

DYNAMIC MODALITY IN A POSSIBLE WORLDS FRAMEWORK

(2480 words)

1. INTRODUCTION

Abilities – no doubt – have a modal nature, but how to spell out this modal nature is up to debate. In this essay, one approach is of special interest. It could be called the *restricted possibility approach to ability*. The idea behind the restricted possibility approach is this: There are many kinds of modals which express for example deontic, epistemic or metaphysical modality. But all these different kinds of modality can be spelled out in one framework.¹ This framework is the usual possible worlds framework where modality is essentially quantification over some set of possible worlds. The different kinds of modality correspond to different ways the possible worlds we quantify over are ‘picked out’: deontic modality is quantification over the morally perfect worlds, metaphysical modality quantification over the metaphysically possible worlds and so forth. Abilities however are regarded as another kind of modality, often called *dynamic modality* (the corresponding modal auxiliary ‘can’ is often referred to as the dynamic ‘can’ or the ‘can’ of ability). To ascribe an ability to someone then, is (in this case existential) quantification over a set of possible worlds. It is an important question what kind of worlds we quantify over when we ascribe abilities to someone but, as we will see, we need not be concerned with this question in this essay.

However, Anthony Kenny criticized the restricted possibility approach claiming that there is no way to capture dynamic modality in a standard possible worlds framework (see [Kenny \[1976\]](#)). In this essay my goal is to strengthen his point and show that even some non-standard way to capture the semantics of dynamic modality fails to account for all the peculiarities we face in our talk about abilities. My claim is that we have to give up the *closure principle* if we want to rely on a possible worlds framework and some prominent interpretation of the operator used to describe dynamic modality.

To get to this point I want to proceed as follows: in section [2](#) I’ll sketch Kennys objection to the restricted possibility approach. This should give a basic impression of the style of critique applied in this essay. In section [3](#) I want to discuss a reply to

¹The most prominent defenders of this approach would be Angelika Kratzer and David Lewis. See for example [Kratzer \[1981\]](#) and [Lewis \[1976\]](#).

Kenny’s discussion provided by Brown ([Brown \[1990\]](#), [Brown \[1988\]](#)) and point to some of its merits. In section 4 however, I want to show that the closure principle fails with respect to an example similar to one presented by Benjamin Schnieder in his [Schnieder \[2008\]](#). This example will not convince everybody – because it uses the fact that the outcome of some actions is dependent not only on the agent but also on how the world is or might be. But, as I will show at the end of section 4, even if we restrict our attention to bodily movements (which only minimally depend on how the world might be) the problem still remains.

2. KENNYS OBJECTION

Kenny’s idea is that if the ‘can’ of ability is a restricted possibility then there is a modal operator reflecting the logical behavior of that ‘can’. But before we go into detail about this, there is something to be said about what kind of operator we should use. If we want to stay in the realm of standard modal logic, we should use a sentential operator, i.e. the operator should take sentences as an ‘input’. A first problem arises if we try to use a phrase such as ‘*p has the ability to . . .*’ as a sentential operator. In the scope of this ‘operator’ is not an entire sentence but only a part of a sentence (for example, if we want to describe Susan’s ability to drive a bulldozer, we would say ‘Susan has the ability to *drive a bulldozer*’ not ‘Susan has the ability to *Susan is driving a bulldozer*’). Kenny proposes to circumvent this problem in using an indexed operator \diamond_p which is read as ‘*p can bring it about that*’. So ‘*Susan has the ability to drive a bulldozer*’ should be paraphrased to ‘*Susan can bring it about that Susan is driving a bulldozer*’ or in short ‘ \diamond_p *Susan is driving a bulldozer*’. I will omit the index p and simply use \diamond in this section.

Although Kenny’s critique – as we will see – targets the logical properties of \diamond , I think a short note on the semantics of \diamond will prove helpful in the course of this essay. The semantics for \diamond (as in every standard modal system) should work (roughly) like this:

- (1) $\diamond \phi$ is true in a world w iff
there is a possible world w' accessible from w such that ϕ is true in w' .

How the accessibility relation is spelled out (and what kind of worlds we ‘look at’) is crucial for the semantic part of the analysis. But some logical properties should hold independently of those considerations. Kenny therefore discusses several different laws (corresponding to different systems) but the most important is the following

$$(K) \quad \diamond (\phi \vee \psi) \rightarrow \diamond \phi \vee \diamond \psi.$$

It is of special importance because it in some sense reflects the weakest normal modal logic (i.e. there is no standard model equipped with truth conditions for \diamond similar to (1) in which **(K)** isn't valid). So if the 'can' of ability should reflect a modal like other familiar modals and its truth conditions are adequately captured by (1), then **(K)** should be a logical law with respect to the dynamic reading of \diamond .² Kenny proposes a counterexample that shows why this would be odd:

"Given a deck of cards, I have the ability to pick out on request a card which is either black or red; but I don't have the ability to pick out a black card on request nor the ability to pick out a red card on request." (Kenny [1976], p. 215)³

Let p stand for '*I pick a black card*' and q for '*I pick a red card*', then

(K left) $\quad \quad \quad \diamond (p \vee q)$

seems to be true, while

(K right) $\quad \quad \quad \diamond p \vee \diamond q$

seems to be false. Now, if we accept Kenny's counterexample we also have to accept that the semantics for our dynamic modal should differ in some crucial respect from the standard possible worlds framework no matter how the accessibility relation is spelled out. As we will see in the next section, Mark Brown drew this conclusion and tried to provide a more sophisticated account of how the semantics of an operator like \diamond should work.

3. BROWN ON THE LOGIC OF ABILITIES

As noted above, Brown accepts Kenny's point that there is no standard model capturing the modal nature of ability claims, but maintains that there is still a way to use the possible worlds framework in constructing an operator which would capture our intuitions about the dynamic 'can'. Brown uses what is called a *minimal model*⁴ which (together with certain truth conditions for a modal operator) assures that a relevant equivalent of **(K)** is not always true. Here is what he says about dynamic modality:

"When I say that I can bring it about that A is true, I can be understood to mean that there is an action open to me, the execution of which would assure that A would be true. But performing such

²Since this is a familiar point in modal logic I won't say much about it. For further information I refer to Chellas [1980] especially ch. 3 and 4.

³Of course the coloured side of the cards should face the Table.

⁴For the notion of a minimal model see for example Chellas [1980] ch. 7.

an action need not (and should not) be understood to determine absolutely every detail of the ensuing state of affairs.” (Brown [1988], p.4)

The question is how to capture the intuition that in performing an action which would ensure the truth of A not every detail has to be fixed. Brown introduces a modal operator \boxplus (the box in a diamond) and proposes the following truth conditions:

(2)

$\boxplus\psi$ is true at a world w iff

there *exists* a (relevant) cluster of worlds C at *every* world of which ψ is true.

Note that in comparison to (1) there are two quantifiers (an existential and an universal one) plus the notion of a cluster of worlds C . Now let W be a set of possible worlds, then C is a subset of W and the existential quantifier ranges over *subsets* of W whereas the universal quantifier ranges over elements (i.e. worlds) in C . The elements of the cluster C can be interpreted as corresponding to the many different ways in which an action with a certain outcome could be performed. Besides the fact that this captures the possibly different ways some truth may be brought about, Browns system has another merit: it can distinguish between *reliably* ‘bringing something about’ and a weaker sense of ‘bringing something about’. To express this weaker sense Brown uses the symbol \boxtimes (the diamond in a diamond) which satisfies the same truth conditions as (2) except that the universal quantifier ranging over worlds in C is replaced by an *existential* quantifier. So Brown draws a distinction between

(3) p can (reliably) bring it about that ψ

and

(4) p might bring it about, that ψ .

The former (3) is represented using the modal operator \boxplus and the latter (4) using the operator \boxtimes . Brown chooses (3) to reflect the meaning of the dynamic ‘can’. I find this quite plausible because when we say that Susan has the ability to drive a bulldozer she should do so reliably. We would – I think – not ascribe an ability if she just *might* drive the bulldozer in a given circumstance. Now interestingly, in Browns system

(5) $\boxplus(\phi \vee \psi) \rightarrow \boxplus\phi \vee \boxplus\psi$

is not a law. This is plausible, in part, because in the situation described by Kenny one could pick a card which is either black or red *reliably*, but this reliability is jeopardized with respect to the request of picking, say, a red card. So the inference used in Kenny's example was unjustified in the first place.

4. THE FAILURE OF BROWNS ACCOUNT

We saw that Brown avoids Kenny's objection by choosing a weaker system to model ability ascriptions. In this section however, I will present a counterexample (which is similar to a counterexample presented by Schnieder [2008]⁵) to the closure principle with respect to Brown's operator \diamond . I.e. the principle that

$$(CP \diamond) \quad \text{if } \models \psi \rightarrow \phi \text{ then } \models \diamond \psi \rightarrow \diamond \phi$$

(read \models as '*it is true that*')⁶. In case you weren't convinced by Kennys critique I think it is easy to see that such an objection translates easily to any approach using standard models and truth conditions for \diamond similar to (1). Here is the example: Suppose Susan is standing in front of the last Tasmanian tiger, lets call him Tim. Susan has a gun and, in addition to this, she is pretty good at shooting animals such as Tasmanian tigers. Now, with Susan's ability to kill Tim comes her ability to render the Tasmanian tiger extinct. Therefore the following sentence seems to be true:

$$(6) \quad \textit{Susan can bring it about that the Tasmanian tiger is extinct.}$$

But the embedded clause 'The Tasmanian Tiger is extinct' in (6) seems to be equivalent to

$$(7) \quad \textit{Tim is dead and every Tasmanian tiger which is not Tim is dead.}$$

Now, if (7) is true, than it follows logically that

$$(8) \quad \textit{Every Tasmanian tiger which is not Tim is dead,}$$

is also true. But that would mean that in accepting the truth of (6), the equivalence of the embedded clause in (6) to (7) and the closure principle (CP \diamond), we would be forced to accept the truth of

$$(9) \quad \textit{Susan can bring it about that} \\ \textit{every Tasmanian tiger which is not Tim is dead.}$$

⁵Schnieder isn't concerned with closure but with the so called *conjunction principle*, which can be interpreted as 'distribution over conjunction'.

⁶As shown in Brown [1988] this principle holds in Browns system.

This would be a strange conclusion since Susan can do nothing about all the other Tasmanian tigers.

A reasonable objection to the argument above is that we only speak loosely in claiming something like (6). It is not Susan alone who brings it about that ‘the Tasmanian tiger is extinct’. It is also the course of the world (including many other people with guns and the need to kill Tasmanian tigers) which ‘brings about’ the truth of the embedded sentence in (6). Perhaps then we should restrict our talk about abilities in some sense. In order to minimize the influence of the world a possible precaution would be to restrict the application of our modal operator to bodily movements. This would for example coincide with Donald Davidson’s claim, that “[w]e never do more than move our bodies: the rest is up to nature.” (Davidson [2001] p. 59).

But even if we restrict Browns operator in such a way, his account still faces counterexamples: Suppose I have the ability to move my arm along a straight line, let’s say from a to b , but suppose the distance from a to b is the smallest distance with respect to which I have rational control over my movements. Now, fix a point c between a and b then the sentence

$$(10) \quad \textit{my arm is moving from a to b}$$

is equivalent to

$$(11) \quad \textit{my arm is moving from a to c and my arm is moving from c to b.}$$

Again, in accepting this equivalence (the equivalence between (10) and (11)), the closure principle (CP \diamond) and

$$(12) \quad \textit{I can bring it about that my arm is moving from a to b}$$

we would be forced to accept

$$(13) \quad \textit{I can bring it about that my arm is moving from a to c}$$

and with (13) my having the *ability* to move my arm from a to c . But since the distance from a to b was the smallest distance I have rational control over, this seems to be a very implausible claim.

Now, what do these considerations show: i) Since the closure principle is a principle which also holds with respect to \diamond , the argument above shows that even if Kenny’s counterexample is not accepted, there is no standard way to capture all the peculiarities involved in our talk about abilities. ii) The two arguments above

show that even Browns sophisticated approach, despite its circumventing Kenny's counterexample, does not account for this kind of peculiarity. The conclusion is that we either have to give up a possible worlds approach altogether, or that we have to become even more sophisticated in using this framework to reflect our talk about abilities.

LITERATUR

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