term, 'reasoning' refers to a process—specifically a mental process. I shall concentrate on conscious reasoning only. I dare say unconscious

[1] Particularly Michael Bratman (2009b) and Anthony Price (2007).
[2] For further developments, see Broome (2013).
[3] My thanks to Yair Levy for his helpful comments on this chapter.

reasoning exists, but in this chapter I shall ignore it. So 'reasoning' in this paper always refers to conscious reasoning.

I start my description of reasoning with an example of theoretical reasoning. Suppose you have a standing belief that mammals do not lay eggs. In particular, you believe that if platypuses lay eggs they are not mammals. Then suppose you come to believe that platypuses lay eggs; perhaps you see one doing so. And suppose that, either immediately or at some later time, these two beliefs cause you to acquire the third belief that platypuses are not mammals. This causal process may not be reasoning; all sorts of processes might cause you to acquire a new belief. However, if it satisfies some particular conditions, then it is reasoning. What are those conditions? In this section I shall present my own answer to this difficult question, but I shall not try to defend it.

First, if the process is to be conscious reasoning, you must be conscious of the contents of the beliefs involved in it. You may just happen to be conscious of them. But sometimes you bring these contents to your consciousness by a mental act; we have the ability to call to mind the contents of our beliefs.

Sometimes you do this using language, by saying to yourself sentences that denote the contents. In this case I say your reasoning is 'explicit'. Occasionally, you may even say the sentences out loud; usually you do it silently. In the example you might say to yourself:

Platypuses lay eggs.
If platypuses lay eggs, they are not mammals.
So platypuses are not mammals.

(The word 'so' indicates that the last sentence is the conclusion of reasoning.) I do not claim that conscious reasoning must be explicit. However, setting out sentences that denote the contents of your attitudes is sometimes a convenient method of describing a piece of reasoning. I shall sometimes use this method, but I do not thereby imply that the reasoning is necessarily explicit.

A second condition for the process to be reasoning is that you must *operate* in a particular way on the contents of your beliefs. The beliefs you start with cause the one you end up with, but when the process is reasoning there is more than a contingent, causal connection between these beliefs. There is

also a semantic connection between their contents. The proposition that is the content of your concluding belief is derived in some way from the propositions that are the contents of your initial beliefs. You reason if you actually make the derivation.

In the example, your first premise—the proposition that platypuses lay eggs—is the antecedent of your second premise—the conditional proposition that if platypuses lay eggs they are not mammals. You operate on these two propositions by applying the modus ponens rule. This rule tells you to derive the proposition that is the consequent of the second premise: that platypuses are not mammals. You derive this consequent, and believe it.

Your operation is computational or algorithmic. These descriptions might suggest it is an operation on symbols that represent contents, but I do not mean that. You operate on meanings, not on representations. In the example, you operate on the propositions that are the contents of your beliefs.

Your operation applies some rule. The rule may be expressed by a schema. The rule for modus ponens reasoning is 'from p and (if p then q) derive q'. (This is a simplified version of the rule; it is stated more fully in section 2.) I assume in the example that you apply this rule, but you might alternatively apply the more specific rule 'from (platypuses F) and (if platypuses F they G) derive (platypuses G)', or some other rule. I shall ignore the well-known difficulties of identifying what rule you apply; I simply assume you apply one.

In order to apply a rule, you do not need to know explicitly what the rule is. You follow the rule, but you may do so in the way in which you often follow rules of grammar. You may compose grammatical sentences without knowing explicitly what grammatical rules you apply in doing so. Similarly, you may reason by modus ponens without knowing explicitly what the modus ponens rule is.

Nothing says that, if you are to reason, the rule you apply has to be correct or appropriate in some way. You can reason by applying a fallacious rule, such as 'from q and (if p then q) derive p'. Your reasoning will be incorrect, of course.

If a process whereby some of your beliefs cause you to acquire a new belief satisfies the first and second conditions I have mentioned, it is reasoning.

2. Practical reasoning

Reasoning in general is a process whereby some of your attitudes, which I call 'premise-attitudes', cause you to acquire a new attitude, which I call the 'conclusion-attitude'. We may classify types of reasoning according to the type of their conclusion-attitude. Reasoning that concludes in a belief, like the platypus example, is theoretical reasoning. I need to generalize my description of reasoning to include other types besides theoretical reasoning.

I call reasoning that concludes in an intention 'practical reasoning'. Here is an example of it. You intend to attend a particular conference. You learn that, to do so, you must register in advance. So you now believe that, if you do not register in advance, you will not attend the conference. This belief and your intention together cause you to acquire the intention of registering in advance. This causal process is reasoning, provided it satisfies some other conditions. What are those conditions?

They are generalized versions of the two conditions I specified for theoretical reasoning. I shall start with the second. For the process to be reasoning, as before it must be a rule-governed operation, but now the operation is not on contents alone.

The attitudes you reason with—beliefs and intentions for instance—are relations between a person (you) and a proposition. I shall call the proposition 'the propositional content' of the attitude. Attitudes of different types may have the same propositional content. For instance, if you intend to attend the conference, the propositional content of your intention is the proposition that you will attend the conference. If you believe you will attend the conference, the propositional content of your belief is that same proposition.

An intention to attend the conference and a belief that you will attend the conference obviously participate in your reasoning in different ways. For instance, reasoning that has the intention as a premise-attitude may arrive at a different conclusion from reasoning that has the belief as a premise-attitude. So when, in reasoning, you apply a rule, the rule must take account of the attitude's type as well as its propositional content. That is to say, it must take account of the pair consisting of the attitude's propositional content and its type. I shall write pairs of this sort using angle brackets. For example, the conference example involves the pair <I shall attend the conference; intention>. (I have expressed the propositional content as you

would express it, in the first person.) The platypus example involves the pair <Platypuses lay eggs; belief>.

Reasoning is a rule-governed operation on pairs of this sort. If you are reasoning in the conference example, from <I shall attend the conference; intention> and <I shall not attend the conference unless I register in advance; belief> you derive <I shall register in advance; intention>. You are probably applying the rule 'from <*p*; intention> and <if *p* then *q*; belief> derive <*q*; intention>'. Alternatively, you may be applying the more specific rule 'from <I shall *F*; intention> and <if I shall *F*, I shall *G*; belief> derive <I shall *G*; intention>'.

For the same reasons, theoretical reasoning too must be an operation on pairs like this. For instance, the modus ponens rule must be understood as: 'from <*p*; belief> and <if *p* then *q*; belief> derive <*q*; belief>'. In section 1 I was considering only theoretical reasoning, so only beliefs were in play. In that context I was able to formulate the rule more simply, but this is the accurate formulation.

For a reason that will very soon appear, I call pairs of this sort the 'marked contents' of your attitudes. The 'mark' is the type of the attitude: intention, belief, or whatever it is. It is possible to think of the mark as part of the content, so that the content of an attitude is the propositional content together with the mark. But I prefer to think of the propositional content as the whole of the content, to which the mark is attached. It does not matter which notion of content we adopt. What matters is that reasoning operates on marked contents, rather than on propositional contents alone.

Now the first condition for a process to be reasoning. Remember I am concerned with conscious reasoning only. Since attitudes of different types participate differently in reasoning, to reason consciously with an attitude you must be conscious of the attitude's type as well as its propositional content. That is to say, you must be conscious of the pair consisting of the propositional content and the type. For example, in the platypus reasoning, you must be conscious of the pair <Platypuses lay eggs; belief>. More specifically, you must be conscious of the proposition that platypuses lay eggs *as* believed. I could alternatively say you must be conscious of the proposition in a believing way. In the conference example you must be conscious of the pair <I shall attend the conference; intention>. You must be conscious of the proposition that you will attend the conference *as* intended; you must be conscious of it in an intending way.

To summarize the conditions together: reasoning is a rule-governed operation on the conscious marked contents of your attitudes.

How can marked contents become conscious? Sometimes you call them to mind by a mental act, and sometimes you do this explicitly, using language. Although I do not claim that conscious reasoning is necessarily explicit, I need to explain how explicit reasoning is possible.

Our language is equipped to express marked contents. It does so by means of 'markers', as I shall call them. When you utter a sentence, you perform a speech-act of some sort. A marker is a linguistic item contained in the sentence that indicates what sort of speech-act you perform. When the speech-act is the act of expressing an attitude, the marker indirectly marks the sort of attitude you express. Indirectly, therefore, it denotes the mark.

Markers are often grammatical moods. The interrogative mood is the marker for the speech-act of asking a question, and the imperative mood the marker for the speech-act of commanding. The optative mood is a marker for expressing a desire. When Robert Browning said 'Oh to be in England now that April's there', he expressed a desire by using the optative mood (or the nearest approximation to the optative mood that English possesses). His sentence denotes the marked content <I am in England now that April is there; desire>.

The marker for expressing belief is the indicative mood. Unfortunately, the marker for expressing intention in English is often subtle or entirely silent. Some authors claim that using 'will' in the first person rather than 'shall' is a marker for intention (see Fowler and Fowler 1908: ch. 2). But in practice 'will' is rarely used for that purpose. In practice, we often express intentions using the very same indicative sentences as express beliefs. You would express your intention of attending the conference by saying 'I am going to attend the conference' or 'I shall attend the conference' or 'I will attend the conference'. Any of those sentences could equally well express a belief that you will attend the conference. So they could equally well denote the marked content <I shall attend the conference; intention> or <I shall attend the conference; belief>.

You may call to mind the marked content of an attitude by saying to yourself a sentence that denotes this marked content. You could call to mind your intention to attend the conference by saying to yourself the sentence 'I shall attend the conference'. Indeed, you could make the whole of your reasoning explicit, by saying to yourself:

I shall attend the conference.
If I do not register in advance, I shall not attend the conference.
So I shall register in advance.

The first and third of these sentences express intentions. They contain the silent marker for intention, but because the marker is silent they are indistinguishable from sentences that express beliefs. This leads to a puzzle, as I shall explain in section 9. But I do not claim that conscious practical reasoning is necessarily explicit, so I do not have to deal with the puzzle here.

3. Requirements of rationality

That concludes my brief description of reasoning. Now I move on to the question of what makes the difference between correct and incorrect reasoning. Reasoning is an operation governed by a rule. It is correct if and only if it is governed by a correct rule. The question is: what rules are correct?

For theoretical reasoning there is a natural answer: a rule is correct if and only if it is supported by a genuine inference. I use the word 'inference' to denote a relation among propositions, rather than among marked contents. It is the relation that holds among the propositions *p*, *q*, *r*, and so on, and the proposition *t* when *t* may be inferred from *p* and *q* and *r* and so on. Among genuine inferences I include deductive ones, by which I mean inferences where, necessarily, if *p* and *q* and *r* and so on, then *t*. Since I am not trying to give a full account of all sorts of correct theoretical reasoning, I can leave open the question of which other inferences are genuine. The list might include inductive inferences, inferences to the best explanation, and others.

That is a natural answer for theoretical reasoning, but I shall later explain that it is only approximately true. In any case, it is not available for reasoning with attitudes other than belief; inference among propositions obviously does not provide the criterion of correctness there. I believe that for these sorts of reasoning, the criterion must come from rationality. So I next need to describe rationality.

Rationality is one of a class of things that I do not know a proper generic name for; I call them 'sources of requirements'. Other members of the class

are the law, convention, and morality. Each of these things makes requirements of you. The law requires you to pay your taxes; convention requires you to use your right hand for shaking hands; morality requires you to be kind to strangers, and so on. Rationality also makes requirements of you. Its requirements are to do with good order among your mental attitudes.

Here is an example of a requirement of rationality:

The instrumental requirement. Rationality requires of *N* that, if

(1) *N* intends at *t* that *e*, and if
(2) *N* believes at *t* that, if *m* were not so, because of that *e* would not be so, and if
(3) *N* believes at *t* that, if she herself were not then to intend *m*, because of that *m* would not be so, then
(4) *N* intends at *t* that *m*.

(where *N* is a person, *t* is a time, and *e* and *m* are propositions.) This requirement calls for elucidation. I can present it in a more friendly form by means of some devices. First, I define some expressions:

'*m* is a means implied by *e*' means that, were *m* not so, because of that *e* would not be so.

'*m* is up to *N* at *t*' means that, if *N* were not at *t* to intend *m*, because of that *m* would not be so.

These definitions give special meanings to the expressions 'means implied' and 'up to'. Nevertheless, I think the defined meanings are sufficiently close to the ordinary ones that they help to make the formula more transparent.

Second, I replace the person-letter '*N*' by the less formal 'you', which is still meant to refer to a generic person. Third, I remove the references to the time *t*. They only serve to specify that all the attitudes are contemporaneous, and I can do that implicitly simply by using the present tense. I get:

The instrumental requirement, friendly formulation. Rationality requires of you that, if

(1) You intend *e*, and if
(2) You believe that *m* is a means implied by e, and if
(3) You believe that *m* is up to you yourself now, then
(4) You intend *m*.

This requirement is fairly widely applicable. It is much more so than Kant's formula: 'Who wills the end, wills (so far as reason has a decisive influence on his actions) also the means which [he believes] are indispensably necessary and in his power' (Kant 1948: 80–1). (I have inserted in square brackets words that Kant should have included; I assume he omitted them by accident.) Kant's formula applies to you only when you believe that the means is indispensably necessary to the end. You will rarely have such a strong belief. My formula applies when you believe that the means is implied by the end. You will have this weaker belief much more often than the strong one.

I recognize there are other requirements of instrumental rationality. For instance, there is no doubt a requirement to intend what you believe to be the best means to an end you intend. But I do not know how to formulate that requirement accurately,[4] whereas I believe my instrumental requirement is accurate.

4. Cognitivism

It is sometimes suggested that practical requirements of rationality can be derived from theoretical requirements. Michael Bratman calls this view 'cognitivism' (see, e.g., Bratman 1999, 2009b). The motivation for it appears to be simply the idea that rationality is ultimately a cognitive matter. I think everyone agrees it is a mental matter. That is to say, rationality supervenes on the mind, to use an expression I borrow from Ralph Wedgwood. If two people's minds have the same intrinsic properties (apart from their rationality) then those people are as rational as each other. Cognitivists go further, and assume that rationality supervenes on the mind's specifically cognitive properties.

Let us test out cognitivism on the instrumental requirement. Let us suppose you violate this requirement, and consider whether it follows that you also violate a theoretical requirement of rationality. If it does, that would give support to cognitivism. So let us suppose that:

(1) You intend *e*, and
(2) You believe that, if *m* were not so, because of that *e* would not be so, and

[4] I described the difficulties in Broome (2002).

(3) You believe that, if you yourself were not then to intend *m*, because of that *m* would not be so, but
(4) You do not intend *m*.

For the sake of argument, let us now make two hypotheses:

Hypothesis A: If you intend *e*, you believe you intend *e*, and if you do not intend *m,* you believe you do not intend *m*.

Hypothesis B: If you believe you intend *e*, you believe *e* is so.

From these and our initial suppositions, we may conclude that

(1) You believe that *e* is so, and
(2) You believe that, if *m* were not so, because of that *e* would not be so, and
(3) You believe that, if you were not then to intend *m*, because of that *m* would not be so, but
(4) You believe you do not intend *m*.

(2) and (3) say that you believe two complex conditional propositions. They are subjunctive conditionals with 'because' clauses added. But we may fairly assume they entail the corresponding simple indicative conditionals. We may assume that:

(1) You believe that *e* is so, and
(2) You believe that, if *m* is not so, *e* is not so, and
(3) You believe that, if you do not intend *m*, *m* is not so, but
(4) You believe you do not intend *m*.

If you are in this state, it is fair to conclude you are breaching some theoretical requirement of rationality. Your beliefs are mutually inconsistent, and it takes only two steps of modus ponens to reveal their inconsistency. Theoretical rationality must require you not to be in that state.

So if hypotheses A and B were necessarily true, there would be a case for thinking the instrumental requirement could be derived from theoretical requirements of rationality. I am willing to accept that hypothesis B is necessarily true, though many would not. I shall explain why in section 9. But hypothesis A is not necessarily true; you do not necessarily have correct

second-order beliefs about all your intentions. Here is a counterexample. It is an elaboration of one of Michael Bratman's.[5]

You regularly shop on Fridays. However, you learn in July that the shops will be closed on the Friday of the last week in August, so you form the intention of shopping on Thursday that week. This intention will work as intentions usually do, to cause you to do what you intend. Early in the last week in August you will remember you are shopping on Thursday that week; you will draw up a shopping list on Wednesday evening and head for the shops on Thursday. Your intention is a particular sort of disposition to shop on Thursday that week, and that disposition is in place. However, by early August you temporarily forget that you have an unusual intention for that last week. Were you asked, you would say that you will shop on Friday that week, as usual. You believe you will shop on Friday that week, and you do not believe you will shop on Thursday that week. So you do not believe you have an intention you do have, and you believe you have an intention you do not have.

Since hypothesis A is not necessarily true; you may violate the instrumental requirement without violating any requirement of theoretical rationality.

A cognitivist may nevertheless defend her position. She may reject the instrumental requirement as I have formulated it. She might claim that rationality imposes requirements only on those of your intentions you have correct beliefs about. She would say my formulation of the requirement is too strong, because it applies even to intentions you do not believe you have.

Is her claim plausible? Cognitivists do not think that rationality imposes requirements only on those of your beliefs you have correct higher-order beliefs about. That would have the implausible consequence that there are no rational requirements on your top-level beliefs—those beliefs you have no higher-order beliefs about. Since cognitivists do not limit theoretical requirements of rationality to attitudes you have higher-order beliefs about, why should they limit practical requirements in this way? So far as I can see, doing so would be pure dogmatism, driven only by the view that rationality has to be a cognitive matter.

I shall therefore assume that cognitivism is false. I shall assume that practical rationality cannot be derived from theoretical rationality. In par-

[5] It is mentioned in Bratman (2009b).

ticular, I shall assume that the instrumental requirement is genuinely a requirement of rationality.

5. Quasi-inferences and the requirement theory of correctness

I call the instrumental requirement a 'material requirement' of rationality because it can be put in the form of a material conditional like this:

Rationality requires of *N* that, if
N has attitude *A* at *t*, and
N has attitude *B* at *t*, and
N has attitude *C* at *t*, . . . then
N has attitude *F* at *t*.

For convenience, I make two innovations. First, I place no restriction on the number of antecedents in this formula, so I count a requirement as a material requirement even if it has no antecedents. Second, I count not having an attitude as a sort of attitude. If you do not believe the sea is wet, I say you have the attitude of non-belief towards the proposition that the sea is wet. I call attitudes of this sort 'negative'.

These innovations conveniently bring many requirements of rationality under the heading of material requirements. Among them is the requirement that you do not believe a contradiction—for instance that you do not believe the sea is wet and not wet. Another is the requirement that you do not have contradictory beliefs—for instance that if you believe the sea is wet, you do not also believe the sea is not wet.

Any material requirement generates something I call a 'quasi-inference'. When the requirement is put in the form I described, I say that the marked content of attitude *F* can be quasi-inferred from the marked contents of *A*, *B*, *C*, and so on.

Take the instrumental requirement from section 3 as an example. It determines that, from the marked contents

<*e*; intention> and
<*m* is a means implied by *e*; belief> and
<*m* is up to me now; belief>

the marked content

<*m*; intention>

may be quasi-inferred. (I have expressed the propositional contents of your second belief in the first person. That is for a technical reason. In clause (3) of the instrumental requirement, 'you yourself' is a reflexive pronoun. It represents in indirect speech the pronoun 'me' in direct speech. It indicates that the propositional content of the belief described in (3) is *de se*. The easiest way to ensure the content is *de se* when it is expressed in direct rather than indirect speech is to put it in the first person.)

An inference is a relation among propositions that constitute the contents of attitudes. Correspondingly, a quasi-inference is a relation among the marked contents of attitudes.

Now I come back to the question of when reasoning is correct. I have described how material requirements of rationality generate quasi-inferences. Quasi-inferences might in turn provide a criterion of correctness for reasoning: that reasoning other than theoretical reasoning is correct if and only if the rule it follows is supported by a genuine quasi-inference. In this way, requirements of rationality would determine when reasoning is correct.

I call this 'the requirement theory of correctness'. It seems plausible at first. But it encounters two difficulties that will force us to abandon it.

6. Basing prohibitions of rationality

The first difficulty is that material requirements can be contraposed. For example, the instrumental requirement can be written in the form:

The instrumental requirement contraposed. Rationality requires of you that, if
(1) You intend *e*, and
(3) You believe that *m* is up to you yourself now, and
(4′) You do not intend *m*, then
(2′) You do not believe that *m* is a means implied by *e*.

So by my definition of a quasi-inference, from the marked contents

<*e*; intention> and
<*m* is up to me now; belief> and
<*m*; non-intention>

the marked content

<*m* is a means implied by *e*; non-belief>

may be quasi-inferred. According to the requirement theory, reasoning that followed this quasi-inference would be correct reasoning.

For instance, suppose you initially believe that registering in advance is a means implied by attending the conference. Suppose you intend to attend the conference. Suppose you believe that registering in advance is up to you, and you do not intend to register in advance. Now suppose that by reasoning on the basis of these last three attitudes, you bring yourself to drop your belief that registering in advance is a means implied by attending the conference. According to the requirement theory, your reasoning would be correct. That is absurd.

It is dubious anyway that you could possibly achieve this result by reasoning. Your reasoning would set out from the negative attitude of not intending something, and it would conclude in the negative attitude of not believing something. It is dubious that you can reason either from a negative attitude or to a negative attitude. But still, we should avoid a theory that implies this reasoning would be correct if it were possible.

My way of dealing with this difficulty clings on to the idea that correctness is determined by quasi-inferences. I restrict the notion of a quasi-inference. I start by recognizing that there are requirements of rationality of a sort I have not yet mentioned. I call them 'basing prohibitions'. A basing prohibition is a requirement not to have some attitude based on some other attitudes that you have. It has the form:

Rationality requires of *N* that it is not the case that
N has attitude *A* at some time and
N has attitude *B* at some time and
N has attitude *C* at some time . . . and
N has attitude *F* at some time, and
Attitude *F* is based on attitude *A* and attitude *B* and attitude *C* . . .

For example, rationality prohibits you from believing *p* on the basis of believing *q* and believing that if *p* then *q*. Rationality also prohibits you from not believing that registering in advance is a means implied by attending the conference, on the basis of intending to attend the conference, believing that registering in advance is up to you yourself now, and not intending to register in advance.

A basing prohibition does not prohibit the attitudes themselves. Rationality may permit you to believe *p*, even at the same time as you believe *q* and you believe that if *p* then *q*. But it prohibits you from having the first of these beliefs on the basis of the second and third.

What does it mean to say one attitude is based on others? For one thing, it means that the first was caused by the others. The causing of an attitude by others is an event, but the caused attitude's property of being based on the others persists after this event. The above formula for basing prohibitions does not restrict the times when the various attitudes may exist. In particular, unlike material requirements, basing prohibitions do not apply only to contemporaneous attitudes. However, *N* cannot fall foul of a basing prohibition unless she has each of her basing attitudes *A*, *B*, *C*, and so on at a time that is no later than a time when she has her based attitude *F*.

Not just any sort of causation is basing. Some attitudes of yours might cause you to have another attitude in all sorts of ways, and many of those ways are not basing. I am sorry to say I cannot give an analysis of basing; I shall have to take it as a primitive.[6]

However, I can give some examples of basing. Reasoning provides one: if an attitude has been derived from others by reasoning, then it is based on the others. But reasoning is not the only example. Sometimes basing happens automatically and unconsciously. Suppose you had always believed platypuses are mammals, but in some way you came to believe that platypuses are not mammals. Probably an automatic process caused you at the same time to stop believing platypuses are mammals; automatic processes normally prevent you from having contradictory beliefs. Then your non-belief in the proposition that platypuses are mammals is based on your belief in the proposition that platypuses are not mammals. Yet you did not acquire the non-belief by reasoning.

Once we have identified basing prohibitions, we can use them to restrict the notion of a quasi-inference. A quasi-inference is derived from a requirement of rationality in the way I described, but only if it is not contrary to a basing prohibition. This means that the instrumental requirement in its original form generates a quasi-inference, but not in its contraposed form. That removes the first difficulty.

[6] An idealized account appears in Wedgwood (2006: 662). I cannot use it because, as Wedgwood recognizes, it makes it impossible for one attitude to be based on others in a way that is rationally prohibited. It would consequently make basing prohibitions otiose.

7. Basing permissions of rationality

The second difficulty was first put to me by Geoffrey Brennan. Suppose you intend to attend the conference, and you believe that registering in advance is a means implied by this end. Suppose you believe that registering in advance is up to you. By that I mean you believe that, were you not at some time to intend to register in advance, because of that you would not register in advance. However, you do not believe that registering in advance is up to you *now*. That is to say, you do not believe that, were you not now to intend to register in advance, because of that you would not register in advance. Maybe you believe that just now you do not even need to think about means of attending the conference; you can leave that to another time.

Nevertheless, suppose you do happen to think about means. Then there is obviously some correct reasoning you could do that would bring you to intend to register in advance. Since you believe this is a means implied by your end, and you believe this means is up to you, of course it would be correct to arrive at the intention of doing it.

But this correct reasoning does not follow the quasi-inference I set out above. Nor does it follow a quasi-inference generated by any other requirement of rationality. You can be rational without now intending the means, so there can be no requirement of rationality that rules this out. It follows that there is something wrong with the requirement theory of correct reasoning. On that theory, correctness is generated by requirements of rationality. But in this case of correct reasoning, there is no relevant requirement.

This difficulty can be reinforced by a point made to me by Kieran Setiya. To continue the example, suppose you do not form the intention of registering in advance until a time arrives when you believe that registering in advance is up to you *then*. That is to say, you then believe that were you not then to intend to register in advance, you would not do so. Evidently you believe you have reached the last moment when you can register. At that time, your beliefs entail it is too late for you to reason your way to intending to register in advance. Reasoning takes time, so you would acquire the intention only later, whereas you believe you must have it then.

Indeed reasoning according to the quasi-inference generated by the instrumental requirement will always come too late. In order to satisfy the instrumental requirement by reasoning, you have to embark on the

reasoning before the instrumental requirement bites. By the time it bites, it is too late to reason.

My solution to this difficulty is still to cling on to the idea that correctness is determined by quasi-inferences, but to put quasi-inferences on a different footing. I start from the idea of a basing permission. A basing permission is simply the negation of a basing prohibition. Rationality permits you to base an attitude *F* on attitudes *A*, *B*, *C*, and so on, if and only if it does not prohibit you from doing so. An example of a basing permission is that rationality permits you to intend *m* on the basis of intending *e*, believing that *m* is a means implied by *e*, and believing that *m* is up to you. Let us call this 'the instrumental permission'.

I now take it that *any* basing permission generates a quasi-inference, and that *all* quasi-inferences are generated by basing permissions. When, and only when, rationality permits you to base an attitude *F* on attitudes *A*, *B*, *C*, and so on, the marked content of *F* may be quasi-inferred from the marked contents of *A*, *B*, *C*, and so on.

The basing permission I mentioned gives us the quasi-inference from the marked contents

<*e*; intention> and
<*m* is a means implied by *e*; belief> and
<*m* is up to me; belief>

the marked content

<*m*; intention>

may be quasi-inferred. This quasi-inference differs in just one place from the one I derived in section 5 from the instrumental requirement: the formula contains no 'now'.

8. The permission theory of correctness

I continue to take it that reasoning is correct if and only if it follows a rule that is supported by a genuine quasi-inference. Since I now take quasi-inferences to arise from basing permissions rather than requirements, I have dropped the requirement theory of correctness and adopted a permission theory instead. This change deals with the first difficulty described in section 6,

as well as the second described in section 7, since it entails that reasoning is not correct if it is opposed by a basing prohibition.

The permission theory covers theoretical reasoning as well as other sorts. Let the attitudes *A*, *B*, *C,* and so on be believing *p*, believing *q*, believing *r*, and so on, and let the attitude *F* be believing *t*. According to the permission theory, theoretical reasoning is correct if and only if rationality permits you to base a belief in *t* on beliefs in *p*, *q*, *r*, and so on, and your reasoning follows a rule that is supported by the quasi-inference that derives from this permission.

In section 3 I suggested that theoretical reasoning is correct if and only if it follows a rule that is supported by a genuine inference from *p*, *q*, *r*, and so on to *t*. At first this suggestion may seem to coincide with the permission theory. It is natural to think at first that rationality permits you to base a belief in *t* on beliefs in *p*, *q*, *r*, and so on if and only if there is a genuine inference from *p*, *q*, *r*, and so on to *t*.

But actually this is not so: 'only if' is right, but 'if' wrong. Suppose the Goldbach Conjecture can be inferred from the Peano Axioms of arithmetic. It is still not known whether this is so. Even if it is, rationality does not permit you (as you actually are) to believe the Goldbach Conjecture on the basis of believing the Peano Axioms, since you do not know that the Goldbach Conjecture can be inferred from the Peano Axioms. So not every genuine inference among propositions matches a quasi-inference among beliefs. The permission theory therefore passes fewer examples of theoretical reasoning as correct. It is intuitively right to do so. It would not be intuitively correct to reason directly from the Peano Axioms to the Goldbach Conjecture.[7] So this theory offers a better account of theoretical reasoning than my previous suggestion did.

The permission theory is therefore a nicely unified account of correctness for reasoning. It is intuitively satisfactory in other ways too. One is simply that, when your reasoning is correct, that intuitively means you are permitted to reason as you do. It does not intuitively mean you are required to. Second, the theory entails that correctness stems from *basing* permissions of rationality rather than *material* requirements or permissions of rationality. This too seems intuitively appropriate, since the effect of reasoning is to base the conclusion-attitude on the premise-attitudes.

[7] This point is made in Boghossian (2008: 269).

Indeed, the permission theory fits correct reasoning so closely that it may be criticized for lacking explanatory power. It says not much more than this: that a piece of reasoning is correct if and only if rationality permits you to reason that way. It says a little more than that, since the notion of a basing permission is broader than the notion of a permission to reason in a particular way. For example, rationality permits you to base a non-belief in a proposition on a belief in that proposition's negation, but you cannot reason from a belief in a proposition's negation to a non-belief in that proposition. Nevertheless, the permission theory will gain significant explanatory power only once it is supplemented by an account of basing permissions. It needs to be specified when and why it is permitted to base one attitude on others. Only then will we have a proper account of when and why particular patterns of reasoning are correct.

I have given some account of basing permissions for beliefs: these permissions derive from genuine inferences among propositions. But I have said that not all genuine inferences generate basing permissions, so I need to distinguish those that do from those that do not. That job remains to be done.

I have not given much of an account of basing permissions for attitudes other than beliefs, and I do not have much of an account to offer. However, I can say that basing permissions must be in some way closely related to requirements of rationality. Perhaps they are derived somehow from requirements.

For instance, the instrumental permission is very closely connected to the instrumental requirement. The quasi-inference that is derived from the permission is a slight generalization of the one I initially derived from the requirement. Moreover, I explained that the only way to satisfy the requirement is to reason according to the permission; if you do not at some time reason as the permission allows, you will not satisfy the requirement. This seems a plausible explanation of why rationality permits you to reason that way. If it is the right explanation, the requirement explains the permission.

In general, our activity of reasoning often improves our rationality. Indeed, that seems to be part of its purpose. To improve your rationality, you must do something that rationality requires of you, not something that it merely permits you to do. So correct reasoning, which is made correct by permissions, must often bring us to satisfy requirements. This suggests in general that requirements explain permissions.

That is as far as I have got in explaining correctness for practical reasoning.

9. Separating theoretical and practical reasoning

Now I return to my very first example of practical reasoning from section 2. You intend to attend the conference and you believe that, if you do not register in advance, you will not attend the conference. This belief and your intention together cause you to acquire the intention of registering in advance. Let us assume that this process satisfies the conditions I mentioned in section 2: it is a rule-governed operation on the conscious marked contents of your attitudes. So it is reasoning.

However, it is not correct reasoning. It does not follow a quasi-inference. The nearest quasi-inference is the one set out at the end of section 7. It shows that, if your reasoning is to be correct, you need stronger beliefs as premise-attitudes. You must believe, first, that registering in advance is a means implied by attending the conference and, second, that registering in advance is up to you.

These stronger beliefs are definitely needed. To see the need for the second one, suppose you intend to attend the conference and you believe that you will not attend it if you do not register in advance. But suppose you do not believe your registering in advance is up to you. Perhaps you have delegated your conference registration to your secretary, because it is beyond your own administrative ability. Then you could not correctly arrive by reasoning at an intention to register in advance.

To see the need for the first of those beliefs, suppose again that you intend to attend the conference, and you believe you will not attend it if you do not register in advance. But suppose you do not believe that registering in advance is a means implied by attending the conference. Suppose instead that you believe it will be a side-effect of some means that is implied by your attending the conference. For instance, suppose you believe you will get to the conference only by taking a lift with your colleague, and you believe that your colleague is an efficient type who will see to it that you register in advance. Then again, you could not correctly arrive by reasoning at an intention to register in advance.

So the piece of practical reasoning in section 2 is incorrect. At least, it is incorrect unless it is enthymematic. Some further premises need to be implicit.

This may seem puzzling. In section 2 I set out the reasoning in the sentences:

I shall attend the conference.
If I do not register in advance, I shall not attend the conference.
So I shall register in advance.

Those sentences look as though they express a piece of correct reasoning by themselves, without needing any further premises. How can they not be?

They would indeed express correct reasoning in themselves if they all expressed beliefs. The three sentences would then express a correct piece of theoretical reasoning by modus ponens. This may explain why the practical reasoning looks correct: the sentences could express a piece of correct reasoning. But correct *practical* reasoning requires different premises.

That puzzle arises only from the expression of reasoning in language. Because the expression of an intention is also the expression of a belief, theoretical and practical reasoning can be confused.

There is a further puzzle that does not depend on language. Still, it is most easily appreciated by starting from the sentences set out above. When those sentences express practical reasoning, the first and third express intentions. But they also express beliefs. In section 2 I said they contain a silent marker that marks them as expressions of intention. Nevertheless, they are indicative sentences. Like most indicative sentences, they make assertions. Not all indicative sentences do that. At my school, a notice used to appear on the notice-board saying 'All gentlemen will take changed exercise this afternoon'. It was an instruction, and not an assertion. The context removed the sentence's assertoric force. But if you express an intention by saying 'I shall attend the conference', the assertoric force of the sentence is not removed. You assert that you will attend the conference. In general, indicative sentences that express intentions also make assertions. This means they also express beliefs.

How is this possible? How is it that, when you express an intention, you are even in a position to express a corresponding belief? Because of this principle:

Intention–Belief. Normally, if *N* intends at *t* that *p*, then *N* believes at *t* that *p*.

Normally, if you intend to do something, you believe you will do it. There are some exceptions. For instance, in section 4 I used the shopping example to explain that you may have an intention, but not believe you have it. In that case, you may not believe you will carry the intention out. This is an abnormal case.

Even with the qualification 'normally', the intention-belief principle is controversial (see Bratman 2009a). But it provides the best explanation of how the normal expression of an intention—an indicative sentence—can also express a belief. I accept it for that reason. Intention–belief is the true source of the puzzle I am describing. The puzzle does not depend on the expression of the attitudes in language. Now I can say what it is.

Suppose you intend to attend the conference and you believe you will not attend it if you do not register in advance. Since you intend to attend the conference and—let us assume—the case is normal, you believe you will. You are therefore apparently in a position to do the correct theoretical reasoning by modus ponens that can be expressed by the sentences above. So you are apparently in a position to arrive by theoretical reasoning at the belief that you will register in advance.

But this is puzzling. Suppose you believe that registering in advance is up to you now. In that case, you will not believe you will register in advance unless you believe you intend to register in advance. You will normally not believe you have this intention unless you do. You may be in a position to acquire the intention by practical reasoning, but you cannot acquire it by theoretical reasoning. Theoretical reasoning cannot possibly give you an intention. So in these circumstances, since theoretical reasoning cannot give you the intention of registering in advance, it cannot give you the belief that you will. Yet it seems that ordinary theoretical reasoning by modus ponens can lead you to this belief.

The solution to this puzzle is to realize that, even if a piece of reasoning would be correct were you to do it, you may not be able to do it. Take the platypus reasoning as an example:

Platypuses lay eggs.
If platypuses lay eggs, they are not mammals.
So platypuses are not mammals.

Suppose you believe the two premises. Then this piece of correct reasoning would bring you to believe the conclusion. But suppose you also believe that platypuses are mammals, and this belief is robust. It may prevent you from completing the reasoning. If it does, it will leave you with inconsistent beliefs, unless you drop one of your premise-beliefs. With luck, you may be able to do that by means of reasoning in reverse. But your forward reasoning is blocked, even thought it would be correct were you to complete it.

The case of theoretical reasoning about the conference is the same. Suppose again that you believe your registering in advance is up to you now. Suppose that at present you do not intend to register in advance. Even if you believe you will attend the conference, and you believe you will not attend the conference if you do not register in advance, theoretical reasoning by itself will not be able to bring you to believe that you will register in advance. That is so even though it would be correct reasoning if it did. It is blocked by your lack of an intention.

You may be able to acquire the belief in some other way. For instance, you may acquire the intention of registering in advance by practical reasoning. Then, by intention-belief you will believe you will register in advance. But theoretical reasoning cannot achieve this result.

10. Conclusions

Section 9 shows how careful we must be to separate practical reasoning from theoretical reasoning. But the main drift of this chapter has been to reveal parallels between the two. Both practical and theoretical reasoning, when they are conscious, are rule-governed operations on the conscious marked contents of attitudes. When they are correct, both are made correct by quasi-inferences. Quasi-inferences in turn are grounded in rationality, and specifically on basing permissions of rationality.

In 'From Thought to Action', Jonathan Dancy argues that practical reasoning is not inferential. Here are my conclusions about that. First, simply as a consequence of my terminology, neither theoretical nor practical reasoning is an inference. I use 'inference' to refer to a relation between propositions, whereas I use 'reasoning' to refer to a mental process.

However, theoretical reasoning does have a close link to inferences, since theoretical rationality is constrained by inferences. Rationality does not permit you to base one belief on others unless the content of the one may be inferred from the content of the others. Practical rationality has no parallel constraint.

Still, both practical and theoretical rationality are regulated by quasi-inferences. Although these are relations among marked contents rather than among propositions, it would not be unreasonable to use the term 'inference' for them, instead of 'quasi-inference'. If you use words that way, then you should recognize that both theoretical and practical reasoning is regulated by inferences. You should disagree with Dancy, therefore.

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