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REFERENCE, CONTINGENCY, AND THE TWO-DIMENSIONAL FRAMEWORK*

ABSTRACT. I review and reconsider some of the themes of 'Two notions of necessity' (Davies and Humberstone, 1980) and attempt to reach a deeper understanding and appreciation of Gareth Evans's reflections (in 'Reference and contingency', 1979) on both modality and reference. My aim is to plot the relationships between the notions of necessity that Humberstone and I characterised in terms of operators in two-dimensional modal logic, the notions of superficial and deep necessity that Evans himself described, and the epistemic notion of *a priority*.

Near the beginning of 'Reference and contingency', Gareth Evans says (1979, p. 178):

> This paper is an attempt to [use] a puzzle about the contingent *a priori* to test and explore certain theories of reference and modality. No one could claim that the puzzle is of any great philosophical importance by itself, but to understand it, one has to get clear about certain aspects of the theory of reference; and to solve it, one has to think a little more deeply than one is perhaps accustomed about what it means to say that a statement is contingent or necessary.

The most familiar examples of the puzzle of the contingent *a priori* and the mirror-image puzzle of the necessary *a posteriori* involve what appear to be referring expressions: ordinary proper names, names of natural kinds, names with their reference fixed by description. So an account of the puzzles can scarcely avoid involvement with the theory of reference. But, as Evans stresses, there are other examples of the contingent *a priori* and the necessary *a posteriori* that do not involve referring expressions at all. So no thesis about reference can suffice, by itself, for a complete solution to the puzzles. Rather, Evans proposes, a solution must be provided by reflection on the modal notions of contingency and necessity.

Evans's response to the puzzle about the contingent *a priori* makes use of a distinction between 'superficial' and 'deep' notions of necessity. In 'Two notions of necessity', Lloyd Humberstone and

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I suggested that Evans's distinction could be rendered by a distinction between two operators in two-dimensional modal logic.[1] The present paper is, on the one hand, a review and reconsideration of some of the themes of 'Two notions of necessity' and, on the other hand, an attempt to reach a deeper understanding and appreciation of Evans's reflections on both modality and reference. The aim, in very general terms, is to plot the relationships between the notions of necessity that Humberstone and I characterised in terms of two-dimensional modal logic, the notions of necessity that Evans himself described, and the epistemic notion of *a priority*. I begin with the two-dimensional framework as Humberstone and I conceived of it.

1. THE TWO-DIMENSIONAL FRAMEWORK

It is a familiar point that there are natural-language sentences, such as 'It is possible that everything that is actually red should have been shiny', that resist formulation given just the standard resources of a quantified modal language.[2] In the case of this example, one of the two obvious candidates:

$$\Diamond(\forall x)(x \text{ is red} \rightarrow x \text{ is shiny})$$

is inadequate because it requires, as the original sentence does not require, that in the envisaged possibility things that are red should *also* be shiny. The other obvious candidate:

$$(\forall x)(x \text{ is red} \rightarrow \Diamond(x \text{ is shiny}))$$

is also inadequate because it fails to require, as the original sentence does require, that in the envisaged possibility the things that are actually red should be shiny *together*.

1.1. *Introducing 'Actually'*

It is an equally familiar point that the solution to this expressive inadequacy is to introduce an 'Actually'-operator, 'A'. In terms of possible-worlds model-theoretic semantics for the modal language, a sentence 'As'[3] is true with respect to a possible world, w, just in case the embedded sentence s is true with respect to the model's designated or 'actual' world, w*. In terms of homophonic truth-conditional semantics, 'As' is true just in case s is actually true.

With the help of this new operator, the originally problematic natural-language sentence can be formalised as:

$$\Diamond(\forall x)(\mathsf{A}(x \text{ is red}) \rightarrow x \text{ is shiny}).$$

This sentence is true in a model just in case there is some possible world, w, such that each object that is red with respect to the model's actual world, w*, is shiny with respect to w. All the objects that are red in w* are required to be shiny *together* – that is, in the same possible world, w – but nothing is required to be red in w and *also* shiny in w.[4]

The semantic rule for the 'Actually'-operator, 'A', has the result that if 'As' is true with respect to any world then it is true with respect to every world. So if 'As' is true then so is '$\Box(\mathsf{A}s)$'. While this is an immediate consequence of the intuitive semantics for 'A', it does not accord well with the idea that it is a largely contingent matter what is actually the case. Suppose, for example, that the embedded sentence s means that the earth moves, and that this is contingently true. Then, even allowing that there is a notion of necessity expressed by the modal operator '$\Box$' on which 'As' is necessarily true (that is, '$\Box(\mathsf{A}s)$' is true), we also want to say that there is another notion of necessity on which 'As' is not necessarily true. This second notion of necessity is needed to capture the intuition that it is a contingent matter which possible world is actual.

1.2. *Introducing 'Fixedly'*

In response to this intuition about a second notion of necessity, Davies and Humberstone (1980) proposed that a further operator '$\mathcal{F}$' ('Fixedly') be added to modal languages, alongside both '$\Box$' and 'A'.[5] Thus, while the introduction of the 'Actually'-operator is motivated by issues about expressive inadequacy, this is not so for the introduction of the 'Fixedly'-operator.

Just as '$\Box$' universally quantifies over possible worlds playing the role of the world with respect to which truth is being evaluated, '$\mathcal{F}$' universally quantifies over worlds playing the role of the actual world – the world to which the operator 'A' directs us. So now we allow for variation both in the world of evaluation, w_j, and in the world playing the role of the actual world, w_i. A sentence '$\Box$s' is true with respect to a world w_j with world w_i playing the role of the actual world just in case, for every world w, the embedded sentence

s is true with respect to w, with world w_i still playing the role of the actual world. A sentence '$\mathcal{F}$s' is true with respect to world w_j with world w_i playing the role of the actual world just in case, for every world w, the embedded sentence s is true with respect to w_j, but now with w playing the role of the actual world. The operator '$\mathcal{F}$' by itself does not capture an intuitive notion of necessity at all for, if the embedded sentence s contains no occurrences of 'A', then '$\mathcal{F}$s' is simply equivalent to s. But once '$\mathcal{F}$' is available we can explore the properties of the combination '$\mathcal{F}$A'.

In this framework, the semantic rule for 'A' says that 'As' is true with respect to w_j with w_i playing the role of the actual world just in case the embedded sentence s is true with respect to w_i, with w_i still playing the role of the actual world. If we put this together with the semantic rule for '$\mathcal{F}$', the result is that '$\mathcal{F}$A' is true with respect to w_j with w_i playing the role of the actual world just in case, for every world w, the embedded sentence s is true with respect to w, with w *also* playing the role of the actual world. So the initial pair of worlds $\langle w_i, w_j \rangle$ does not matter. A sentence '$\mathcal{F}$A' is true just in case, for every world w, s is true with respect to w, with w also playing the role of the actual world. We might express this by saying that '$\mathcal{F}$A' is true just in case, for every world w, s is true at w *considered as actual* (Davies and Humberstone, 1980, p. 3).

If the embedded sentence s contains no occurrences of 'A', then '$\mathcal{F}$A' is equivalent to '$\Box$s'. But '$\mathcal{F}$A' is not in general equivalent to '$\Box$', as we can see if we consider its application to the problematically necessary sentence 'As'. While '$\Box$(As)' is true, '$\mathcal{F}$A(As)' is equivalent to '$\mathcal{F}$As' and so to '$\Box$s', which is false. Davies and Humberstone thus proposed that, in a modal language with '$\mathcal{F}$' alongside the more familiar '$\Box$' and 'A', we could express two notions of necessity. There is one notion, expressed by '$\Box$', for which 'As' is, if true, then necessarily true; and there is another notion, expressed by '$\mathcal{F}$A', for which 'As' is, though true, not necessarily true (unless s is itself necessarily true). This second notion thus captures the intuition that it is a contingent matter which possible world is actual.

1.3. *Two-Dimensional Arrays and One-Dimensional Intensions*

It is clear why modal logic with 'A' and '$\mathcal{F}$' is *two-dimensional* modal logic. In any model, the evaluation function for a sentence is a mapping from pairs of possible worlds to truth values (a *2D-intension*). In each pair, one world plays the role of the actual world and one plays the role of the 'floating' world. The evaluation of a sentence can thus be represented in a two-dimensional array, in which each row is labelled with a world playing the role of the actual world and each column is labelled with a world playing the role of the floating world.

Before '$\mathcal{F}$' was introduced we only needed to consider the top row of such an array, for the world playing the role of the actual world was held constant (as $w^* = w_1$, say). Now, with '$\mathcal{F}$' added to the language, the truth of '$\Box$s' with respect to the pair of w_i as the actual world and w_j as the floating world requires that s be evaluated as true in each cell on the w_i-labelled row. The truth of '$\mathcal{F}$s' with respect to the same pair requires that s be evaluated as true in each cell on the w_j-labelled column. The truth of '$\mathcal{F}\Box$s' with respect to any pair requires that s be evaluated as true in every cell in the two-dimensional array. And finally, the truth of '$\mathcal{F}\mathsf{A}$s' with respect to any pair requires that s be evaluated as true in each cell on the leading diagonal. Thus, in the two-dimensional framework, the necessity expressed by '$\mathcal{F}\mathsf{A}$' is *truth on the diagonal*.

It is natural to associate with each sentence, in addition to its 2D-intension, three one-dimensional intensions or mappings from possible worlds to truth values. First, corresponding to the w_i-labelled row there is the horizontal intension (*H-intension*) for w_i as the actual world. The H-intension for the original actual world, $w^* = w_1$, might be called the H-intension *simpliciter*. Second, similarly, corresponding to the w_j-labelled column there is the vertical intension (*V-intension*) for w_j as the floating world; and the V-intension for w_1 is the V-intension *simpliciter*. Third, corresponding to the diagonal, there is the *D-intension*. Of these three one-dimensional intensions, it is the H-intension and the D-intension that will mainly concern us in what follows. The H-intension corresponds to Chalmers's secondary intension, Jackson's C-intension, and Stalnaker's 'what is said'; the D-intension to Chalmers's primary

intension, Jackson's A-intension, and Stalnaker's diagonal proposition (Chalmers, 1996; Jackson, 1998a; Stalnaker, 1978).

Both H-intensions and D-intensions are functions from worlds to truth values. But we have terminology ready to hand that allows us to distinguish two different ways in which a sentence may have its truth value determined by a possible world. A sentence's H-intension tells us about the truth or falsity of the sentence *with respect to worlds* (with no variation in which world plays the role of the actual world). Truth with respect to possible worlds is relevant to the evaluation of '$\Box$'-modalisations. In contrast, a sentence's D-intension tells us about the truth or falsity of the sentence *at worlds considered as actual*. Truth at possible worlds considered as actual is relevant to the evaluation of '$\mathcal{F}\mathsf{A}$'-modalisations.

1.4. *The Simple Modal Conception of the Two-Dimensional Framework*

It will be clear from this brief review that Humberstone and I employed a *simple modal conception* of the two-dimensional framework. Along the second (horizontal) dimension are ranged possible worlds with respect to which sentences are evaluated in the way familiar from the semantics for standard modal languages with '$\Box$' and '$\Diamond$'. Along the first (vertical) dimension are ranged the very same possible worlds, but now playing the role of the actual world – the world with respect to which a sentence is evaluated if it occurs within the scope of the 'Actually'-operator, 'A'. Along the diagonal, the same possible worlds play both roles simultaneously.

Thus, the three one-dimensional intensions have the very same set of worlds as their domain. The domain of the D-intension might be described as 'possible worlds considered as actual', but this should not be taken to indicate a new category of world-like items. Rather, the description should be taken in an utterly flat-footed way. The truth value assigned to a sentence s for world w as argument is the truth value with respect to w (as for the H-intension) but with the same world w also playing the role of the actual world.

We can briefly contrast this simple modal conception of the framework with three others that are discussed by David Chalmers and by Robert Stalnaker: the contextual, epistemic, and metasemantic conceptions. Our conception of the first (vertical) dimen-

sion is not the *contextual* conception that is discussed and rejected by Chalmers (this volume, section 2; see also Chalmers, 2004). Although there are formal similarities between modal logic and tense logic, we follow Evans in not regarding the actual world as a contextual parameter.[6] Nor is our conception the *epistemic* one favoured by Chalmers (this volume, section 3; see also Chalmers, 2004). We do not build anything epistemic into the framework. Thus, Thomas Baldwin says (2001, p. 161): '[T]here is, in the face of it, nothing epistemological about the role of either dimension [of two-dimensional possible-worlds semantics].' However, although nothing epistemic is built into the framework itself, the notion of actuality does give rise to some important *a priori* truths (see below, section 4.1).

Finally, our conception of the first dimension is not the *metasemantic* one that Stalnaker endorses (this volume; see also Stalnaker, 2001, 2003). The sentences that are considered in the two-dimensional framework are taken as being understood with their standard meanings.

2. EVANS'S OBJECTION TO THE INTRODUCTION OF '$\mathcal{F}$'

In his 'Comment on "Two notions of necessity"', Evans raises a worry about Davies and Humberstone's introduction of the 'Fixedly'-operator, '$\mathcal{F}$', into a modal language. He argues that the new operator involves a quite new way of embedding sentences and that this is liable to give rise to problems.[7]

2.1. *Context-Shifting Operators: 'A Hitherto Unknown Form of Embedding'*

The analogy that Evans draws is with a hypothetical language in which (1985, pp. 357–358):[8]

> A sentence like 'To the left (I am hot)' as uttered by a speaker x at t is true iff there is at t on x's left someone moderately near who is hot.

The reason why we have to recognise 'a hitherto unknown form of embedding' here is that 'the semantic value which the sentence "P(X)" ["To the left (I am hot)"] has in a context is a function of the

semantic value which X ["I am hot"] would have in *another* context' (1985, p. 357). For consider what the semantic rule for 'To the left' must be (*ibid*., p. 358; emphasis added):

> If, but apparently only if, we suppose that these operators are governed by the rule that a sentence of the form 'To the left'^(*S*) is true, *as uttered by x* at *t* iff there is someone moderately near to the left of *x* such that, *if he were to utter the sentence S* at *t*, what he would thereby say is true, we can generate the postulated truth conditions, while continuing to suppose that the only role of the first person pronoun is that of denoting the speaker.

In this case, 'To the left' is functioning as a *context-shifting operator*, just as 'As for Lloyd' would be if the sentence 'As for Lloyd (I am hot)', as uttered by Martin at *t*, were to be true just in case Lloyd is hot at *t*.

There is certainly a respect in which 'actually' is at least analogous to context-dependent expressions like 'I', 'here', and 'now'. For, as we ordinarily use expressions like 'actually', 'as things actually are', or 'in the actual world', these expressions take us back to how things really, *actually* actually are, even when they are embedded inside other operators. Evans stresses this point when he says (this volume, p. 14):

> You write '"$\mathcal{F}\mathsf{A}\alpha$" says: whichever world had been actual, α would have been the case true in the actual world.' But precisely because of the 'rigidity' of 'actual' I hear this wrong; [I] suggest you alter it to '. . . α would have been the case in that world'.[9]

So it must be acknowledged that the way in which 'A' behaves within the scope of '$\mathcal{F}$' is importantly different from the way that 'actually' behaves within the scope of other operators, including modal operators, in natural language. According to Evans, this behaviour of the 'Actually'-operator can be understood only if we regard '$\mathcal{F}$' as a context-shifting operator like 'To the left'.

Davies and Humberstone made some attempt to respond to Evans's concern that '$\mathcal{F}$' is a context-shifting operator (Davies and Humberstone, 1980, pp. 12–13; Davies, 1981, pp. 201–209). This is not the place to rehearse that attempt, but one salient claim is that the actual world should not be regarded as an aspect of context (like the speaker, time, or place of an utterance). Difference in context makes for a difference in what is said. If Lloyd and Martin both

say, 'I am hot', believing what they say, then what Lloyd says and believes is not what Martin says and believes. If both on Monday and on Tuesday I say, 'Today is fine', believing what I say, then what I say and believe on Monday is not what I say and believe on Tuesday. But difference in which world is actual does not make for a difference in what is said. It is not plausible that if things had been slightly different – if a different possible world had been actual – then I would have said and believed something different in uttering 'Grass is actually green'.

2.2. *Utterance Difficulties*

However, it is not clear that we go to the heart of Evans's suspicions about '$\mathcal{F}$' by disputing whether it is literally a context-shifting operator. For, even if the actual world is not properly an aspect of context, it might still be that the introduction of '$\mathcal{F}$' is problematic. So, what might the problematic feature be?

We have noted that the way in which the 'Actually'-operator behaves within the scope of '$\mathcal{F}$' is different from the way that 'actually' behaves within the scope of operators in natural language. But it cannot be that this difference is, by itself, a reason to find the introduction of '$\mathcal{F}$' into a formal language problematic. Evans affirms, and Davies and Humberstone deny, that '$\mathcal{F}$' must be regarded as a context-shifting operator. But Evans does not say that there is anything formally or conceptually objectionable about the introduction of a context-shifting operator. Thus (this volume, p. 11): 'Now I didn't think and don't think that this form of embedding is incoherent, but I should like its distinctness from previously recognized forms to be made explicit.'

What Evans does suggest is that, if '$\mathcal{F}$' is a context-shifting operator, then it may be hard to avoid 'utterance difficulties' when explaining how '$\mathcal{F}$' functions. To see how this problem arises, consider first the undisputed context-shifting operator, 'To the left', with the semantic rule (1985, p. 358):

> 'To the left'$^\wedge$(S) is true, as uttered by x at t iff there is someone moderately near to the left of x such that, if he were to utter the sentence S at t, what he would thereby say is true.

This rule has the consequence that my utterance of 'To the left (I am speaking)' comes out true even when there is a silent person

to my left. So, if '$\mathcal{F}$' is a context-shifting operator, then its semantic rule may similarly have '$\mathcal{F}$(someone actually speaks)', and '$\mathcal{F}\mathsf{A}$(someone speaks)', come out true even though there are possible worlds in which no one speaks. This would be problematic if '$\mathcal{F}\mathsf{A}$' is supposed to express a notion of necessity. When we say that it is contingent which possible world is actual, we surely do not have to allow that, for the corresponding notion of necessity, it is necessary that someone speaks.

This problem does not, strictly speaking, rest on the claim that '$\mathcal{F}$' is a context-shifting operator. It arises provided only that Evans is right to say that understanding '$\mathcal{F}$s' '[involves] the thought of the utterance of the embedded sentence in other circumstances' (this volume, p. 12). But it is not really clear why we have to accept that idea. What is clear is that, when we consider a sentence embedded within the scope of '$\mathcal{F}$' or '$\mathcal{F}\mathsf{A}$', it will not do to consider the truth of the embedded sentence *with respect to* worlds. For truth with respect to possible worlds is relevant to understanding only '$\Box$'-modalisations. But there is an alternative to considering the truth of sentences with respect to worlds. We can consider the truth of *sentences at worlds considered as actual*. If understanding '$\mathcal{F}\mathsf{A}$'-modalisations does not require consideration of *utterances* of the embedded sentence, then it is difficult to see why '$\mathcal{F}$(someone actually speaks)' should come out true.

In response to this, a critic might concede one point but hold to another. The critic might concede that appeal to the truth of sentences at worlds considered as actual would permit the introduction of a primitive modal operator expressing truth on the diagonal. But the critic might still maintain that the introduction of '$\mathcal{F}$' does involve utterance difficulties. It is not clear what the motivation for this position would be and I shall proceed on the provisional assumption that we can introduce '$\mathcal{F}$' without running into utterance difficulties.[10] But if this imagined critic's position were shown to be correct then we could simply forgo '$\mathcal{F}$' and introduce a primitive modal operator, '$\mathcal{D}$', for truth on the diagonal.[11] Indeed, it is of some interest to note that, at the beginning of his comments, Evans suggests the introduction of a primitive operator equivalent to the combination '$\mathcal{F}\Box$'. He may well have favoured the introduction of

'$\mathcal{D}$' rather than '$\mathcal{F}$' for the same reason; namely that it 'is closer to a necessity operator right from the start' (this volume, p. 11).

The logic of '$\mathcal{D}$' would, of course, be different from the logic of '$\mathcal{F}$'; for example, '$\mathcal{D}$A s' is equivalent to '$\mathcal{D}$s' although '$\mathcal{F}$A s' is not equivalent to '$\mathcal{F}$s'. Truth on the vertical, previously expressed by '$\mathcal{F}$', would no longer be expressible; in particular, while '$\mathcal{D}$' is definable in terms of '$\mathcal{F}$' and 'A', '$\mathcal{F}$' is not definable in terms of '$\mathcal{D}$' and 'A'. But perhaps this would be no great loss since truth on the vertical does not correspond to any intuitive notion of necessity. And the necessity previously expressed by '$\mathcal{F}\Box$' (or equivalently by '$\Box\mathcal{F}$'), truth everywhere in the two-dimensional matrix, would now be expressed by '$\mathcal{D}\Box$' (but not by '$\Box\mathcal{D}$', which is equivalent to '$\mathcal{D}$' by itself).

3. SUPERFICIAL VERSUS DEEP CONTINGENCY AND NECESSITY

Davies and Humberstone's (1980) two notions of necessity were the necessity expressed by the familiar modal operator '$\Box$' and the necessity expressed by the novel operator '$\mathcal{F}$A'. Since the first is truth on the horizontal and the second is truth on the diagonal, let us say that the first notion is *H-necessity* and the second is *D-necessity*. Davies and Humberstone suggested that H-necessity is Evans's superficial necessity while D-necessity coincides with Evans's deep necessity. But when Evans introduced his distinction between superficial and deep contingency, he certainly did not treat it as a distinction between two modal operators in two-dimensional modal logic.

Evans characterises superficial contingency as a property of a sentence that 'depends upon how it embeds inside the scope of modal operators' – the standard modal operators, '$\Box$' and '$\Diamond$' (1979, p. 179). So the identification of superficial necessity with H-necessity, the necessity expressed by '$\Box$', is straightforward. But he does not characterise deep contingency in terms of modal operators at all.

3.1. *Evans on Deep Contingency and Necessity*

Deep contingency is introduced thus: 'Whether a statement is deeply contingent depends upon *what makes it true*' (*ibid.*; emphasis added). By way of elucidation of this characterisation, Evans tells us that 'there is an ineliminable modal element in the notion of what makes a sentence true' (p. 206). To say that a state of affairs *makes a sentence true* is to say that, had that state of affairs obtained, the sentence would have been true. But there is also an additional constraint on the notion of making true; namely, that s and 'As' are made true by the same states of affairs. They are either both deeply contingent or both deeply necessary.[12]

If we think of a sentence's being *made true by* a state of affairs along the lines of the sentence's being *true with respect to* a possible world, then this additional constraint is bound to seem puzzling. In general, s and 'As' are true with respect to different possible worlds. That is why it may be that '$\Box$s' is false even though '$\Box(\mathsf{A}$s)' is true. So how could s and 'As' be made true by the same states of affairs? The way out of this apparent puzzle is to observe that Evans insists that we distinguish between truth *with respect to* a world and truth *in* a world (p. 188, note 17). Truth with respect to possible worlds is relevant to the evaluation of '$\Box$'-modalisations and so it belongs with the notions of superficial contingency and necessity. But the notions of deep contingency and necessity go along with truth *in* possible worlds. A sentence is deeply necessary just in case it is true *in* every possible world.[13] Truth *in* a world w is glossed as: if w were to obtain, or were to be actual, then ___ would be true (p. 207). And it is subject to the constraint that s and 'As' are true in the same worlds.

Truth with respect to possible worlds is, Evans says, a notion that is 'purely internal to the semantic theory' (p. 207); its role is just to deliver the correct truth values for modal sentences containing '$\Box$' and '$\Diamond$'. Superficial contingency and necessity are a matter of the *properties* (specifically the truth values) *of modal sentences*. In contrast, deep contingency and necessity are a matter of what makes a sentence true and of truth *in* possible worlds. There is a modal element in this notion, but that does not mean that deep contingency and necessity are themselves fundamentally a matter of the properties of modal sentences. Rather, they are a matter of the *modal*

properties of (non-modal) *sentences*. We can represent the clusters of notions associated with superficial contingency and necessity, on the one hand, and with deep contingency and necessity, on the other hand, in the following table.

Superficial	Deep
Truth with respect to worlds	Truth in worlds (being made true)
Purely internal to semantic theory	Not purely internal to semantic theory
Properties of modal sentences	Modal properties of sentences

Clusters of notions associated with superficial and deep contingency and necessity

Evans's final explanation of deep contingency is this (1979, p. 212):

> If a deeply contingent statement is true, there will exist some state of affairs of which we can say both that had it not existed the sentence would not have been true, and that it might not have existed. The truth of the sentence will thus depend upon some contingent feature of reality.

Correspondingly, a deeply necessary sentence is one whose truth depends on no contingent feature of reality. Whichever state of affairs were to obtain, whichever possible world were to be actual, the sentence would still be true. A deeply necessary sentence is true *no matter what*.

It might seem at first that Evans's notions of deep contingency and necessity are technical and recherché by comparison with the notions of contingency and necessity associated with the familiar modal operators. But this is not so. Indeed, once an 'Actually'-operator is introduced, it is the idea of '$\Box$' as capturing an intuitive notion of necessary truth for sentences that stands in need of defence. In contrast, the idea that a necessarily true sentence is one that is true no matter what strikes us immediately as being right.

3.2. *Deep Necessity, Absolute Truth, and Utterances*

We need to say a little more about why the notion of truth *in* a world has a life of its own, rather than being purely internal to a semantic theory that specifies the truth conditions of modal sentences. A

sentence is *true in a world* just in case, if that world were actual, the sentence would be *true*. This notion of truth *simpliciter*, or absolute truth, is the familiar and philosophically fundamental notion of truth as the normative end of assertion and judgement. So, there is a close conceptual connection between the notions of deep necessity, being made true by a state of affairs, and truth in a world, on the one hand, and the truth of assertions or utterances and the correctness of judgements or thoughts, on the other.

Given this close connection, it might seem natural to move to the idea that truth in a world, or being made true by a state of affairs, should be glossed directly in terms of the truth of utterances or the correctness of thoughts. So, can we say, for example, that a sentence is made true by a state of affairs just in case an utterance of the sentence in such a state of affairs would be a true utterance? Can we say that a sentence is true in a world just in case a thought in that world with the content that is conventionally expressed by the sentence would be a correct thought?

Consider an account of the truth of a sentence, s, *in* a world, w, along the lines of:

(U) If w were to be actual, then an utterance of s in w would be true.

For a wide range of cases, this gets the right results; and it is faithful to the requirement that s and 'As' should be true *in* the same worlds. In a world where grass is orange, an utterance of 'Grass is orange' or of 'Grass is actually orange' would be a true utterance. But any gloss of a sentence's truth in a world that proceeds directly in terms of utterances runs into trouble over sentences such as 'All is silent' or 'Someone speaks'.[14] Similarly, a gloss that proceeds directly in terms of having a thought with the content that would be conventionally expressed by s runs into trouble over 'No thought is going on' or 'Someone thinks'. We certainly do not want the consequence that the sentences 'I speak' and 'I think' are made true by every state of affairs, are true in every possible world, and so are deeply necessary.

Evidently, the putative principle (U) overplays the connection between the truth of sentences and the truth of utterances (or the correctness of thoughts). We must find a way to acknowledge the connection between truth and assertion without ending up with an

explanation of deep necessity directly in terms of the truth of utterances. We can achieve this by linking the truth of utterances with the truth of sentences in a world through a principle such as:

> If u is an utterance of sentence s in world w, then u is a true utterance in w just in case s is true *in* w.

(See Davies and Humberstone, 1980, pp. 15–17.) Given such a link, we can then retain Evans's account of the truth of a sentence, s, in a world, w:

> If w were to be actual, then s would be true.

Here, there is no mention of assertion or utterances.

3.3. *Deep Necessity and D-Necessity*

The proposal that deep necessity coincides with D-necessity or truth on the diagonal is, in essence, the proposal that Evans's notion of truth *in* a world coincides with Davies and Humberstone's notion of truth *at a world considered as actual*.

It is important that what is being suggested here is *not* that the fundamental explanation of truth in a world should be in terms of truth at a world considered as actual. That suggestion would fly in the face of the contrast that Evans draws between superficial and deep necessity. Evans says that superficial necessity is explained in terms of a theory-internal notion of truth while deep necessity is not. But, in two-dimensional possible-worlds semantics, $\text{truth}_{\text{w,w}}$ – that is, truth at a world considered as actual – is a theory-internal notion that figures in the evaluation of '$\mathcal{F}$A'-modalisations just as, in one-dimensional possible-worlds semantics, truth_{w} is a theory-internal notion that figures in the evaluation of '$\Box$'-modalisations.

The suggestion is, rather, that the reason why the sentences that are deeply necessary turn out to be the sentences whose '$\mathcal{F}$A'-modalisations are true is that the model-theoretic notion of $\text{truth}_{\text{w,w}}$ corresponds to the notion of absolute truth – the truth at which assertion and judgement aim. Quite generally, we must be able to connect truth with validity.[15] So absolute truth must correspond to some model-theoretic notion and, given that s and 'As' are to be true in the same worlds, $\text{truth}_{\text{w,w}}$ is the only candidate.

Thus, Davies and Humberstone argue that, in the two-dimensional framework, it is with $\text{truth}_{\text{w,w}}$ – rather than with $\text{truth}_{\text{w}_i,\text{w}_j}$

or with $\text{truth}_{w^*,w}$ – that absolute truth is most closely connected. Suppose, for example, that s means that grass is orange and consider a possible world, w, in which grass is indeed orange. If w were actual, if the state of affairs of grass's being orange were to obtain, then sentence s would be true in the absolute sense; so sentence s is true *in* w. Because s and 'As' are to be made true by the same states of affairs, 'As' must also be true *in* w. But 'As' comes out false with respect to w (or any other world) if the 'Actually'-operator is interpreted as taking us back to the real actual world, w*, where grass is green. Thus, truth *in* w does not coincide with $\text{truth}_{w^*,w}$, for example, but with $\text{truth}_{w,w}$. As Davies and Humberstone put it, 'the truth which matters, the truth at which sincere asserters in w aim, is $\text{truth}_{w,w}$' (1980, p. 16).

In this section, we have revisited Davies and Humberstone's suggestion that Evans's distinction between superficial and deep necessity can be rendered by the distinction between two operators in two-dimensional modal logic, '$\Box$' and '$\mathcal{F}\mathsf{A}$'. Earlier (section 2.2) we argued that, despite worries that Evans raised, the notion of D-necessity expressed by '$\mathcal{F}\mathsf{A}$' is not subject to utterance difficulties. But suppose that someone remains unpersuaded by those arguments. If the worries are specific to the introduction of '$\mathcal{F}$' then we have offered a primitive modal operator, '$\mathcal{D}$', for D-necessity or truth on the diagonal. But perhaps it is thought that '$\mathcal{D}$' is, itself, beset by utterance difficulties; or perhaps there are residual concerns just because the behaviour of 'A' within the scope of '$\mathcal{D}$' is different from the behaviour of 'actually' within the scope of natural-language operators. A sceptic about both '$\mathcal{F}\mathsf{A}$' and '$\mathcal{D}$' can take a step back from two-dimensional modal logic to two-dimensional semantics and still accept the core of Davies and Humberstone's suggestion. Superficial necessity is H-necessity or truth on the horizontal; deep necessity coincides with D-necessity or truth on the diagonal. But, according to this sceptic, while superficial necessity is expressed by '$\Box$', deep necessity is (surprising as this may sound) not expressed by any modal operator at all.

4. ACTUALITY AND THE *A PRIORI*

Although we are concerned with the puzzles of the contingent *a priori* and the necessary *a posteriori*, epistemological notions have been strikingly absent from the discussion up to this point. However, while nothing epistemic has been built into the two-dimensional framework itself, the notion of actuality does give rise to some important *a priori* truths.

4.1. *The Epistemic Equivalence of s and 'As'*

Evans says that the two sentences, s and 'As', are 'epistemically equivalent' (1979, p. 210), where epistemic equivalence is a tighter relationship than *a priori* equivalence and is explained as follows (*ibid*., p. 200):

> [I]f two sentences have the same content, then what is believed by one who understands and accepts the one sentence as true is the same as what is believed by one who understands and accepts the other sentence as true. On this, very strict, view of sameness of content, if two sentences have the same content, and a person understands both, then he cannot believe what one sentence says and disbelieve what the other sentence says. When two sentences meet this condition, I shall say that they are epistemically equivalent.

The epistemic equivalence of 'As' and s (perhaps 'cognitive equivalence' would be a better term) has an important consequence. Someone who understands 'A' and s is in a position to know *a priori* that the sentence 'As' is true just in case the embedded sentence s is true and to know *a priori* that the sentence 'As ↔ s' is true.

Transposing this idea into the material mode, we say that someone who understands the notion of actuality is thereby in a position to know *a priori* that, for example, the earth actually moves just in case the earth moves. Indeed, the thought that the earth actually moves and the thought that the earth moves are epistemically and cognitively equivalent. So, if it is knowable only *a posteriori* that the earth moves then equally it is knowable only *a posteriori* that the earth actually moves. And, returning to the formal mode, if it is knowable only *a posteriori* that the sentence s is true then equally it is knowable only *a posteriori* that the sentence 'As' is true.

The sentence 'As' is *a posteriori* true while 'As ↔ s' is *a priori* true. Now consider the modal properties of 'As'. It is true

on the horizontal and so '$\Box(\mathsf{A}s)$' is true; but it is not true on the diagonal and so '$\mathcal{F}\mathsf{A}(\mathsf{A}s)$' is false (since s is contingently true). The sentence '$\mathsf{A}s$' is H-necessary and so superficially necessary; but it is D-contingent and so deeply contingent. In short, '$\mathsf{A}s$' is a simple example (the simplest example) of the superficially necessary but deeply contingent *a posteriori*.

If we consider the modal properties of '$\mathsf{A}s \leftrightarrow s$' we find the opposite profile. It is true on the diagonal and so '$\mathcal{F}\mathsf{A}(\mathsf{A}s \leftrightarrow s)$' is true; but it is not true on the horizontal and so '$\Box(\mathsf{A}s \leftrightarrow s)$' is false (since s is contingently true). The sentence '$\mathsf{A}s \leftrightarrow s$' is D-necessary and so deeply necessary; but it is H-contingent and so superficially contingent. Thus, '$\mathsf{A}s \leftrightarrow s$' is a simple example (the simplest example) of the superficially contingent but deeply necessary *a priori*.

Over the very limited domain of these ur-examples, *a priority* dissociates in both directions from superficial necessity and coincides with deep necessity. But it is a further question whether there is any more general relationship between *a priority* and deep necessity. There is nothing in the two-dimensional framework itself to suggest that *a priority* should coincide with truth on the diagonal.

4.2. *Is the Deeply Contingent* A Priori *Intolerable?*

Evans says that 'there is nothing particularly perplexing about the existence of a statement which is both knowable *a priori* and *superficially* contingent' but that 'it would be *intolerable* for there to be a statement which is both knowable *a priori* and *deeply* contingent' (1979, p. 179; emphasis added). He does not provide very much in the way of argument for the claim that the combination of deep contingency with *a priority* is intolerable. But it is clear what such an argument would need to show; namely, that if the truth of an understood sentence can be known *a priori* then that truth cannot depend on any contingent feature of reality. Here we face two problems. First, we can already predict certain kinds of counterexample to the claim that what is knowable *a priori* is deeply necessary. Second, while a powerful intuition speaks in favour of some hedged version of the claim that *a priority* entails deep necessity, it is not easy to see how to provide the intuition with illuminating argumen-

tative support, even if those predictable kinds of counterexample could be set to one side.

To see how the first problem arises, consider that we are sometimes entitled to ignore the possibility of empirical conditions that would defeat a claim to knowledge. Thus, for example, in the case of my *a posteriori* knowledge, based on perception, that I have hands, I am entitled to ignore the possibility that I am a handless brain in a vat who is the victim of a powerful but deceptive scientist (Pryor, 2000). Evidence that I am a brain in a vat would remove my epistemic warrant for believing that I have hands. But in the absence of such evidence, I can know that I have hands without taking any positive steps to rule out the brain-in-a-vat possibility.

We sometimes presume upon the non-obtaining of various empirical defeating conditions in the case of *a priori* knowledge, too. Even though a justification is empirically defeasible, it can still be an *a priori* justification provided that we are entitled simply to ignore the possibility that the empirical defeating condition obtains. For example, in following a mathematical proof, we are entitled to ignore the possibility that memory failure prevents us from keeping track of the preceding steps (Burge, 1993). In this case, (a), the proof constitutes a conclusive, and not just a *prima facie*, justification for the mathematical belief. But evidence of memory failure would threaten our justification for believing that what is before us is a proof. In other cases, (b), of *a priori* knowledge, a defeating condition would count against there being any such thing to think as the proposition whose truth we are investigating. If the defeating condition were to obtain then our putative or 'essayed' thought would not have a truth-evaluable content at all; there would be an illusion of understanding. But we are entitled to ignore the possibility that the defeating condition obtains.[16] Perhaps there are even cases, (c), of *a priori* knowledge in which we are entitled to ignore a possible defeating condition whose obtaining would be straightforwardly sufficient for the falsity of the believed proposition.[17]

In all three kinds of case of empirically defeasible *a priority*, it is utterly contingent whether the defeating condition obtains or not. But there is an important difference between cases of kind (a) and cases of the other two kinds. In cases of kind (a), provided that we do have a conclusive *a priori* justification for the mathematical belief,

it is natural to maintain that the proposition believed is true as a matter of necessity. But, in cases of kinds (b) and (c), we clearly cannot move directly from *a priority* to truth no matter what. For, in those kinds of case, we presume upon contingent states of affairs (the non-obtaining of certain potential defeating conditions) that are crucial to the truth, or even to the truth-evaluability, of the proposition in question. There are ways in which our thought could be false, or ways in which our putative thought might not even be truth-evaluable, that are not ruled out by our *a priori* justification. So, even given an intuition to the effect that what can be established *a priori* cannot depend on any contingent feature of reality, the most that we could reasonably conclude would be that the proposition is true in all those worlds that include the presumed-upon states of affairs.

Let us turn now to the second problem. Even if we set aside the phenomenon of empirically defeasible *a priori* justification found in cases of kinds (b) and (c), it is difficult to provide illuminating argumentative support for the claim that *a priority* entails deep necessity. Suppose for *reductio* that the truth of some understood sentence, s, can be known *a priori* although s is deeply contingent. (And suppose that this deep contingency is not just a reflection of the fact that the possibility of certain empirical defeating conditions is legitimately ignored in the course of the *a priori* justification.) The truth of s depends on the obtaining of a contingent state of affairs, S. *A priori* knowledge that s is true would provide an *a priori* guarantee that S does indeed obtain. But, even if S does obtain, still it might not have obtained. It is not guaranteed to obtain. As Evans puts it (1979, p. 212): 'A deeply contingent statement is one for which there is no guarantee that there exists a verifying state of affairs.' It might seem a very short step from this point to a contradiction: S is not guaranteed to obtain even though we have a guarantee that S does obtain. But this short step involves a slip between modal and epistemic notions of guarantee: S is not *modally* guaranteed to obtain even though we have an *epistemic* guarantee that S does obtain. So, instead of saying that because S is contingent it is not guaranteed to obtain, it would be better to stress that contingency is a modal notion: S modally might not have obtained. In order to complete the *reductio*, we would then need to show that if S modally might not have obtained then we cannot be *a priori* epistemically

guaranteed that S does obtain. But this is uncomfortably close to what we were supposed to be showing in the first place, namely, that *a priority* entails deep necessity.[18]

What the attempted *reductio* does achieve is a shift from a claim about a sentence to a claim about a state of affairs. This serves to highlight the very close relationship between deep necessity for sentences and the necessary obtaining of states of affairs. There is a much looser relationship between superficial necessity for sentences and the necessary obtaining of states of affairs.

To see this contrast, consider again '$\mathsf{A}s \leftrightarrow s$' as a simple example of the *superficially* contingent *a priori*. The superficial contingency of this sentence depends on the occurrence of the 'Actually'-operator. But '$\mathsf{A}s$' and s are made true by the same states of affairs. So the superficially contingent sentence '$\mathsf{A}s \leftrightarrow s$' is made true by the same states of affairs as the sentence '$s \leftrightarrow s$', which is superficially (and deeply) necessary. Similarly, the superficially necessary sentence '$\mathsf{A}s$' is made true by the same states of affairs as the sentence s, which is superficially (and deeply) contingent. So we must not conflate superficial contingency as a property of sentences with contingency as a property of states of affairs. The sentence '$\mathsf{A}s \leftrightarrow s$' is superficially contingent, but it is made true by a state of affairs that obtains as a matter of necessity. The sentence '$\mathsf{A}s$' is superficially necessary, but it is made true by a state of affairs that modally might not have obtained.

Deep contingency, in contrast with superficial contingency, is defined in terms of making true and thus cannot depend on the pattern of occurrences of the 'Actually'-operator. So we can safely move between deep contingency as a property of sentences and contingency as a property of states of affairs. A deeply contingent sentence is made true by a state of affairs that might not have obtained. As we have seen, the question whether a sentence could be *a priori* true yet deeply contingent then becomes the question whether we could have an *a priori* epistemic guarantee that a state of affairs obtains even though that state of affairs modally might not have obtained. A negative answer to this question is supported by intuition, rather than by independent argument.

To the extent that the combination of *a priority* and *contingency for states of affairs* is intolerable, the combination of *a priority* and

deep contingency for sentences is equally intolerable. But, however it may be with states of affairs, the combination of *a priority* and *superficial* contingency for sentences may be both tolerable and unperplexing, as the example of '$\mathsf{A}s \leftrightarrow s$' shows.[19]

4.3. *Sense, Reference, and Asymmetry*

The idea we have reached is that there is a very close connection between the deep modal properties of sentences and the modal properties of states of affairs. One way of developing this idea would be to follow Graeme Forbes (1989) in assigning a state of affairs (rather than, as Frege would have it, a truth value) to each sentence as its referent or *Bedeutung*.[20] A true sentence is deeply contingent if its referent is a state of affairs that might not have obtained. A sentence is deeply necessary if its referent is a state of affairs that obtains as a matter of necessity; that is, a state of affairs that would obtain no matter which world were to be actual. *Deep modal properties* can then be described as belonging fundamentally at *the level of reference* and a sentence operator expressing a deep modal property can be properly classified as *extensional*. If s_1 and s_2 have the same referent then 'It is deeply contingent that'$^\wedge s_1$ is true just in case 'It is deeply contingent that'$^\wedge s_2$ is true.

A sentence has, not only a referent, but also a sense; namely, the thought – perhaps better, the thought content – that it expresses (Frege, 1892). Superficial modal properties cannot be transposed from sentences to their senses because (as in the case of '$\mathsf{A}s$' and s) a sentence that is superficially necessary and a sentence that is superficially contingent may express the same thought content. But deep modal properties can be transposed from sentences to their senses. Evans says that epistemically equivalent sentences are made true by the same states of affairs (1979, p. 205). So sentences that express the same thought content never differ in their deep modal properties. In Forbes's framework, the point follows from an instance of the Fregean doctrine that sense determines reference. If two sentences have the same sense – that is, express the same thought content – then they are assigned the same state of affairs as their referent, and so they have the same deep modal properties.

While a sentence operator expressing a deep modal property is extensional, propositional attitude operators are classified as *inten-*

sional. For it is not, in general, correct that if s_1 and s_2 have the same referent then 'Ralph believes that'^s_1 is true just in case 'Ralph believes that'^s_2 is true (Forbes, 1989, p. 121). Thought contents are discriminated more finely than states of affairs and being believed by Ralph is fundamentally a property of thought contents.

Epistemic notions such as *a priority* are like propositional attitude notions, and unlike deep modal notions, in belonging fundamentally at *the level of sense*. Thus, when we say that an understood sentence is *a priori* true we mean something along the following lines. Just in virtue of grasping the thought content that the sentence expresses (where this includes grasping the concepts that are constituents of that content), a subject is in a position to know that the thought content is correct. This *a priori* knowledge that the thought content is correct furnishes an *a priori* epistemic guarantee that the state of affairs that is the referent of the understood sentence obtains.

As we have seen (section 4.2), it may be that this epistemic guarantee is furnished only against a background of presumed-upon conditions. So the intuition that *a priority* entails necessity for states of affairs – powerful as it may be – must be hedged. If an understood sentence is *a priori* true then the state of affairs that is the referent of the sentence obtains in all those possible worlds in which the presumed-upon conditions also obtain. Taking into account both the hedge and the lack of independent argumentative support, we said that, to the extent that the combination of *a priority* and contingency for states of affairs is intolerable, the combination of *a priority* and deep contingency for sentences is equally intolerable. We have now set the close connection between the modal properties of states of affairs and the deep modal properties of sentences in Forbes's Fregean framework of sentence, sense, and reference. The point of doing this is not to provide any new argument in support of the claim that *a priority* entails deep necessity. The point is, rather, to shed some light on the question whether intuitive support for the claim that *a priority* entails deep necessity carries over to the converse claim that deep necessity entails *a priority*.[21]

With the issues set in a Fregean framework, we see that the inference from *a priority* to deep necessity involves a shift from a notion that belongs at the level of sense to a notion that belongs at the

level of reference. In general, sense and reference are asymmetrically related. Sense determines reference, but there is no route back from reference to sense. So it is not unreasonable to suppose that *a priority* and deep necessity are also asymmetrically related.

It may be, for example, that many different thought contents are modes of presentation of a single state of affairs, S. Suppose that, for one of these thought contents, M, just grasping M is sufficient to put a subject into a position to know that the thought content is correct. From this, we infer that S obtains as a matter of necessity – or, at least, that S obtains in all those worlds in which certain presumed-upon conditions obtain. This is the plausible move from sense to reference. But, even if S obtains in all possible worlds, it would surely be hasty to move back from reference to sense. So we should not infer that, for every other thought content, M′, that is also a mode of presentation of S, just grasping M′ puts a subject into a position to know that the thought content is correct.

Summary. Over a domain of ur-examples, ‘As $\leftrightarrow$ s’ and ‘As’, *a priority* coincides with deep necessity and so with D-necessity or truth on the diagonal. But there is nothing in the simple modal conception of the two-dimensional framework to suggest that *a priority* should always coincide with truth on the diagonal. There is a powerful intuition that seems to support some version of the claim that *a priority* entails deep necessity. But, first, the claim must be hedged and, second, it is difficult to provide the intuition with illuminating argumentative support. More importantly, the relationship between *a priority* and deep necessity appears to be asymmetric. The inference from *a priority* to deep necessity involves a shift from sense to reference. So, for general Fregean reasons, we should not expect that intuitive support for that inference would carry over to the converse inference from deep necessity to *a priority*, since this involves a shift from reference back to sense.

5. *A PRIORITY*, DEEP NECESSITY, AND DESCRIPTIVE NAMES

We have seen that the relationship between *a priority* and deep necessity is complicated by the phenomenon of empirically defeasible *a priori* justification. But if we set this complication aside

then there is a powerful intuition that *a priority* entails deep necessity and there is, in the sentence '$\mathsf{A}s \leftrightarrow s$', an ur-example of the superficially contingent but deeply necessary *a priori*. So an obvious strategy for understanding an apparent example of a sentence that is contingent and *a priori* is to show that the sentence plays some more or less complex variation on the theme of '$\mathsf{A}s \leftrightarrow s$'.

5.1. *The Contingent* A Priori *and Descriptive Names*

The sentence:

(1) If anyone uniquely invented the zip then the actual inventor of the zip invented the zip.

with the formulation:

(2) $(\exists x)(x$ uniquely invented the zip$) \rightarrow$ [The x: $\mathsf{A}(x$ invented the zip)](x invented the zip).[22]

is an apparent example of the contingent *a priori*. Sentence (2) is *a priori* true because it is epistemically equivalent to the obviously *a priori*:

(3) $(\exists x)(x$ uniquely invented the zip$) \rightarrow$ [The x: x invented the zip](x invented the zip).

Sentence (2) is superficially contingent since its '$\Box$'-modalisation is false and the sentence:

$\Diamond((\exists x)(x$ uniquely invented the zip) & $\sim$[The x: $\mathsf{A}(x$ invented the zip)](x invented the zip))

is true. It is surely possible that someone other than Whitcomb L. Judson, the person who actually invented the zip, should have invented the zip. Presumably, it is possible that Tiny Tim should have uniquely invented the zip.

But sentence (2) is deeply necessary. Because (2) is epistemically equivalent to (3) it is made true by the same states of affairs as (3) – a sentence whose 2D-intension is everywhere true. Another way to see that (2) is deeply necessary is to observe that (3) differs from (2) only by the removal of the single occurrence of the 'Actually'-operator, so that (2) and (3) have the same D-intension.[23] Sentence (3) is certainly D-necessary; so (2) is also D-necessary, and thus deeply necessary.

This combination of properties – *a priori*, superficially contingent, deeply necessary – is just that Evans (1979, p. 193) claims for:

(4) If anyone uniquely invented the zip then Julius invented the zip.

Here 'Julius' is a *descriptive name* whose reference is fixed by the description 'the inventor of the zip'. Evans supposes that 'Julius' is introduced into the language by the stipulation (*ibid.*, p. 181):

(D) Let us use 'Julius' to refer to whoever invented the zip.

And he restricts attention to the initial period of the name's use, when it is 'unquestionably a "one-criterion" name' (*ibid.*). This restriction is crucial to Evans's account of descriptive names. A name that is originally introduced by way of a reference-fixing description may evolve into an ordinary proper name and the conditions for understanding an ordinary proper name of the inventor of the zip are quite different from the conditions for understanding the descriptive name 'Julius'.[24]

Now consider the three properties that Evans claims for sentence (4). First, (4) is *a priori* because 'someone can know that the sentence [4] is true, simply in virtue of knowledge he has as a speaker of the language' (*ibid.*, pp. 192–193.). This is not just a matter of knowing *a priori* that (4) expresses some truth or other but not knowing what truth it expresses. Rather (p. 182):

> It is sufficient to understand 'Julius' that one know that it refers to whoever invented the zip. This knowledge can certainly be possessed whether or not there is such a person, and possessing it, one is in a position to know exactly what conditions have to be satisfied for sentences containing the name to be true, and hence to understand them.

Second, sentence (4) is superficially contingent because 'a world in which someone who did not actually invent the zip invents the zip is a world *with respect to which* the antecedent of the conditional [4] is true, but the consequent, and thus the whole conditional, is false' (p. 193; emphasis added). So the '□'-modalisation of (4) is false.

But third, sentence (4) is not deeply contingent because 'there is no contingent feature on which its truth depends': it 'demands nothing of the actual world' (p. 212). Whichever world were to be actual, sentence (4) would still be true; that is, true as a sentence

of English governed by the stipulation (D). Suppose, for example, that Tiny Tim had invented the zip. Then the (non-modal) sentences 'Tiny Tim invented the zip', 'Tiny Tim is Julius' and 'Julius invented the zip' would all have been true;[25] and sentence (4) would also have been true. If no one had uniquely invented the zip then (4) would still have been true. Sentence (4) is deeply necessary; it is true no matter what.[26]

In short, we can show that (4) is *a priori* true and superficially contingent, but deeply necessary, by pointing to modal and epistemic similarities between the descriptive name 'Julius' and the definite description 'the actual inventor of the zip'. Sentence (4) is thus revealed as playing a variation – much the same variation as sentence (1) – on the theme of '$\mathsf{A}s \leftrightarrow s$'.

5.2. *The Necessary* A Posteriori *and Descriptive Names*

Just as there is an obvious strategy for understanding an apparent example of a sentence that is contingent and *a priori*, so also there is an obvious strategy for understanding an apparent example of a sentence that is necessary and *a posteriori*. We show that the sentence plays some variation on the theme of '$\mathsf{A}s$'.

Whitcomb L. Judson invented the zip fastener. So the following sentence is *a posteriori* true and contingent:

(5) The inventor of the zip = WLJ.

Consequently, the result of prefixing (5) with the 'Actually'-operator:

(6) Actually (The inventor of the zip = WLJ)

is *a posteriori* and superficially necessary, but deeply contingent. So too (provided that we ignore complications about contingent existence) is:

(7) The actual inventor of the zip = WLJ.

Sentence (7) is superficially necessary because its '$\Box$'-necessitation is true (again ignoring complications about contingent existence). It is deeply contingent because, if a world in which Tiny Tim invented the zip had been actual, then (7) would have been false.

Now consider:

(8) Julius = WLJ.

As a true identity statement involving proper names, this is an apparent example of the necessary *a posteriori*. But, the descriptive name 'Julius' is modally and epistemically similar to the 'actually'-embedding description 'The actual inventor of the zip' ('The *x* such that *x* actually invented the zip'). So sentence (8) is epistemically and modally like (7). Thus, sentence (8) plays a variation on the theme of 'As' and is an example of the superficially necessary *a posteriori*, but not of the deeply necessary *a posteriori*.

5.3. *Ordinary Proper Names*

Over the domain that includes these examples involving descriptive names, (4) and (8), in addition to the ur-examples ('As $\leftrightarrow$ s') and ('As'), *a priority* coincides with deep necessity and so with truth on the diagonal. But let us now consider examples that involve only ordinary proper names.

Suppose first that, in our example of the superficially contingent but deeply necessary *a priori*, sentence (4), we eliminate the descriptive name 'Julius' in favour of an ordinary proper name, 'WLJ'. The result:

(9) If anyone uniquely invented the zip then WLJ invented the zip.

does not even appear to be an example of the contingent *a priori*. Like sentence (5), it is (both superficially and deeply) contingent but only *a posteriori* true. So sentence (9) does not present any threat to the coincidence of *a priority* with deep necessity.

However, suppose second that, instead of our example of the superficially necessary but deeply contingent *a posteriori*, sentence (8), we consider a true identity statement involving only ordinary proper names, such as 'Cicero = Tully' or:

(10) Slim Dusty = David Gordon Kirkpatrick.

This does still appear to be an example of the necessary *a posteriori*.

Here, I assume that the semantic contribution of an ordinary proper name is to be stated in an object-dependent way. There is a semantic connection between the name and its bearer and not just, as in the case of a descriptive name, between the name and a descriptive condition. An ordinary proper name cannot refer to an object other than its (actual) bearer without a change in meaning. So

long as its meaning is maintained, it refers to the same object both *with respect to* every possible world and *in* every possible world (again, we ignore complications about contingent existence). We might say that an ordinary proper name is both a superficially rigid, and a deeply rigid, designator.

Given this assumption, a true identity statement involving only ordinary proper names is both H-necessary and D-necessary. Indeed, its 2D-intension is everywhere true. Thus, a sentence like (10) does present a challenge to the coincidence of *a priority* with deep necessity because it threatens the claim that deep necessity entails *a priority*.

Summary. The overall situation suggested by the examples in this section (where we have set aside the complications of empirically defeasible *a priority*) is this. First, apparent examples of the contingent *a priori* and the necessary *a posteriori* that involve descriptive names present no challenge to the coincidence of *a priority* with deep necessity or truth on the diagonal. Apparent examples of the contingent *a priori* are consistent with the claim that *a priority* entails deep necessity; and apparent examples of the necessary *a posteriori* are consistent with the claim that *a posteriority* entails deep contingency; that is, that deep necessity entails *a priority*.

Second, when we replace descriptive names with ordinary proper names we do not produce even apparent examples of the contingent *a priori*. So there is still no threat to the claim that *a priority* entails deep necessity.

But, third, with ordinary proper names we produce apparent examples of the necessary *a posteriori* that are both superficially and deeply necessary. So these examples threaten the claim that deep necessity entails *a priority*. This overall situation is, of course, entirely consistent with the idea, defended in section 4.3, that the relationship between *a priority* and deep necessity may be asymmetric. Intuitive support for the inference from *a priority* to deep necessity does not carry over to the converse inference from deep necessity to *a priority*.

6. THE DESCRIPTIVE NAMES STRATEGY

There is, clearly enough, a general strategy for bringing the epistemic distinction between *a priority* and *a posteriority* more fully into alignment with the modal distinction between deep necessity and deep contingency, so that *a priority* will more nearly coincide – will perhaps coincide perfectly – with truth on the diagonal. The strategy is to treat all referring expressions as being, or as being relevantly similar to, descriptive names. This is the strategy adopted, for example, by Frank Jackson (1998a, 1998b, this volume) both for natural kind terms like 'water' and for ordinary proper names of planets, places, and people.

In the case of natural kind terms, I think that the descriptive names strategy is quite plausible. In the end, I am somewhat inclined against it, but there is important work that still needs to be done on developing an alternative. In the case of ordinary proper names, however, I am more firmly inclined to reject the descriptive names strategy, and to accept that there will be residual examples of the deeply necessary *a posteriori*. In this section, I shall briefly indicate why.[27]

6.1. *Description-Theoretic Accounts of Reference*

I begin with some very familiar background. In *Naming and Necessity*, Kripke offers three kinds of argument against description-theoretic (descriptivist) accounts of the reference of ordinary proper names: semantic arguments, epistemic arguments, and modal arguments.[28]

Suppose that 'N' is a name in the language or idiolect of U. Then, according to a descriptivist account of proper names, there is a description, 'the H', such that the semantic condition for an object *x* to be the referent of 'N' (in the language or idiolect of U) is simply that *x* should be the unique H. Suppose further that a semantic theory for a language states what a speaker knows just in virtue of knowing or understanding the language: a theory of meaning is a theory of understanding. Then U understands the name 'N' (or knows its meaning) by knowing that 'N' refers to whichever object (if any) is uniquely H. This is the semantic aspect of a descriptivist account of proper names. A *semantic argument* against descrip-

tivist accounts challenges these claims about meaning, reference and understanding.

A descriptivist account also says that a sentence containing 'N', say, 'N is F', is epistemically and cognitively equivalent (for U) to the sentence, 'The H is F'. To think that N is F is to think that the H is F. To know or discover that N is F is to know or discover that the H is F. This is the epistemic aspect of a descriptivist account of proper names, and an *epistemic argument* against descriptivist accounts challenges these claims about thought and knowledge.

A descriptivist account of proper names says one more thing. It says that a sentence containing 'N' is modally equivalent to the sentence that results by replacing 'N' with its reference-determining description, 'the H'. The modal equivalence of 'N is F' and 'The H is F' involves at least the requirement that, if the two sentences are embedded in the same modal context, then the resulting modal sentences should have the same truth value. Thus, for example, 'Necessarily, if something is uniquely H, then N is H' and 'Necessarily, if something is uniquely H, then the H is H' should have the same truth value. As a result, this third aspect of the descriptivist account is initially extremely implausible. For example, it might be proposed that the reference-determining description for the name 'Aristotle' is 'the teacher of Alexander'. But the sentence 'Necessarily, if someone uniquely taught Alexander, then Aristotle taught Alexander' is false, whereas 'Necessarily, if someone uniquely taught Alexander, then the teacher of Alexander taught Alexander' is true, or at least has a true reading.

Descriptivists usually respond to this problem by choosing 'actually'-embedding reference-determining descriptions. Certainly, the description 'the *actual* teacher of Alexander' comes closer to matching the behaviour of 'Aristotle' in modal sentences than the description 'the teacher of Aristotle' does. But, in the light of Evans's distinction between superficial and deep modal properties, we should insist that modal equivalence is not just a matter of pairs of modal sentences having the same truth values. It is also a matter of pairs of *non-modal sentences*, 'N is F' and 'The H is F', having the same *modal properties*. A *modal argument* against descriptivist accounts challenges these claims about the truth values of

modal sentences and about the modal properties of non-modal sentences.

Descriptive names have semantic, epistemic, and modal properties corresponding to the three aspects of a descriptivist account of proper names (section 5.1). First, if 'M' is a descriptive name then its reference-fixing description, 'the G' (or the 'actually'-embedding description, 'the actual G') plays exactly the reference-determining role for 'M' that is specified by the semantic aspect of a descriptivist account of proper names. Second, the sentence 'M is F' is epistemically and cognitively equivalent to 'The G is F' (or 'The actual G is F'). And third, 'M is F' and 'The actual G is F' are modally equivalent; they have the same modal profile. They are true *with respect to* the same possible worlds; so substitution of one for the other within the scope of the modal operators '$\Box$' and '$\Diamond$' makes no difference to truth value. And they are true *in* the same possible worlds: whichever state of affairs were to obtain, whichever world were to be actual, the sentences 'M is F' and 'The actual G is F' would be true together or false together. Because of these two aspects of modal equivalence, 'M is F' and 'The actual G is F' agree in their superficial, and in their deep, modal properties.

Clearly, then, the descriptive names strategy can be assessed in the light of the three kinds of argument that Kripke advanced.

6.2. *Three Arguments Against the Descriptive Names Strategy*

Suppose that an advocate of the descriptive names strategy proposes that an ordinary proper name, 'N', in the language or idiolect of U, is or is relevantly similar to a descriptive name. The reference-fixing description, 'the G', must meet the condition that an object x is the referent of 'N' just in case x is uniquely G. So it is likely that the advocate of the descriptive names strategy will offer a reference-fixing description that incorporates the kinds of conditions that would be mentioned in a good theory of reference.[29]

This choice of reference-fixing description protects the descriptive names strategy from objections along the lines that the description 'the G' is liable to pick out an object that is not the referent of 'N'. But a *semantic argument* against the strategy can press on the requirement that the speaker, U, should know what the descriptive conditions on the reference of 'N' are. After all, U is

supposed to understand 'N' by *knowing* that it refers to whichever object (if any) is uniquely G.

A defender of the strategy can respond to this kind of argument by appealing to the notion of *implicit* knowledge or grasp of the reference-determining condition (Jackson, 1998b, pp. 210–212 and this volume, pp. 270–273). For the purposes of the present brief discussion, I shall allow that the semantic argument against the descriptive names strategy can be met in this way. Whether or not it is ultimately correct to make this concession, considerations that are problematic for the strategy emerge when we turn to the epistemic and modal arguments in the light of this response to the semantic argument.

Consider *epistemic arguments*. An advocate of the descriptive names strategy says that 'N is F' is epistemically and cognitively equivalent to 'The (actual) G is F'. Thus, to think, know, or discover that N is F is to think, know, or discover that the G is F. But this is not a compelling claim about thought contents. The description 'the (actual) G' incorporates the kinds of conditions that would be mentioned in a good theory of reference for proper names. So someone who thinks that the G is F thereby deploys concepts that figure in theories of reference. But it is not very plausible that, when an ordinary speaker, U, thinks that N is F, he or she deploys those reference-theoretic concepts. Intuitively, it seems that U might not even possess those concepts.

Jackson describes as 'a blind alley' the suggestion that a description theory of reference is to be resisted on the grounds that we are able to think about, and to use language to convey information about, *objects*. His reason for rejecting the suggestion is that 'you cannot give information about objects without giving information about their properties ... we access objects via their properties' (1998b, p. 216). Now, it is surely correct that there is a sense in which my ability to think about an object depends on the properties of that object. Thus, suppose that I am able to think of a friend, Z, in virtue of having a capacity to recognise him. This recognitional capacity will be underpinned, we may assume, by a piece of information-processing machinery that is sensitive to various properties of visually presented people. This device will fire in the presence of my friend (provided that he is not in disguise). It would

also fire in the presence of any person who was like my friend in respect of the properties to which the device is sensitive. So there is a description 'the K' that a person must satisfy if the device is to fire.

But none of this establishes a thesis about thought contents to the effect that, when I think *that Z is F*, I am really thinking *that the K is F*. The properties that are mentioned in the descriptive condition are implicated in the subpersonal-level whirrings and grindings of the device that underpins my recognitional capacity. They are the properties to which the device is sensitive. But no concepts of those properties need figure in my thinking. Similarly, we can accept that 'N' refers to whoever satisfies a description, 'the G', and even allow an implicit grasp of the reference-determining condition, without agreeing that, when I think that N is F, I am really thinking that the G is F.

Finally, consider *modal arguments* against the descriptive names strategy. According to the strategy, 'N is F' is supposed to be modally equivalent to 'The actual G is F'. The problem here does not flow from the first of the two requirements for modal equivalence, having to do with embedding in modal contexts. Substitution of 'The actual G is F' for 'N is F' within the scope of the modal operators '$\Box$' and '$\Diamond$' will, indeed, make no difference to truth value. But the second requirement for modal equivalence, having to do with modal properties – including deep modal properties – of non-modal sentences, is more problematic. For it is not obvious that whichever state of affairs were to obtain, whichever world were to be actual, the non-modal sentences 'N is F' and 'The actual G is F' would be true together or false together.

To see how the problem arises, consider the name 'DBM' of David Braddon-Mitchell. Suppose that the reference-determining description for 'DBM' is something along the lines of 'the person whose properties cause so-and-so device to fire etc.'; and imagine that we do not press any epistemic argument against this proposal. Now consider a possible state of affairs in which David has a beard, but it is a beardless man, Nigel, whose properties cause so-and-so device to fire. If this state of affairs were to obtain, if such a possible world were to be actual, then the sentence:

(11) DBM is bearded.

would be true (without any change in its meaning). But the sentence:

(12) The person whose properties actually cause so-and-so device to fire etc. is bearded.

would be false. For this sentence is *made true* by the same states of affairs as 'The person whose properties cause so-and-so device to fire etc. is bearded'.

Similarly, the sentence:

(13) The properties of DBM cause so-and-so device to fire.

would be false, while:

(14) The properties of the person whose properties actually cause so-and-so device to fire etc. cause so-and-so device to fire.

would be true. Thus, 'DBM' is not a descriptive name with its reference fixed by the description 'the person whose properties cause so-and-so device to fire etc.'

This section is very far from providing a full cost-benefit analysis of the descriptive names strategy for bringing *a priority* into alignment with deep necessity or truth on the diagonal. But, provisionally, it seems to me that epistemic and modal arguments cast some doubt on the prospects for the descriptive names strategy, at least in its application to ordinary proper names. Examples of the deeply necessary *a posteriori*, such as true identity statements involving ordinary proper names, will remain.

7. EVANS'S ACCOUNT OF DESCRIPTIVE NAMES AS REFERRING EXPRESSIONS

At many points in the last two sections, we have relied on modal and epistemic similarities between descriptive names and 'actually'-embedding definite descriptions – between 'Julius' and 'the actual inventor of the zip', for example. Because the properties that Evans claimed for the sentence:

(4) If anyone uniquely invented the zip then Julius invented the zip.

are just those of:

(1) If anyone uniquely invented the zip then the actual inventor of the zip invented the zip.

Davies and Humberstone suggested that 'a descriptive name with its reference fixed by "the G" is nothing other than a conventional abbreviation of (or at least, an expression whose sense is that of) "the actual G"' (1980, p. 11). This suggestion seems to be accepted by some as an account of Evans's own views.[30] But, in his 'Comment on "Two notions of necessity"', Evans explicitly rejected the suggestion that descriptive names are abbreviations of 'actually'-embedding descriptions (this volume, p. 13): 'So you would expect me to dissent from your suggestion that a descriptive name is a conventional abbreviation for a definite description embedding "actually".' In this final section of the paper, I shall address the question why Evans was so firmly against the idea that descriptive names belong semantically with definite descriptions.

7.1. *Descriptive Names, Definite Descriptions, and the Reference Relation*

According to Evans, descriptive names have two crucial features (1979, p. 180):

> First, a descriptive name is a referring expression; it belongs to that category of expressions whose contribution to the truth conditions of sentences containing them is stated by means of the relation of reference. Second, there is a semantical connection between the name and a description; the sense of the name is such that an object is determined to be the referent of the name if and only if it satisfies a certain description.

This is likely to strike us, at least initially, as a surprising combination of features. For we are familiar, from Evans's work on reference, with a contrast between a genuine or 'Russellian' singular term, 'whose significance depends upon its having a referent' (1982, p. 12 and *passim*), and a definite description, whose significance can be grasped independently of whether it has a denotation. Understanding a Russellian singular term involves knowing *of* a particular object that the term refers to it; it involves having an object-dependent thought. For such an expression, merely knowing that it refers to whichever object satisfies a particular descriptive condition (if any object does) cannot suffice for understanding.

Against the background of these ideas about Russellian singular terms as examples of referring expressions, the two features that Evans associates with descriptive names may seem to be in tension. It may be tempting to think that, if 'Julius' is a referring expression, then someone who knows only that there is a semantic connection between 'Julius' and the description 'the inventor of the zip' does not understand 'Julius'. According to this tempting thought, a person who knows the stipulation:

(D) Let us use 'Julius' to refer to whoever invented the zip.

by which 'Julius' was introduced can know that 'Julius' refers to whoever invented the zip (assuming that it refers at all). But this does not amount to understanding 'Julius' because someone who knows *only* the stipulation (D) does not know *of* any individual, and in particular does not know *of* Whitcomb L. Judson, that he invented the zip and so is the referent of the singular term 'Julius'.

In line with this tempting thought, it might be proposed that someone could, just in virtue of knowing the stipulation (D), know that sentence (4) expresses a truth, but would not thereby know what truth it is that the sentence expresses (see Donnellan, 1977, p. 18). This is certainly *not* Evans's position. But Evans needs to explain why, given his account of what is involved in understanding sentence (4), he maintains that 'Julius' is a referring expression.

The key to this explanation lies in a distinctive view about reference coupled with the conception of a referring expression as any expression 'whose contribution to the truth conditions of sentences containing [it] is stated by means of the relation of reference' (1979, p. 184). First, it is agreed on all sides that reference is a relation. But Evans's distinctive view is that reference is just 'whatever relation it is between expressions and objects which makes the following principle true' (*ibid.*):

(P) If $R(t_1 \ldots t_n)$ is atomic, and $t_1 \ldots t_n$ are referring expressions, then $R(t_1 \ldots t_n)$ is true iff ⟨the referent of $t_1 \ldots$ the referent of t_n⟩ satisfies R.

No requirement of a causal relation between expression and object, for example, is built into the notion of reference.

Second, although reference is a relation, the semantic contribution of a referring expression need not be stated by simply asserting

that the relation of reference obtains between the expression and some particular object. Nor must understanding a referring expression always involve an object-dependent thought. In the familiar case of a Russellian singular term, such as an ordinary proper name, the semantic contribution will be stated in an object-dependent way, along the lines of:

(15) The referent of 'John' = John.

But it is equally the relation of reference that is at work in the clause:

(16) $(\forall x)$ (Refers to ('Julius', x) $\leftrightarrow$ x uniquely invented the zip).

And this clause does not give 'Julius' an object-dependent sense.

Thus, if we grant Evans's two background assumptions – that a referring expression is one whose contribution to truth conditions is stated by means of the relation of reference and that reference is just the relation that makes principle (P) come out true – then it is clear why 'Julius' is classified as a referring expression.[31] However, in order to understand why Evans rejects the idea that descriptive names belong semantically with definite descriptions, we need to see why definite descriptions cannot *also* be included in the category of referring expressions. So, why is it that a statement of the semantic contribution of a definite description cannot be modelled on (16)?

The reason Evans gives is that such a statement of the semantic contribution of a definite description would not account for the way in which descriptions interact with modal operators. In possible-worlds semantics for modal languages, the satisfaction relation has to be relativised to worlds. So principle (P) must be replaced by (1979, p. 189):

(P′) If $R(t_1 \ldots t_n)$ is atomic, and $t_1 \ldots t_n$ are referring expressions, then $R(t_1 \ldots t_n)$ is true_w iff ⟨the referent of t_1 ... the referent of t_n⟩ satisfies_w R.

But – and this is the crucial point – the relation of reference does *not* need to be relativised (*ibid.*):

Even in a modal language, all that is necessary to state the significance of names and other referring expressions is to state to what, if anything, they refer; the truth-with-respect-to-a-situation of a sentence containing a singular term depends

simply upon whether or not its referent satisfies the predicate with respect to that situation. But, notoriously, this is not the case with definite descriptions.

It might be replied to this that there is something arbitrary about relativising the relation of satisfaction but not the relation of reference. If we were to avoid this arbitrariness, and were to relativise the relation of reference to worlds, then definite descriptions could be grouped together with descriptive names and Russellian singular terms – ordinary proper names, indexicals, demonstratives – as referring expressions. But Evans's response to this proposal is that the use of a relativised relation of reference even for Russellian singular terms would involve an over-attribution of semantic powers. If we relativise the relation of reference in all cases then 'we ascribe to names, pronouns, and demonstratives semantical properties of a type which would allow them to get up to tricks they never in fact get up to' (*ibid.*, p. 190).

Evans's view, then, is that the decision not to relativise reference to worlds is well motivated rather than arbitrary. And if the relation of reference is not relativised, then descriptive names are grouped together with the familiar Russellian singular terms and are distinguished from definite descriptions. For descriptive names, like ordinary proper names, indexicals, and demonstratives, do not 'get up to tricks' in modal sentences. We do not, Evans says, use the descriptive name 'Julius' in such a way that sentences like:

> If you had invented the zip, you would have been Julius.
> If Julius had never invented the zip, he would not have been Julius.

come out true (p. 192; see also Evans, 1982, p. 60).

A referring expression is one whose contribution to truth conditions is stated by means of a *non-world-relative* relation of reference that makes principle (P′) come out true. So, despite the modal and epistemic similarities between descriptive names and 'actually'-embedding definite descriptions, descriptive names do, and definite descriptions do not, belong in the semantic category of referring expressions.

7.2. *Descriptive Names in the Two-Dimensional Framework*

It may seem, however, that there is room for doubt as to whether Evans has really established that descriptive names are referring expressions, even by the lights of his own account of what a referring expression is. Davies and Humberstone raise this doubt by pointing out that, in a two-dimensional semantic theory for a modal language including '$\mathcal{F}$' as well as '$\Box$' and 'A' (1980, p. 12): 'The reference relation for proper names requires no relativization, that for descriptions requires the full double relativization, while the reference relation for descriptive names requires relativization in just the actual world place.' For clearly, there must be some world-relativity in the semantic axiom for a descriptive name such as 'Julius' in order to allow that the sentence:

(17) $\mathcal{F}\mathsf{A}$(Julius = Whitcomb L. Judson)

is false.

On the face of it, this doubt about Evans's argument turns on the behaviour of descriptive names within the scope of '$\mathcal{F}$', as in sentence (17). So Evans could respond to the doubt by returning to his reservations about the introduction of '$\mathcal{F}$' (section 2). Certainly, if Evans is right to say that '$\mathcal{F}$' is a context-shifting operator, then there is a good reply for him to make. For, in that case, the relativisation of the reference relation for descriptive names is nothing other than context-dependence, and even Russellian singular terms can be context-dependent. Thus, Evans says (this volume, pp. 12–13):

> This naturally leads me to the disagreement I might have with you over the question of the need for relativizing the relation of reference to deal with 'Julius' in your '$\mathcal{F}$' contexts. I am quite happy to allow a relativity to a *context* [of utterance] is required once we accept as legitimate such [linguistic] contexts [in which 'Julius' occurs within the scope of '$\mathcal{F}$']. But I do not think that this marks a distinction between 'Julius' and other 'genuine' referring expressions since after all reference must be thus relativized for 'I', 'you', 'now' &c.

In fact, Evans's account of descriptive names as referring expressions could be defended without relying on the claim that '$\mathcal{F}$' is literally a context-shifting operator. Any objection to the introduction of '$\mathcal{F}$' would serve to defend the account against doubts that turn on the behaviour of descriptive names within the scope of '$\mathcal{F}$'. And an objection that extended to the introduction of '$\mathcal{D}$' for truth

on the diagonal would defend the account against similar doubts that arise from the fact that the sentence:

(18) $\mathcal{D}$(Julius = Whitcomb L. Judson)

is false.

Suppose, for a moment, that there were good objections against the introduction of '$\mathcal{F}$' and of '$\mathcal{D}$', the operators that take advantage of variation in which world plays the role of the actual world. Then Evans's claim, that the contribution to truth conditions made by a descriptive name can be stated using a non-world-relative relation of reference, would be secure against doubts that depend on the properties of modal sentences such as (17) and (18). But there would still be other doubts that depend on the modal properties of (non-modal) sentences. Thus, for example, we would still need to account for the fact that the sentence:

(3) If anyone uniquely invented the zip then Julius invented the zip.

is deeply necessary – true at every world considered as actual – even though there is a world in which Tiny Tim, rather than Whitcomb L. Judson, invented the zip. So the reference of the descriptive name 'Julius' must be allowed to vary as we consider the truth of (3) *in* different worlds. Similarly, the reference of 'Julius' must be world-relative in some way if we are to make sense of the idea that if a different world had been actual – if, for example, Tiny Tim rather than Whitcomb L. Judson had invented the zip – then 'Tiny Tim is Julius' would have been true.

Evans says (this volume, p. 13): 'I still cling to the idea that there is a *non-arbitrary* distinction which puts "Julius" with "Tom" [an ordinary proper name], and not with descriptions.' For the reasons just given, I think that descriptive names and ordinary proper names belong in different semantic categories. But it does not follow that descriptive names belong in the same semantic category as definite descriptions. Although Davies and Humberstone suggested that a descriptive name abbreviates an 'actually'-embedding description, they went on to say (1980, p. 11): 'Whether the suggestion ultimately proves to be tenable would depend on the resolution of such questions as: could a language containing unstructured expressions functioning as descriptive names fail to contain anything

corresponding to "actually"?' Considerations of semantic structure might very well provide grounds for placing descriptive names in a *different* semantic category from definite descriptions.

It seems that we need a three-way distinction here. Ordinary proper names belong in a semantic category of Russellian singular terms. For members of this category, there is a semantic connection between the singular term and its referent and not just between the singular term and a descriptive condition. So there is no prospect of variation in reference without a change of meaning.

Definite descriptions belong in a different semantic category – arguably, in the category of quantifier expressions. In general, a definite description, 'The G', has a world-relative denotation because, as Evans says, the predicate 'G' has a world-relative satisfaction condition. Whether a given object satisfies 'G' varies as we move along the horizontal dimension of a two-dimensional array. When a definite description contains the 'Actually'-operator, this cancels out the horizontal world-relativity, but allows for variation in denotation as we vary which world plays the role of the actual world.

Descriptive names do not exhibit the horizontal world-relativity of definite descriptions, and they do not 'get up to tricks' when they occur within the scope of '$\Box$' or '$\Diamond$', or within the scope of modal operators in natural language. But they do still show some kind of world-relativity. For, as we have seen, the reference of a descriptive name varies (without any change in meaning) as we consider it *in* (but not *with respect to*) different possible worlds. This variation in reference can be conceived as resulting from variation in which world plays the role of the actual world – variation as we move along the vertical dimension of a two-dimensional array. Thus, descriptive names, like 'actually'-embedding descriptions, exhibit vertical world-relativity. But, in the absence of horizontal world-relativity, moving along the vertical dimension comes to the same thing as moving along the diagonal. So we could equally well say that descriptive names and 'actually'-embedding descriptions exhibit diagonal world-relativity. And this way of putting it connects more directly with deep necessity and with truth *in* worlds.

8. CONCLUSION

My aim has been to plot the relationships between the notions of necessity that Humberstone and I characterised in terms of the operators '$\Box$' and '$\mathcal{F}\mathsf{A}$', Evans's notions of superficial and deep necessity, and the epistemic notion of *a priority*.

In the two-dimensional framework, the necessity expressed by '$\Box$' is truth on the horizontal, H-necessity, and the necessity expressed by '$\mathcal{F}\mathsf{A}$' is truth on the diagonal, D-necessity. Evans had reservations about the introduction of '$\mathcal{F}$', partly because of worries about utterance difficulties (section 2). But, in any case, I have argued (section 3) that Evans's superficial necessity is H-necessity, while his deep necessity coincides with D-necessity. Evans said that the combination of *a priority* with deep contingency would be intolerable and I have noted two problems about that claim. More importantly, I have suggested that the relationship between *a priority* and deep necessity may be asymmetric (section 4).

Examples using descriptive names present no challenge to the coincidence of *a priority* with deep necessity, but examples using ordinary proper names threaten the inference from deep necessity to *a priority* (section 5). A general strategy for maintaining the coincidence between *a priority* and deep necessity is to treat all referring expressions as being relevantly similar to descriptive names. But I have argued (section 6) that this strategy faces objections similar to Kripke's objections to descriptivist theories of reference.

Finally (section 7), I have expressed some reservations about Evans's own account of descriptive names, according to which they belong in a category of referring expressions alongside Russellian singular terms. However, neither Evans's account, nor my reservations about it, cast any doubt on the modal and epistemic similarities between descriptive names and 'actually'-embedding definite descriptions that are at the heart of Evans's solution to the puzzle of the contingent *a priori*.

NOTES

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Kroon, and Daniel Stoljar, for comments and conversations. My greatest and longest-standing debts are, of course, to Lloyd Humberstone and Gareth Evans.

[1] Davies and Humberstone (1980). In fact, the model-theoretic semantics presented in that paper is not explicitly two-dimensional. It makes use, instead, of a notion of *variance* between (one-dimensional) models for a modal language with an 'Actually'-operator. In such models, there is a distinguished world, w*, and two models stand in the relation of variance if they differ at most over which world is the distinguished world. The equivalence between this way of presenting the model theory and the two-dimensional way is noted at p. 26, n. 4.

[2] I first learned about the logic of 'actually' from Lloyd Humberstone in 1974. See Crossley and Humberstone (1977), from which this example and much else is borrowed. See also Hazen (1976), and Humberstone, 'Two-dimensional adventures', in this volume, section 2.

[3] Where confusion is unlikely to result, I use ordinary quotation marks even though corner quotes would be more accurate. What is intended here is 'A'$^\frown$s, the concatenation of the 'Actually'-operator, 'A', with the sentence s.

[4] Here, I set aside two complications. One concerns the interpretation of first-order quantification when the domain of objects varies from possible world to possible world. The other concerns the use of second-order quantification in order to overcome the expressive limitations of quantified modal languages without an 'Actually'-operator. See Forbes, 1989; esp. chapters 2 and 4.

[5] Davies and Humberstone (1980, n. 7) and Bibliography item [11], referred to a paper, 'The logic of "Fixedly"', as forthcoming. In fact, this material appeared as Appendix 10 of Davies, 1981.

[6] See Evans (1985). (In Davies and Humberstone (1980), this paper by Evans was incorrectly referred to as forthcoming in a Festschrift for Donald Davidson.) See also, Forbes (1983); Davies (1983). Davies and Humberstone (1980) make no attempt to extend their use of the two-dimensional framework to encompass context-dependence. In this respect, their approach is different from the approach of those whose route into the framework goes via David Kaplan's (1989) work on character and content in the semantics of demonstratives.

[7] Evans's comments on a draft version of 'Two notions of necessity', contained in a letter to me of 14 July, 1979, are published for the first time in this volume. He begins (this volume, p. 11): 'I confess to being a bit suspicious of the way you introduce your operator "$\mathcal{F}$", though I am quite unable to express my doubts in a compelling way.' See also Humberstone, this volume, p. 29, who points out that presenting the model theory for '$\mathcal{F}$' by invoking a relation of variance between models serves to highlight the fact that, with the introduction of this operator, 'something rather new is happening'.

[8] Cf. Lewis (1980, pp. 27–28): 'To be sure, we could speak a language in which "As for you, I am hungry." is true iff "I am hungry." is true when the role of speaker is shifted from me to you – in other words, iff you are hungry. We could – but we don't.'

[9] As a result of this comment by Evans, the published version of 'Two notions of necessity' has (p. 3): '"$\mathcal{F}$Aα" says: whichever world had been actual, α would have been true at that world considered as actual.'

[10] My brief discussion here does not respond to every aspect of what Evans says about utterance difficulties. See again Evans, this volume, esp. n. 5 and the associated text.

[11] '$\mathcal{D}$s' is true with respect to w_j with w_i playing the role of the actual world just in case, for every world w, the embedded sentence s is true with respect to w, with w also playing the role of the actual world. '$\mathcal{D}$' is thus the third of the four operators listed in the second paragraph of note 4 in Davies and Humberstone, 1980. The combination '$\mathcal{F}\Box$' is equivalent to the fourth of those operators.

[12] This additional constraint follows from two claims. First, 'As' and s are 'epistemically equivalent' (1979, p. 210). Second, if two sentences are epistemically equivalent then they are made true by the same states of affairs (p. 205).

[13] Evans stresses that, when he talks about truth in a world, he is not concerned with 'the truth of a sentence identified merely as a sequence of expression types', but with a sentence being true '*as a sentence of English*' (p. 207; italics in original). David Chalmers has pointed out that, if a sentence's truth in w as a sentence of English requires that the English language should exist in w, then this seems to make the existence of English itself deeply necessary. But this is not clearly an objection to Evans's account, so long as it is only the *abstract* language whose existence is deeply necessary. It would be problematic if the account had the consequence that it is deeply necessary that English should exist as a language *in use* or that English should be *spoken*. But that problem is avoided so long as truth in a world is not glossed in terms of truth if uttered as a sentence of English in that world. See below, section 3.2.

[14] Strictly speaking, (U) will have every sentence that is not uttered in w come out vacuously true in w. However, if it is construed so that we consider, not w itself, but a world differing minimally from w so as to allow for the utterance of s, then 'All is silent' comes out false in w, while 'Someone speaks' comes out true in w.

[15] In the case of one-dimensional possible-worlds semantics, Evans says that we must 'be able to regard absolute truth as a special case of [the theory-internal notion] truth_w' (1979, p. 203). In particular, if w* is the actual world then absolute truth – the truth at which assertion and judgement aim – must coincide with the specific theory-internal notion truth_{w^*}: 'Only if there is this connection between the concepts will it follow from the fact that a sentence is (absolutely) true, that there is a world with respect to which it is true' (*ibid.*).

[16] Burge says (1988, p. 653): 'It is uncontroversial that the conditions for thinking a certain thought must be presupposed in the thinking.'

[17] Field (1996) distinguishes between *weak a priority*, which admits of empirical defeat, and *strong a priority*, which does not. He also distinguishes between primary and secondary undermining evidence, where 'secondary undermining evidence does not primarily go against the claim being undermined but against the claim that we knew it a priori' (p. 362). Field's final account of strong *a*

priority is that it does not admit of primary empirical defeat. So cases of kind (a) could still be cases of strong *a priority*, while cases of kinds (b) and (c) could only be cases of weak *a priority*.

See also Peacocke (2004, pp. 24–31) for a similar distinction (p. 30) between defeasibility of identification (cf. Field's secondary undermining evidence) and defeasibility of grounds (cf. Field's primary undermining evidence) and for the important notion of relative *a priority* (p. 26).

[18] See Forbes (1989, p. 152) for a similar argument that 'the natural way of trying to show that everything contingent is *a posteriori*' breaks down because it 'assumes what it is supposed to be establishing'.

[19] In *Naming and Necessity*, before introducing his apparent examples of the contingent *a priori* and the necessary *a posteriori*, Saul Kripke makes some suggestions about why 'people have thought that these two things ["necessary" and "*a priori*"] must mean the same' (1980, p. 38). Concerning the move from *a priority* to necessity, he says (*ibid.*): 'I guess it's thought that . . . if something is known *a priori* it must be necessary, because it was known without looking at the world. If it depended on some contingent feature of the actual world, how could you know it without looking? Maybe the actual world is one of the possible worlds in which it would have been false.'

[20] Forbes (1989), chapter 5. For this purpose, states of affairs are abstract state types that might or might not obtain. Cf. Barwise and Perry (1983); Taylor (1976, 1985).

[21] Concerning the move from necessity to *a priority*, Kripke (1980, p. 38) credits people with the following thought: '[I]f something not only happens to be true in the actual world but is also true in all possible worlds, then, of course, just by running through all the possible worlds in our heads, we ought to be able with enough effort to see, if a statement is necessary, that it is necessary, and thus know it *a priori*.' But he immediately continues that 'really this is not so obviously feasible at all'.

[22] The consequent of this conditional regiments the definite description by using the notation of restricted quantification. An alternative Russellian version of the consequent would be:

$$(\exists x)(\mathsf{A}(x \text{ invented the zip}) \ \& \ (\forall y)(\mathsf{A}(y \text{ invented the zip}) \rightarrow (y = \mathrm{x} \ \& \ y \text{ invented the zip}))).$$

[23] For any sentence, α, that is free of '$\Box$' and '$\mathcal{F}$', if α' results from α by removal of all occurrences of 'A', then α and α' have the same D-intension.

[24] See Evans, 1979, pp. 180–182; Davies and Humberstone, 1980, p. 18; Baldwin, 2001, p. 166.

[25] This is *not* to say that the *modal* sentence, 'If Tiny Tim had invented the zip then Tiny Tim would have been Julius', is true. See Evans, 1979, p. 192.

[26] The deep necessity of sentence (4) is not a surprising result, given other aspects of Evans's account. As Evans conceives descriptive names, the belief that Julius is F (the belief expressed by 'Julius is F') is the very same belief as the belief that the inventor of the zip is F (*ibid.*, p. 202): 'We do not get ourselves

into new belief states by "the stroke of a pen" (in Grice's phrase) – simply by introducing a name into the language'.

[27] Clearly, the relationship between *a priority* and truth on the diagonal requires more extended consideration than it can receive here. See my '*A priority* and truth on the diagonal' (forthcoming).

[28] Kripke (1980). In the next few paragraphs, I closely follow Soames (2002), chapter 2.

[29] See e.g. Jackson, 1998b, esp. pp. 208–212 and 1998a, p. 40, n. 16; see also Kroon, 1987 and this volume, ms pp. 4–5.

[30] See e.g. Baldwin (2001, p. 166): 'On a semantic account of the matter, Evans . . . simply introduced the term "Julius" as an abbreviation of the description "the actual inventor of the zip". This seems indeed to be the way in which Evans himself thought of the matter.'

[31] In his Preface to Evans's *The Varieties of Reference*, John McDowell says (pp. vi–vii): '[I]n notes for a lecture course on the theory of reference, Evans remarked that whereas some years previously he would have been tempted to call such a course "The Essence of Reference", now he would prefer to call it "The Varieties of Reference" . . . What he meant . . . was probably connected with his having become convinced that "descriptive names" are a perfectly good category of referring expressions. Earlier, he would have insisted that all genuine singular reference is . . . Russellian. Now that struck him as unwarrantedly essentialistic: a theoretically well founded conception of genuine singular terms could embrace both Russellian and non-Russellian varieties.'

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