Meeting of the Aristotelian Society held at Senate House, University of London, on 9 January 2012 at 4:15 p.m.

VI—Bayesian Expressivism

Seth Yalcin

I develop a conception of expressivism according to which it is chiefly a pragmatic thesis about some fragment of discourse, one imposing certain constraints on semantics. The first half of the paper uses *credal expressivism* about the language of probability as a stalking-horse for this purpose. The second half turns to the question of how one might frame an analogous form of expressivism about the language of deontic modality. Here I offer a preliminary comparison of two expressivist lines. The first, *expectation expressivism*, looks again to Bayesian modelling for inspiration: it glosses deontically modal language as characteristically serving to express decision-theoretic expectation (expected utility). The second, *plan expressivism*, develops the idea (due to Gibbard 2003) that this language serves to express 'plan-laden' states of belief. In the process of comparing the views, I show how to incorporate Gibbard's modelling ideas into a compositional semantics for attitudes and modals, filling a lacuna in the account. I close with the question whether and how plan expressivism might be developed with expectation-like structure.

I

Introduction. Contemporary metaethical expressivism is widely taken to be, in part, an empirical thesis about some fragment of natural language, a fragment including normative vocabulary. Qua empirical linguistic thesis, the proposal has not gotten very far. Some would say that it has not gotten anywhere. The thesis is not visible in the empirical study of natural language. The debate about expressivism in the literature has overwhelmingly centred, not on whether the thesis is empirically superior to rivals in accommodating various subtle linguistic phenomena, but on elementary questions fantastically prior to this, such as whether expressivism is even in principle compatible with a compositional semantics for a very simple possible language (such as the language of propositional logic). From the perspective of serious, detailed inquiry into natural language, metaethical expressivism is not in the game.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
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This fact is perhaps not surprising. For despite being in part a thesis about language, expressivism has not traditionally been motivated in the first place by linguistic considerations.[1] Its canonical motivation stems instead from a package of theses concerning the metaphysics, epistemology and (especially) psychology of the normative. The prototypical expressivist is best construed as driven to her distinctive claims about language by these antecedent non-linguistic commitments. She enters the linguistics room, as it were, already with certain philosophical and psychological axes to grind; and her first order of business is not to *give* (to offer an account of some hitherto unexplained linguistic data) but to *take* (to call for some account of normative talk fitting harmoniously with her antecedent philosophical and psychological constraints, in the process seeming to reject otherwise motivated accounts).

Of course, it is fair enough to theorize about language, or whatever, from the point of view of constraints one sees as having substantial independent motivation. What is objectionable is just the lack of results. It remains controversial whether there is a version of metaethical expressivism that delivers anything besides problems for the theorist of language. To many, it has at best seemed to wrinkle linguistic theory, to call for the reinvention of perfectly functional wheels; at worst it has seemed simply incompatible with an explanatory semantics and pragmatics. It has not helped matters that expressivists have not exactly coalesced around anything like a specific programme. But, being so unmoored from linguistic phenomena in the first place, it is unsurprising that there is little agreement concerning just what the expressivist's linguistic programme actually is, or should be.

This bleak narrative could be disrupted if a version of expressivism could be shown, not merely to be conceptually coherent and compatible with a sensible linguistic theory, but also to offer positive explanatory advantages for such theory. In Yalcin (2007, 2011) I aimed for just that, developing a version of expressivism substantially motivated in the first instance by considerations about language. The expressivist programme of this work, however, does not concern normative language, the traditional domain of metaethical

[1] I oversimplify for the sake of narrative. There is, of course, the strand of expressivism that begins with the idea that moral language is prescriptive language, belonging in the same class as imperatives. See, for example, Stevenson (1937) and (especially) Hare (1952).

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
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expressivism. It concerns a quite different fragment of language—a fragment incorporating epistemic modals, conditionals and probability operators. It differs also from more familiar forms of expressivism in carrying no particular antecedent metaphysical agenda, and in not being a form of non-cognitivism. But the story is recognizably expressivist in being guided by an independently motivated conception of the states of mind involved in accepting sentences of the target fragment, in claiming that assertions of sentences of the target fragment canonically serve to express states of mind not equivalent to full belief in propositions, and in being a development of the idea that sentences of the target fragment are not straightforwardly factual.

In connection with probability operators ('probably', 'likely', etc.), the proposal leans on a broadly Bayesian conception of the underlying states of mind. Briefly, it develops the thought that in asserting something like

(1) Allan is probably in his office,

one may express an aspect of one's credal state, without describing that state. One expresses one's confidence, that is, without literally saying that one is confident. The relevant credal state expressed is of course a doxastic (hence 'cognitive') state, but it is not a state tantamount to full belief in a proposition. *Credal expressivism* is what I call this view.

In this paper, my objective is to clarify the general structure of this kind of expressivism. The emphasis will be less on the particular linguistic motivations, discussed already in some detail elsewhere, than on the conceptual contours of the view, though I hope to make it clear where linguistic considerations can assist in mooring productive foundational inquiry. I want in particular to clarify the various roles that the notions of attitude, content, force, semantic value and expression play in framing this form of expressivism. The details here are different, in many cases, from textbook forms of expressivism. Notably: credal expressivism, I explain, is best construed as a pragmatic thesis, not as a semantic thesis. But like other theses in pragmatics, it imposes constraints on semantics. Below I try to clarify what these constraints are. These various objectives occupy §§II–VII below.

The expressivist strategy I offer will, I hope, be of interest to expressivists of a more traditional stripe, for it can be adapted and ap-

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

plied to normative discourse. Indeed, I aim to show how (though I don't aim to give a full defence of such a view here). After distilling the general features of credal expressivism in §VIII, I ask whether an analogous kind of expressivist view could be had for the language of deontic modality. §IX explores specifically whether such language is apt to be understood as serving to express decision-theoretic *expectation* (expected utility), where this notion is understood to track desire and preference in the usual way. Packaged together with credal expressivism, such a view would yield a thoroughgoing kind of *Bayesian expressivism*. My exploration concludes negatively, however: the most flat-footed sort of expectation expressivism about deontically modal language does not work.

§X tries again, beginning with a quite different idea about the states of mind underlying deontic talk: the idea, developed in detail by Gibbard (2003), that the target states are *plan-laden* states of mind. Here the results are markedly more promising: I show how Gibbard's fundamental modelling ideas can cohere with existing work on the compositional semantics of deontic modals and attitudes, and with credal expressivism. The results help to clarify, I hope, what expressivism about normative states of mind can look like, and the question how linguistically plausible Gibbard's brand of expressivism is.

The penultimate section investigates some possible ways of elaborating the plan-oriented semantics for deontic modals broached in §X. Here I explore the prospects for an agent-relative reading of deontic clauses, broadly in the spirit of Schroeder (2011). And I return to the idea of expectation, asking now whether our planning states might themselves incorporate expectation-like structure. On such a gloss the expectations would reflect, not what an agent prefers, but rather (something like) what an agent views as fit to be preferred, or realized, or chosen. Together with credal expressivism, this view too would yield a kind of Bayesian expressivist package for epistemic and deontic modalities—albeit one of an unusual variety.

II

Attitude, Content, Structural Character. In philosophical theorizing about a wide array of intentional mental states, it is usual to individuate mental state types by the specification of a pair of values

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

along two dimensions: *attitude* and *representational content*. The distinction roughly tracks differences apparent on the surface of ordinary talk. Thus the mental states corresponding to (i) and (ii) are said to be the same in attitude, and to differ in representational content, whereas the states (ii) and (iii) are said to be the same respect of representational content, but to differ in attitude:

(i) Believing that it is raining
(ii) Believing that it is snowing
(iii) Imagining it is snowing

From the perspective of a functionalist understanding of such states, the different attitudes—belief, desire, imagination, etc.—correspond to characteristic functional role types. The content of a state is one of the features by which its functional structure is articulated, so we get more determinate functional role types by specifying particular representational contents. A state's having content is also assumed to be that feature in virtue of which the state is intentional— the feature in virtue of which it has its aboutness.

Shifting now to a broadly Bayesian modelling perspective, wherein a complete doxastic state is representable by a probability space, or by a set of probability spaces,[2] we can ask what features of this model correspond to the traditional notions of attitude and content. I take it the usual answer is something like the following. First, contents are taken to correspond to the *objects of credence*: the things over which the probability measures are defined. (I will generally use 'proposition' to mean *the sort of thing capable of playing the object of credence role*.) Second, the Bayesian is interpreted as dramatically multiplying possible attitudes. In place of a single attitude of belief either taken or not taken toward some content, the Bayesian is taken as recognizing an uncountable plenitude of attitudes, one for each real number in the interval $[0, 1]$. Thus if my credal state associates the proposition that it is raining with 0.9 probability, and your credal state associates the proposition that it is snowing with 0.9 probability, we are described as taking the same attitude towards distinct contents (in respect, anyway, of these particular

[2] Modulo some subtleties introduced below, I will work with ordinary quantitative probability spaces, thereby glossing over some subtle issues about how much structure is truly required to characterize the target states. On the possibility of primitive comparative probability, see Fine (1973); on the possibility of taking conditional probability as basic, see Hájek (2003).

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

properties of our respective global doxastic states). Likewise, if my credal state associates the proposition that it is raining with 0.9 probability, and your credal state associates the proposition that it is raining with 0.87 probability, we are described as taking different attitudes towards the same content.

This way of extending the jargon of attitude and content to a Bayesian setting seems to me unhelpful at best, however. Whether one is in a state assigning a given proposition 0.9 credence or 0.87 credence, there is a completely straightforward sense in which the states in question are of exactly the same attitude type. They are doxastic states—as distinguished from states of preference, or imagination, or presupposition, or whatever.

Rather than proliferating attitude types in response to the probabilistic structure introduced by the Bayesian, we do better to say that a Bayesian model of belief recognizes further joints in psychological nature. We need a further distinction. The thought is reinforced by reflection on our ordinary ways of talking. Consider:

(a) Believing that it is raining
(b) Believing that it is probably raining
(c) Imagining it is probably raining

The first state corresponds, prima facie, to ordinary 'binary belief' in the proposition that it is raining. The second state corresponds to a state of highish confidence in the proposition that it is raining—the sort of thing a Bayesian would normally model as a credal state associating that proposition with some highish probability, or range of probabilities.[3] These two states, let us agree, are doxastic attitudes. They are of the same broad attitude type—differing notably in this respect from (c), for example. The two states also have the same representational content. They do not differ in what they are about: the representational content of each state is the proposition that it is raining.

Since the states (a) and (b) are distinct, but are plausibly described as the same in respect of attitude type and the same in respect of representational content, we do well to recognize some other dimension along which they differ. I will use *structural character* to refer to this dimension. Thus we will say that (b) and (c) are the same in

[3] For a vindication of this gloss on (b), see Yalcin (2007, 2011, 2012*b*). (More on this below.) On the context-sensitivity of probability talk, see Yalcin (2010) and references cited therein. Below I generally ignore this context-sensitivity, assuming a 0.5 threshold in connection with 'probably' for expository convenience.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

respect of structural character, differing in this respect from (a). This jargon adverts, obviously, to the additional structure the Bayesian picture postulates. What this picture is doing, *inter alia*, is moving beyond the idea that to model an attitude state we can simply name an attitude type and then supply a list of propositions. The Bayesian model calls for further structure to be laid down over these propositions—probabilistic structure, notably, at least when dealing with belief and belief-like states. The textbook Bayesian also recommends the structure of a preference ordering over propositions to model desire-like states, or states reflecting some comparative valuing of outcomes. This too I would read as a proposal about structural character.

Moving beyond belief and desire, we can recognize various further attitude states as equipped with structure in the present sense. Reflection on the semantics of the language used to pick out state (c), for example, suggests that imagination states can be profitably viewed as equipped, or equipable, with probabilistic structure, or something tantamount. Likewise for states of presupposition. The state of presupposing that it is probably raining, it could be said, is structurally analogous to a credal state, in that it involves associating a class of open propositions with (ranges of) probability values.

I will elaborate and defend that view about presupposition below. But one more point about the idea of structural character. Although Bayesianism can be seen to recommend the notion, we can of course make good use of it entirely in abstraction from a Bayesian point of view. One might agree that states of belief have structure without agreeing that this structure is straightforwardly probabilistic in character. Perhaps a global state of belief has a very different structure. Perhaps it is the structure recommended by Dempster-Shafer theory, or by cumulative prospect theory, or by support theory. Perhaps it has, in some relevant sense, a structure akin to that of a database. And so on. If one has any such model, one has motivation to embrace the jargon of structural character.

III

Structuring the Common Ground. To articulate credal expressivism we need, in addition to the notion of structural character, the idea of the *common ground* for a conversation. Roughly, this corresponds

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

to the body of information mutually taken for granted by those in conversation. (For background, see Stalnaker 2002.) On the most elementary picture, the common ground of a conversation is given by the set of propositions mutually presupposed by the interlocutors, with presupposition assumed to be a 'public' attitude in the sense that the presuppositional states of a set of interlocutors are correct only if they match, having the same content and structure. We could define this set for a group in terms of presupposition and common knowledge, as follows:

> A proposition *p* is *common ground* in a group just in case all members of the group presuppose the proposition *p*, and it is common knowledge (in the group) that everyone in the group presupposes the proposition *p*.

Plausibly, the notion of a common ground is central to any model of normal linguistic communication. It fixes the state of play in conversation at any given point; it is where the 'score' of the conversation resides (Lewis 1979*a*). It is also central to articulating the characteristic rational purpose behind the performance of various forms of speech act—asserting, raising questions, and so on. Broadly following Stalnaker and Lewis building upon Grice, I will take it that the mutually understood proximal rational aim of speech acts generally is to effect some change in the common ground of the conversation —to update the conversational scoreboard. Our more distal communicative objectives—of transferring knowledge, raising questions, convincing, misleading, and so forth—are generally achieved *by way of* changing the common ground.

It is important not to conflate the notion of common ground with the notion of common belief. These are quite distinct ideas. Sometimes more is common ground than what is common belief—as when we converse under (explicit or tacit) suppositions, or when we make polite conversation, allowing in presuppositions we don't plan to take home. Other times, the common ground does not include propositions that are common belief, as when we reason under counterfactual suppositions, or tell stories. And even setting aside such cases, what exactly one comes away from a conversation actually believing always depends on subtleties about trust and perceived authority. Such factors may, but needn't, influence what one presupposes: whether they will or not in any given case depends on the goals and interests of the interlocutors, and on the mutually un-

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

derstood point of the conversation. A model of the abstract dynamics of the common ground, and of the general way in which the common ground is updated by speech acts, does best to prescind from these factors.

How many ways are there to change the common ground? This depends on how much structure the common ground has. If we retain the elementary picture just sketched, wherein the common ground is modelled merely as a set of propositions, changing the common ground could only be a matter of adding or removing propositions from the set. Now perhaps this is enough structure to model assertion, at least in the simplest cases: we could follow Stalnaker (1978) and say that the characteristic effect of successful assertion is to update the common ground by adding to it a proposition.[4] Asserted sentences could then be associated with a characteristic sort of operation on, or update to, the common ground—in the jargon of Heim (1983), with a characteristic sort of *context-change potential*: namely, the sort of operation that adds a proposition.

I think it is hard to deny that this Stalnakerian picture of assertion supplies a powerful modelling angle on just what one is doing, or trying to do, when one asserts something. It is less clear, however, that our elementary model of the common ground lends itself to fruitful analysis of the structure of other kinds of speech act. Consider raising questions. If I ask you whether it is raining, I do not seem to be adding propositions to the common ground; nor do I seem to be subtracting propositions. To get a formal grip on their discourse effect, it would be nice if we could associate questions with some characteristic effect on the common ground; but the present model of the common ground lacks a structure adequate for modelling such updates. Likewise for commands.

One could take this difficulty as a general objection to the idea of modelling speech acts from the perspective of their characteristic effects on the common ground. But an alternative reaction is to see in these points motivation for maintaining that the common ground must have additional structure. According to this reaction, if the context-change potential of a question cannot be articulated as an

[4] Stalnaker's preferred analysis of assertion also assumes that the propositions in the common ground are closed under entailment. I am abstracting from this further commitment here—though I take it on later.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

operation on common grounds construed as sets of presupposed propositions, the right conclusion to draw is that we must revise our model of the common ground. That indeed is a move made in the literature on questions and commands—arguably with fruitful and illuminating results.[5]

When we add structure in this way, though, it is best not to lose sight of the fact that in talking about the common ground, we are always talking about the states of mind of conversing agents—in particular, their states of presupposition. To 'add structure' to the common ground is always equivalent to making a proposal about the structural character of the mental state of presupposition. (Or so I shall assume.)

It is also worth noting that theorizing about presupposition in the way I am describing—by postulating additional structure for the state as required to model varieties of conversational update—leads easily to a relatively abstract notion of presupposition, one removed from, and not especially answerable to, the ordinary word 'presuppose'. That of course is no objection; if we like, we may kick away the ladder supplied by ordinary language and resort to some technical term for the postulated target public mental state. We could, for instance, trade talk of presuppositional states for talk of *conversational states*. I will go back and forth between both ways of talking as convenient below.

If we recognize that conversational states may have some non-trivial structural character in addition to propositional content, and think that sometimes the conversational objective in updating the common ground by tokening a sentence is to coordinate on aspects of structural character rather than on, or merely on, some propositional content per se, we do well to work with a broader conception of the sort of thing that can count as common ground; and we do well not to assume that tokening a sentence is always tantamount to expressing or asserting a proposition. Just what range of objects we should say can count as 'in' the common ground will depend on the contours of particular theories of particular phenomena, but for a preliminary we can retreat to the idea of a *sentence* being common ground, working with the following schema:

[5] See, among may others, Hulstijn (1997), the papers in Aloni et al. (2007), Portner (2005, 2007), Ninan (2005), Charlow (2010). The general theoretical viewpoint here is in the spirit of Lewis (1979*a*).

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

> A sentence ϕ is *common ground* in a group just in case the conversational state of each member of the group incorporates the update associated with ϕ, and moreover the fact that this is so is common knowledge in the group.

—where a conversational state 'incorporates the update associated with a sentence' just in case it is in the range of the sentence's context-change potential. Thus as long as we can articulate what it is for a conversational state to incorporate the update associated with a sentence, we can use the above to explain what it is to take the thing 'expressed by' the sentence as common ground.

IV

Context Probabilism. Now the credal expressivism I wish to develop crucially depends on the idea of adding structure—probabilistic structure—to the conversational states of agents in discourse. This further structure will enable us to characterize the distinctive results of the conversational updates associated with expressing the target Bayesian states of mind: states of credence. (We come to utility-theoretic expectation later.) That characterization in turn will serve as our precisification of what 'expressing credence' amounts to.

Return to:

(1) Allan is probably in his office.

What we are presently interested in is not the internal compositional semantics of this sentence, but rather in its characteristic effect on the common ground of a conversation when uttered. More specifically, we are interested in the question what it is to incorporate the conversational update associated with it.[6]

In theorizing about this question, our credal expressivist is moved, in characteristic expressivist fashion, by a conception of what it is to *believe* that Allan is probably in his office. Or as we could put it by semantically ascending, our expressivist is moved by an idea about the truth conditions of a sentence embedding (1) under 'believes':

(2) Simon believes that Allan is probably in his office.

[6] In this paper I set aside the question of conversational dynamics per se. For some discussion of that issue, see Yalcin (2007, 2012*a*).

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

The basic modelling idea is this: (2) is true just in case Simon is in a state assigning highish credence to the proposition that Allan is in the office. Or, so as not to beg the question against the Bayesian who favours unsharp probabilities: he is in a credal state leaving open only highish probabilities for that proposition. (2) is true just in case Simon is in a certain probabilistically articulated belief state, namely, one which rules out assigning the *Allan-in-office* outcome 0.5 odds or lower. Thus the representational content of the belief state described by (2) is just the proposition that Allan is in his office. We do not construe the sentential operator 'probably' as contributing to the determination of the state's representational content. Rather, it marks an aspect of the probabilistic structural character of the state.[7]

It helps to think of matters in terms of the property Simon's probabilistically articulated belief state must have in order for (2) to be true. The target property is one a state has just in case it only allows probability to be apportioned so that

$$\Pr(\text{Allan in office}) > 0.5.$$

The property is, again, partly a matter of the structural character of his belief state.

So our credal expressivist adopts some version of the Bayesian modelling approach to belief and, using the structure supplied by that model, adopts a hypothesis about the conditions under which (2) is true. Equipped with this hypothesis, he then returns to the question what it is to accept (1) in conversation—the question what it is to be in a conversational state incorporating the conversational update associated with this sentence. He gives the simplest possible answer to that question, consistent his assumptions so far: to be in a conversational state that incorporates the information that Allan is probably in his office is exactly like being in a state of belief incorporating that information. To believe that Allan is probably in his office, your belief state must satisfy the property articulated above.

[7] The hypothesis might be contrasted with the idea that the truth of (2) is a matter of Simon's having 'full' belief in a proposition concerning his own credence, or concerning his evidence; alternatively, with a proposition concerning the frequency of the *Allan-in-office* outcome relative to some reference class of possible events; alternatively, with a proposition concerning Allan's propensities; etc. For some further discussion, see Yalcin (2007, 2011). I do not deny that 'probably' may sometimes track one or more of these notions, with sufficient priming of context. It is enough for my purposes that there is a reading of the operator behaving as I describe.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

Likewise, says the credal expressivist, for accepting that Allan is probably in his office in conversation: this too is a matter of one's conversational state satisfying exactly the above property.

To say this, of course, our expressivist must accept a further modelling assumption, namely, that conversational states admit of probabilistic structural character, akin to the structure of belief. My credal expressivist does take on this commitment. I call this further commitment *context probabilism*. It is the view that the common ground admits of probabilistic landscaping.

Once we go context probabilist, we face a maze of choice points about how exactly to employ probability-theoretic tools in the representation of presupposition—just as we already do when modelling graded belief. We can abstract from many of the fine details for current purposes, but to fix ideas it will be useful to take a stand on three specific modelling assumptions. (Readers may wish to skim the following section, returning only as needed.)

V

Three Modelling Assumptions. First modelling assumption: we will work with the idea that a conversational state is representable as (at least) a *set* of probability spaces. We will not assume that conversational states in general can be associated with a single probability space. The motivations for this assumption are discussed in Yalcin (2012*b*). To mention one: we need the resources to distinguish these two states:

(a) the state of failing to presuppose that Allan is probably in his office;
(b) the state of presupposing that it is not the case that Allan is probably in his office.

If a conversational state is represented with only a single precise probability space, it is hard to see how we can distinguish these.

Second modelling assumption: we are working with sets of probability *spaces*, not merely with sets of probability *measures*. As usually defined, a probability space is a triple of a sample space, a Boolean algebra over the sample space (or more generally, a σ-field), and a measure over the algebra obeying some probability axioms. Much work in the Bayesian literature on unsharp or vague probabil-

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

ities works with a conception of the sample space and its affiliate algebra as fixed. A belief state is represented as a set of probability spaces, but these probability spaces all share a common sample space and algebra; the variation is only in the way they apportion the probabilities. As a consequence, such approaches usually speak of modelling belief via sets of probability measures. But we will find it useful to model conversational states via sets of probability spaces whose members potentially *differ* in respect of sample space and in respect of algebra. These further dimensions supply us with the structure needed to model aspects of conversation and presupposition not particularly probabilistic in character.

Consider first ordinary factual, non-probabilistic information. Suppose I say

(3) Allan is in his office,

leaving probabilistic hedging out of it. What is it to be in a state of presupposition incorporating the update associated with this sentence? I will take it, broadly following Stalnaker (1978), that this is just a matter of being in a conversational state which rules out the possibility that Allan is not in his office. And I will take it that this is a property a conversational state satisfies just in case, for every probability space P the state leaves open, the sample space of P includes only possibilities wherein Allan is in his office. (Thus I take it sample spaces are sets of possible worlds, and I take sets of possible worlds to be propositions.) With ordinary non-probabilistic factual talk we seek to express conditions on the world at large. We reflect these conditions in the model as conditions on sample spaces. That leaves us with a fairly conservative extension of the Stalnakerian picture. We can to a great extent ignore probabilistic structure in the modelling of discourses not particularly probabilistic in character.[8]

Next consider questions. These too are not in general probabilis-

[8] Note this has the consequence that ordinary factual propositions, when asserted and accepted, can only receive probability 1 according to the affiliate common ground. That appears to be the correct assumption—consider: 'There is a chance Allan is not in his office. But he's in his office.' But note that this decision point is closely connected to the question of how to understand the relation between graded and binary ('full') belief. If we give a semantics of 'believes' in a way which mirrors the way I have claimed sentences are accepted in conversation (as I assume below we should), we seem to have the result that full belief requires probability 1; but there are familiar worries for that view. (For some relevant discussion, see Maher 1993, Sturgeon 2008.) I think belief ascriptions are context-sensitive in a way evades these difficulties, but I lack the space to expand on that thesis here.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

tic in nature. In modelling the update effect of questions in the context of the present apparatus, it is natural to reach for conditions (not on the sample space or probability measure, but) on the algebras of our probability spaces. If, as one well-known model of questions has it, they typically correspond to partitions of logical space, then coordinating on a question in conversation is a matter of ensuring that for every probability space P the state leaves open, the algebra of P is defined over that partition. Raising questions is a way of imposing constraints on the algebras of propositions left open according to our conversation. We could take such constraints too as reflecting the *subject matter* of the discourse, or the *issues* raised within it. (For elaboration of this kind of gloss, see Lewis 1988, Hulstijn 1997, Yalcin 2011.)

Third modelling assumption: we must depart in one important way from the traditional definition of a probability space. As we noted, normally a probability space involves the specification of a sample space and an algebra defined over that sample space. We will want something slightly different, however: we want to allow that the algebra may be defined over subsets drawn from (some partition of) all logical space, not just the sample space. The reason is that otherwise, precious few propositions will have well-defined probabilities as conversation proceeds.

You may reply that I abuse the term 'sample space'. This reply is correct. So let me now adjust the jargon. The probability spaces we need are, strictly speaking, not triples but quadruples of

(i) the space of all possible worlds W, the *sample space*;
(ii) some privileged subset s of W, call it the *domain*;
(iii) some Boolean algebra A of subsets of W including s; and
(iv) some probability measure defined over A such that $\Pr(s)=1$.

The non-standard additional structure we have added is (ii). The domain plays the role we have so far credited to the sample space. Factual statements serve to place conditions on the domain; adding the proposition that p to the common ground is removing the worlds where p is false from every domain left open by the common ground.

The role of the domain is, *inter alia*, to reflect what might really happen according to a given space (in the sense tracked by epistemic possibility modals). In particular, if I say

(4) Allan might be in his office,

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

and this becomes accepted in context, then the common ground will be minimally such that, for all probability spaces *P* it leaves open, the domain *s* of *P* includes worlds where Allan is in his office.[9]

VI

Credal Expressivism. The set-up for the credal expressivist view is now essentially complete. Yet we have not said anything very precise about what 'expressing credence' means, or could mean, on this model. Although I doubt that the present account particularly needs a precise notion of expression, some remarks on this are in order.

What should we mean when we talk about *what is expressed* by sentences uttered in context? One could approach the question in myriad ways. My approach has been to ask what it is that becomes common ground in the aftermath of successful utterance: to look for the new property our conversational states become coordinated on. With ordinary factual talk, the property we become coordinated on is, in effect, a property of the world at large; we coordinate on a way the world is. With probabilistic talk, by contrast, the property is instead partly a matter of the structural character of our states.

We can make this a bit clearer. Call any state of mind that admits of probabilistic structural character an *information state*. For my credal expressivist, belief is an information state; so too are presupposition and imagination; plausibly, so too is knowledge. (On the latter, see Moss 2011, Yalcin 2012*a*.) Then what we can say is that factual and probabilistic sentences alike, when tokened unembedded, serve to express properties of information states. The sort of property we get from the former is one corresponding in a straightforward way to a state of the world—a truth condition in the most familiar sense. Not so the latter sort of property, which is a matter in part of structural character.

Thus, in a narrow sense, what (1) 'expresses' is a certain abstract property of information states, a property it has in virtue of its structural character. This property is what our conversational states come to share when the assertion of (1) succeeds. The next question

[9] This idea is implemented elegantly in the dynamic semantics of Willer (2010); see also Willer (2012*a*). I assume further that if (4) is accepted in context, then for all spaces *P* left open, the algebra of *P* is such as to include the proposition that Allan is in his office. (Compare Yalcin 2011.)

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

is this: when does expressing this abstract property of information states constitute expressing *credence*?

The answer, it seems to me, is complex, but not particularly pressing for the expressivist. To express your credence per se via (1), one natural requirement is that your credal state actually have the property of information states you are expressing. A second requirement is for this property of your credal state to be appropriately implicated in the causal genesis of the utterance. A third natural requirement is pragmatic: it is for it to be mutually taken for granted within your discourse that anything added to the common ground is apt for belief. (If I utter (1) in the context of telling some fiction, I am not expressing credence.) Probably there are further requirements. No doubt we have a cluster of overlapping 'expression' concepts in this vicinity. Anyway, there is no special problem here for the expressivist. The general problem of filling in the details—and it is unclear whether it is an interesting problem—recurs for the question what it is to express ordinary 'binary' belief via the assertion of an ordinary factual sentence like 'Allan is in his office'.

Moreover, however exactly the details get filled in, it will be clear that *expressing credence* is not equivalent to *describing one's credence*. A sentence that serves to do the latter, such as

(5) I'm reasonably confident that Allan is in his office,

corresponds, in the current setting, to a very different property of information states. It corresponds to a condition on possible worlds, a condition incorporated into the common ground as a constraint on domains.

As I see it, the special challenge expressivism has faced is not the challenge of precisifying the ambiguous notion of 'expressing an attitude'. Rather, the challenge raised by the expressivist idea is the question of how to make room, in our model of conversation and communication, for the possibility of speech acts that canonically serve to engender coordination on properties states of mind have in virtue of features besides (or beyond) their representational content. My emphasis in the preceding has, accordingly, been on addressing this question.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

VII

Expressivism, Semantics and Pragmatics. Credal expressivism is primarily a view about the characteristic conversational impact of tokening unembedded sentences of the target discourse on the common ground of a conversation. It is a view about this inspired substantially by a Bayesian conception of the underlying states of mind—or, semantically ascending, by a Bayesian conception of conditions under which attitude ascriptions embedding the target sentences (such as (2)) are true. It is thus best understood as a thesis in pragmatics. Of course, like many pragmatic theses, credal expressivism imposes some non-trivial constraints on compositional semantics. Still, the view is not helpfully viewed as a thesis of compositional semantics proper. In particular, it is not a special kind of semantic theory. (You may have noticed the general absence of interpretation brackets in the preceding.) As I will note below, the view is compatible with a range of concrete compositional semantic proposals about probability operators, conditionals and epistemic modals.

This conception of expressivism—as a pragmatic thesis—differs from the conception one typically finds in the metaethics literature. There, expressivism is usually taken to be a view about meaning—about the semantic values of the target class of sentences. Here are two fairly characteristic descriptions of the received conception:

> The centerpiece of any quasi-realist [expressivist] 'account' is what I shall call a psychologistic semantics for the region: a mapping from statements in the area to the mental states they 'express' when uttered sincerely. The procedure is broadly recursive. Begin with an account of the *basic states*: the attitudes expressed by the simplest statements involving the region's characteristic vocabulary. Then assign operations on attitudes to the various constructions for generating complex statements in such a way as to determine an 'expressive role' for each of the infinitely many statements in the area. (Rosen 1998, pp. 387–8, discussing Blackburn 1993)

> The basic idea of expressivism is that it is the job of a semantic theory to explain what a sentence, 'P', means, by saying what it is to think that P. (Schroeder 2008*a*, p. 704)

On a natural reading of these quotes, expressivism is (*inter alia*) a specific view about what kind of object sentences of the target dis-

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

course serve to compositionally contribute to complex sentences in which they occur. It is, at least in part, a thesis of descriptive semantics—one ultimately quite difficult to motivate on linguistic grounds, judging by the results.

Why have expressivists tended to state their view in this way? The full answer is no doubt complex, but it seems to me at least two confusions are sometimes involved. There is a tendency, first, to trade on an ambiguity in the word 'express'. On one use—the use in play at the end of the last section—the verb relates a person, an utterance, a state of mind, a conversational context, and perhaps more. The notion belongs, if anywhere, to pragmatics. On another, much more specific and technical use, it relates a linguistic expression to its compositional semantic value. This notion belongs to semantics. Discussions of expressivism have sometimes slid back and forth between these usages. But such movement is illicit. Although I am happy to say (as I did above) that, given an appropriate context, one can express one's credence by tokening the sentence 'Allan is probably in his office', I would *not* be happy to say that embedded occurrences of the clause do so. That looks to be, if even coherent, just obviously mistaken. For instance, when I utter

(2) Simon believes that Allan is probably in his office,

I am not 'expressing my credence' with the embedded clause in any natural sense. Rather, I am, with the whole sentence, describing Simon's credal state. Likewise if I utter

(6) Simon imagines that Allan is probably in his office.

Here again I am not expressing credence; nor am I even describing someone else's credal state. I am describing Simon's (probabilistically structured) state of imagination. The sense in which we express credence with probabilistic language is not a sense that applies unrestrictedly to embedded occurrences of these sentences.[10] The expressivist has no problem maintaining this.

Second, and related, there has been a tendency—not just in the expressivist literature, but in the philosophy of language literature at large—to conflate (i) the compositional semantic contribution of a clause with (ii) the sort of thing the sentence characteristically

[10] Nor does it even apply unrestrictedly to *unembedded* occurrences; again, this depends in part on the mutually understood point of the conversation.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

adds to the common ground of a conversation. But it is a mistake to conflate these notions. They correspond to very different theoretical roles. The claim that these roles are realized by the same kind of object is a substantive, high-level empirical thesis. Very plausibly, the thesis is false: see Lewis (1980), Yalcin (2007), Ninan (2010*a*), Rabern (2012), among others. Thus when I claim that the sort of thing 'Allan is probably in his office' adds to the common ground is in effect a certain property of information states, this should not be taken to entail that the semantic value of the clause must literally be identical to that property. I incur no such commitment.

This is not to say credal expressivism has no semantic debts; far from it. It is just that the articulation of these debts is subtler than is usually assumed about expressivist positions. The view I have advanced does impose non-trivial constraints on semantics—in particular, at least the following two constraints.

First constraint: If assertions of 'Allan is probably in his office' are to characteristically add the to the common ground the property of information states I have isolated, it follows that knowledge of the compositional semantic value of the sentence, together with any standing mutually known pragmatic norms and relevant facts of context, must be sufficient to determine this property. Moreover, if we are to accommodate the productivity of linguistic understanding, the rule for recovering this property as a function of compositional semantic value, mutual pragmatic knowledge, and context must be finitely statable.

Second constraint: I have said that credal expressivism is partly inspired by a conception of the truth conditions of attitude ascriptions like (2). A thesis merely about the truth conditions of a sentence in context is not equivalent to a thesis about its compositional semantics, but it does impose a serious constraint on that semantics, namely that it be sufficient to determine those truth conditions in context.

Credal expressivism would be seriously undermined if the best account of the semantic interaction of attitude verbs like 'believes' and modals like 'probably' was such as to preclude the possibility of determining the sort of truth conditions our expressivist hypothesizes for sentences such as (2); and it would be undermined if the best account of the semantics of probability operators made it difficult or impossible to recover, in a systematic way, the property of information states the expressivist claims is typically added to the common

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

ground by sentences such as (1). Contrariwise, credal expressivism would be powerfully buttressed if the best semantic theory did satisfy the above two constraints. Considerations from semantics are thus of central importance for the evaluation of the view.

Fortunately, there are several compositional semantic proposals in the literature, each independently motivated and conservatively extending existing assumptions, which dovetail well with our two constraints. For a conservative extension of an ordinary intensional semantic framework, one which can be read as evolving Kratzer's classic work on modal operators (Kratzer 1977, 1981, 1991), see Yalcin (2007, 2011, 2012*a*); relevant here also is Klinedinst and Rothschild (2012), Rothschild (2012). For a conservative extension of a textbook dynamic semantic framework, one that can be seen as evolving Veltman's important work on epistemic modals (Veltman 1996), see Yalcin (2012*b*); also relevant here is Willer (2010, 2012*a*). An event-based semantics compatible with our expressivist constraints is given in Hacquard (2006). This work indirectly supports the credal expressivist's pragmatic thesis. It also underscores the point that our expressivism does not require some radically new form of semantics. I refer the reader to these works for the full formal semantic details.

VIII

An Expressivist Programme. My title is 'Bayesian Expressivism', but I have so far only articulated the credal and probabilistic side of the story. It remains to broach the possibility of expressivism about decision-theoretic expectation. To get to that, it will help to first step back and try to say, in a general way, what collection of moves makes for the sort of expressivist position I have tried to stake out. There are around five moves:

(i) Postulate some feature a state of mind has in virtue, or partly in virtue, of its structural character. (Example: probabilistic structure for belief.)

(ii) Motivate the idea that this structural character is implicated in the truth conditions of some class of attitude ascriptions. (Example: our truth conditions for (2) above.)

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

(iii) Allow that conversational states of mind may exhibit analogous structural character. (Example: context probabilism.)

(iv) Associate the embedded clauses of the attitude ascriptions targeted at (ii) with a class of speech acts whose characteristic effect on the common ground is not (merely) to add some new representational content, but rather to influence or manipulate the aspect of its structural character introduced at (iii), and in a manner consistent with the truth conditions of the attitude ascriptions. (Example: the thesis that (1) is a proposal to add a certain probabilistic constraint to the common ground, namely, just the constraint Simon's state of belief satisfies when (2) is true.)

(v) Show that all of the above is consistent with an empirically plausible compositional semantics.

Credal expressivism fits this basic outline. The results are empirically plausible, I claim. But it should be clear that one might in principle arrive at a variety of expressivist views within this general format by beginning with some different (non-credal) notion of structure, and by emphasizing a different fragment of discourse. With that in mind, turn next to decision-theoretic expectation and the language of deontic modality.

IX

Expectation Expressivism, Desire and Deontic Modality. If we are Bayesian, it is certainly logically possible that there could be a linguistic practice, analogous to credal expressivism, whereby we express and coordinate upon expected utilities. Is it plausible that there is such a practice?

We begin with a suggestive lead. Deontic modals are known to be 'information-sensitive' in just the way that epistemic modals and probability operators are (see Kolodny and MacFarlane 2010, Klinedinst and Rothschild 2012): their behaviour when embedded in 'information-shifting' contexts, such as attitude and conditional environments, strongly suggests that deontic clauses are semantically evaluated relative to states of information. It is also plain that the

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

structure supplied by the states of information we have so far postulated is (while arguably adequate to epistemic modals and probability operators) not sufficient for the semantics of deontics; these exhibit sensitivity also to some further structure.

In articulating what this further structure is, there is some temptation, from a Bayesian perspective, to implicate expected utility. Expected utility is, after all, partly a function of the probabilities of the relevant outcomes. In the relevant sense, it is an information-sensitive quantity. So if we added utility-theoretic structure to our information states and proposed that deontic modals were sensitive to the resulting expected utilities, we would be in position to predict their information-sensitivity. Moreover, given the standard idea that utilities and expected utility reflect preference and desire, we would have the beginning of an expressivism holding that some normative language—deontically modal language—is in the business of expressing preference or desire-like states. And in at least *some* incarnations, metaethical expressivism has tried to be just such a view.

The question is now whether natural language deontic modals really work this way. There is a variety of approaches one could take to investigate this. I propose to begin from a proposal in the semantics literature that does fruitfully exploit utility-theoretic structure. This is Levinson's proposal about the semantics of 'wants' (2003). Consider, for instance:

(7) Jane wants Billy to wear a helmet.

Taking ideas from Stalnaker (1984) and Heim (1992) in a Bayesian direction, Levinson supplies an elegant compositional semantics according to which (roughly) (7) is true just in case, relative to Jane's state of credence and her utilities, the expected utility of Billy's wearing a helmet is greater than the expected utility of Billy's not wearing a helmet. He demonstrates some empirical advantages this general account has over leading alternatives (for example, Heim 1992, von Fintel 1999).[11]

Now suppose Levinson's approach to 'wants' is the right one. Then the expectation expressivist we just described could try leveraging it in order to motivate her idea about deontic modals. One

[11] Büring (2003) expresses scepticism about Levinson's semantics. But he misdescribes Levinson's proposal (see his summary of the view on p. 10, which omits the role of probability within the account), and he produces no counterexamples to it.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

straightforward way of doing this would be to hypothesize that the truth conditions of (7) and of (8) are equivalent:

(8) Jane thinks Billy ought to wear a helmet.

If such an equivalence—between 'wants' sentences and 'thinks ought' sentences—generally held, one could use the Levinsonian semantics to defend the view that deontically modal talk is sensitive to expectational structure, and to develop the idea that when 'ought'-talk occurs unembedded, it typically serves to express expectation, construed as a state of wanting.

In fact, it would be routine to give a compositional semantics for (8) such that it has the truth conditions Levinson predicts for (7). The trouble is that such a semantics would be totally incorrect, as the hypothesized equivalence between 'wants' and 'thinks ought' does not hold. This will have been obvious to many readers from the start, but to bring it out, compare:

(9) Judy thinks Vann ought to apologize.
(10) Judy wants Vann to apologize.

It is easy to imagine a case where the truth values of these sentences come apart. Perhaps: Judy thinks she was wronged by Vann; she thinks those wronged ought to get apologies; but also, banking on Vann's stubbornness, Judy has bet a large sum of money on Vann's never apologizing. In such a case it may be that (9) is true but (10) false. It is easy to multiply examples. A naive expectation expressivism for deontics, in the crude form in which I have just imagined it, does not fly. The simple point is that one's views about what ought to be the case need not line up in any clean way with what one desires.

Of course, it may be that some other fragment of language is fruitfully modelled as characteristically expressing decision-theoretic expectation. I leave that open. Second, it may still be the case that to have a view about what (deontically) ought to be the case is to be in a certain non-bouletic state of mind whose structure is *formally akin* to that of expected utility. I return to this idea below.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

X

Plan Expressivism and Deontic Modality. The expressivist approach to 'ought' is to think first about what makes for the truth of sentences such as (8) or (9). The idea that their truth flat-footedly tracks the agent's desires (or expected utilities, construing these as tracking desire) certainly fails, we just observed. Let us consider another leading expressivist idea.

According to Gibbard (2003) (see also Gibbard 1990), to have a view about what one ought to do is not equivalent to belief in ordinary matters of fact; nor is it equivalent to a state of desire or preference. Rather, it is to be in a certain kind of *sui generis* planning state of mind. Gibbard offers to model this state of mind formally with the notion of a *hyperplan*. A hyperplan is a maximal contingency plan: it

> … covers any occasion for choice one might conceivably be in, and for each alternative open on such an occasion, to adopt the plan involves either rejecting the alternative or rejecting rejecting it. In other worlds, the plan either forbids an alternative or permits it. (Gibbard 2003, p. 56)

In Gibbard's technical development, hyperplans are taken as primitive in the way that possible worlds are taken as primitive in a possible worlds semantics. This primitivism about hyperplans is understandable, given some of the intended analogies between the two notions; but it obscures the important fact that hyperplans can be modelled entirely in terms of possibilia. It is clarifying to build hyperplans out of possibilia explicitly, so I will do that here. As a start, we may model them as follows: a hyperplan is a function that takes a set of possible worlds (a set which reflects a possible informational situation vis-à-vis what the world is like; a set reflecting 'an occasion of choice') to some non-empty subset of that set (a set reflecting outcomes which it is permissible to realize according to the hyperplan, given the informational situation).[12] Gibbard postulates that a planning state of mind—a view about what to do—has the structure supplied by a set of hyperplans. To have the view that realizing proposi-

[12] This is in certain respects closer to the development in Gibbard (1990). The hyperplans of Gibbard (2003) should strictly be modelled via sets of *centred* worlds. We come to this below.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

tion p is the thing *required* in a given situation s is for all of the hyperplans h compatible with your planning state to be such that $h(s) \subseteq p$. To have the view that p is *forbidden* relative to that situation is for all of these hyperplans h to be such that $h(s) \subseteq \neg p$. To have the view that p is *permissible* is for all of these hyperplans h to be such that $h(s) \cap p \neq \emptyset$. To be on the fence about the deontic status of p is for none of these conditions to hold of your planning state.

Gibbard has made the crucial first moves toward an expressivism of the general sort I have explored here: he supplies and motivates a modelling proposal for a state of mind with a distinctive structure, and he in effect implicates that structure in the truth conditions of sentences which ascribe 'ought'-thoughts to agents. To continue to progress, we should want to see that his hypothesized truth conditions, or something very like them, are determinable compositionally for the relevant class of attitude ascriptions; for instance, sentences such as (8) and (9).

Gibbard himself does not supply a semantics. More specifically: he does not supply a compositional semantics for attitude verbs (like 'thinks') and for deontic modals that would generate the truth conditions he hypothesizes that 'thinks ought' ascriptions have. Scepticism about the possibility of such a semantics underlies some of the resistance to his view; and I suspect that general unclarity about the details have lead to some confusion about what exactly plan expressivism is, or could be.

A compositional semantics making good on Gibbard's modelling proposal can, however, be given. In fact, doing so is more straightforward than it superficially appears. A slight adjustment to some recent proposals about the semantics of deontics and of attitude verbs like 'thinks' will get the desired results. Let me explain.

Begin with deontics. As we are modelling them, hyperplans are formally analogous to the *deontic selection functions* Kolodny and MacFarlane (2010) postulate in giving an information-sensitive semantics for deontic modals.[13] Building on their proposal, the plan expressivist can adopt the following intensional semantics for deontic 'ought':

$$[\text{OUGHT } \phi] \quad \langle w, h, s\rangle = 1 \text{ iff } \forall w' \in h(s)\colon [\phi]\langle w', h, s\rangle = 1$$

[13] As they characterize it, 'A *deontic selection function* … maps an information state [a set of worlds] to the set of worlds that are *as deontically ideal as possible*, given that information' (Kolodny and MacFarlane 2010, p. 133).

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

Extensions are here relativized to points of evaluation that are triples of a world w, a state of information s, and a hyperplan h. We abstract from probabilistic structure for now, treating information states as sets of worlds. The above semantics is identical to that of Kolodny and MacFarlane (2010), save for the fact that hyperplans form a component of the points of evaluation in our model, with 'ought' clauses sensitive to that parameter.

By adding a hyperplan parameter in this way, the Gibbardian plan expressivist can postulate that attitude verbs serve to shift it—just as these verbs shift the world of evaluation in a Hintikka-style possible worlds semantics—and thereby she can compositionally recover her postulated truth conditions for sentences ascribing 'ought'-thoughts.

To make this precise, begin with the usual idea that to any agent α and possible world w, there corresponds the set of worlds $B(\alpha, w)$ compatible with the way α believes the world to be in w. Then, following Gibbard, add that to any such α in w there corresponds also the set of hyperplans $H(\alpha, \mathrm{w})$ left open by α's planning state of mind in w. The former determines the agent's factual beliefs in w; the latter determines the agent's views about what is to be done relative to various informational situations. Paired, these comprise an agent's *plan-laden belief state*.[14] We now hypothesize that ascriptions involving 'thinks' ('believes', etc.) may be sensitive to *both* aspects of one's plan-laden belief state; and we assume that these verbs are information state-shifting for their complements in the style of Yalcin (2007), as follows:

$$[\textsc{thinks}_\alpha\ \phi] \quad \langle w, h, s\rangle = 1 \text{ iff } \forall h' \in H(\alpha, w)\colon \forall w' \in B(\alpha, w)\colon [\phi]\langle w', h', B(w, \alpha)\rangle = 1$$

This semantics conservatively extends the received possible worlds semantics for attitudes. When there is no plan-sensitive vocabulary in the vicinity, we may safely ignore the quantification over hyperplans entirely.

[14] A not uncommon worry: 'I understand the technical machinery of hyperplans, but what I don't understand is: in virtue of what is one in a given plan-laden state of mind?' Some, notably Schroeder (2008*b*), have worried that the question ultimately fails to receive a non-question-begging answer in Gibbard (2003). It seems to me that to give an answer to the question one should supply an account of the functional role of a planning state (just as one might supply an account of the functional role of belief, in response to the question in virtue of what one is in a belief state representable as a set of possibilities). And as I read it, Gibbard (2003) is largely devoted to the task of characterizing that functional role.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

The two semantic values we have just given suffice to get the outcome our plan expressivist is after: the truth conditions of 'thinks ought'-claims now track the plan-laden states of mind of their subjects. For example, (8) comes out true at *w* just in case every hyperplan left open by Jane's planning state in *w* requires Billy's wearing a helmet, when evaluated relative to the way Jane takes the world to be in *w*.

Crucially, moreover, important aspects of the above semantic values admit of non-trivial empirical motivation quite apart from any particular expressivist agenda. If Kolodny and MacFarlane (2010) are correct, we already need the idea that deontic modals are sensitive to hyperplans and information states; and if Yalcin (2007) is correct, we already need the idea that attitudes are information state-shifting. These semantic values evolve ideas already well-motivated within natural language semantics.

To complete the story, our plan expressivist naturally wants the idea that unembedded deontic claims can serve to express plan-laden states of mind. We can make this intelligible in the same general style as credal expressivism. Endow the common ground with planning structure, in the obvious way: let a common ground be a pair of an information state and a set of hyperplans—an instance of a *plan-laden information state*. Second, construe unembedded deontic talk as pragmatically serving to add a constraint to the plan-laden common ground—namely, exactly the kind of constraint isolated in the clause for 'thinks' above. Such constraints will not in general correspond to the addition of a proposition (possible worlds truth condition) to what is presupposed. (Compare Lewis 1979*b*, Portner 2005, Ninan 2005.)

What I have just described is a package of theses in semantics and pragmatics about deontic language. The package shows a way that the plan expressivist conception of what it is to think deontic thoughts can cohere with a compositional semantics for deontic modals and attitudes, and with a pragmatics making the idea of 'expressing a plan' with deontic talk formally clear and distinctive in its effect on the common ground. The package requires no departure from model-theoretic semantics, or from a broadly representationalist conception of the mental. It does not require a deflationary conception of truth, and it does not assume a theory of meaning according to which compositionality is not explanatory. It does not require a radical reassessment of the foundations of semantics. And

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

it does not require a semantic theory which introduces a dramatic bifurcation between the semantic values of normative vocabulary and the rest.

Of course, I have not said enough to fully motivate the package here. The study of natural language deontic modals is a flourishing area of contemporary research, and there is no hope of engaging the range of data that would be required to show that the package is a serious contender from a linguistic perspective.[15] My objective here has mainly been to describe a general path the plan expressivist can take to get into the game.

Like credal expressivism, I see plan expressivism chiefly as a pragmatic thesis, and not a thesis about particular semantic values. The semantic values I describe above are meant to show a way that the pragmatic thesis can cohere with a compositional semantics of the target discourse. But no doubt there exists a range of formally different compositional semantic systems that can cohere with the plan expressivist's pragmatic thesis, just as there exists a range of formally different semantic systems cohering with credal expressivism. Moreover, the general shape of the plan expressivist idea for deontic language can survive adjustments to the predictions of this particular semantics.

Indeed, it is plain the details of the story will need to evolve. In the next section I flag three possible directions for refining the semantics, again reserving extended discussion for elsewhere.

XI

Extensions: Agent-Relativity, Probability-Sensitivity and Expectation Revisited. First, we might add to the semantics the possibility for a reading of deontic clauses wherein they are, in a certain sense, *agent-relative*. Second, we might want to enable 'oughts' to be sensitive to the probabilities supplied by a state of information. Third, we might wish to allow for the idea that hyperplans distribute some kind of value over the permissible outcomes. I discuss each of these in turn.

[15] A fraction of the recent work in this vicinity: Hacquard (2006), Kolodny and MacFarlane (2010), Charlow (2011), Cariani (2011), Chrisman (2011), Klinedinst and Rothschild (2012), Lassiter (2011), Schroeder (2011), von Fintel (2012), Kratzer (2012), Willer (2012*b*).

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

Agent-Relativity. Noting related proposals from Broome, Wedgwood, and within general philosophical lore, Schroeder (2011) argues that we should like a semantic distinction between two readings of 'ought', an *evaluative* sense and a *deliberative* sense. The former sense is supposed to be most clearly operative in deontic sentences which, roughly, serve to characterize what would make for ideal circumstances, without necessarily indicating in any direct way that an agent is permitted or obligated to perform a certain action. One of Schroeder's examples:

(11) The meeting ought to start at noon.

The deliberative reading, by contrast, is supposed to track a relation between an agent and an action—one 'more closely connected' to the notion of obligation than the evaluative sense, and one more straightforwardly operative in 'advice-giving' uses of 'ought'. The deliberative reading is generally the natural one where a rational agent is the understood subject:

(12) Holmes ought to start packing.

Now it is a subtle matter determining whether we have a distinction here to be marked in the semantics of these constructions. But I think Schroeder is on to something. We can see this in connection with a problem arising for the plan-laden semantics for deontics described above.

Suppose John's puppy has been poisoned; so too Niko's kitten. Naturally there is only enough antidote left in the world to save one of their pets, and the price is too high. Now consider Jay, who knows all of this. Jay takes pet ownership seriously. He is amazed at John's complacency. His view is that the thing for John to do, given his situation, is to steal the last of the antidote and give it to his puppy. Jay is amazed too at Niko's complacency: Jay thinks that the thing for Niko to do, given *his* situation, is to steal the last of the antidote and give it to his kitten. As we could put it:

(12) Jay thinks Niko ought to steal the remaining antidote and give it to his kitten.

(13) Jay thinks John ought to steal the remaining antidote and give it to his puppy.

Very plausibly, Jay's views are coherent. But the hyperplan seman-

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

tics sketched above would entail that if (12) and (13) are true, it follows that Jay is in an incoherent plan-laden belief state.[16] This prediction is incorrect. Although it may be allowed that (12) and (13) do have readings according to which they describe an inconsistent state of mind, we should grant, too, that they can describe a totally coherent outlook. And here a distinction like Schroeder's naturally suggests itself. The readings of (12) and (13) which make for inconsistency in Jay's state seems to fit with what Schroeder calls the *evaluative* sense of 'ought'; the more natural reading, allowing for consistency, seems to fit with what he calls the *deliberative* sense of 'ought'.

Our plan-laden semantics appears to capture the evaluative sense well enough, but not the deliberative sense. I think this shortcoming can be addressed, however, and in a manner redounding to the credit of a plan-laden approach.

Upgrade first to *self-locating* plan-laden belief states: to any agent α and possible world w, there corresponds the set of *centred* worlds $B(\alpha, w)$ compatible with the way α believes the world to be in w; and to any such α in w there corresponds also the set of *centred* hyperplans $H(\alpha, w)$ left open by α's planning state of mind in w. A centred hyperplan is what it sounds like: it is a function taking a set of centred worlds (construed as body of self-locating information) to a set of centred worlds (construed as the permissible centres for the relevant agent to occupy, given that information; equivalently, the property the relevant agent must satisfy in order to be in accord with the hyperplan). (The model of plan-laden belief states supplied by Gibbard 2003 is already self-locating in the present sense.)

Equipped with self-locating structure, we can now mark the distinction we want. Consider again the natural reading of (12). When Jay thinks Niko ought to steal the antidote, what he thinks is this: positioned as Niko is in the world, the thing to do, for someone so positioned, is to steal the antidote. More precisely: take the centred worlds compatible with Jay's state of belief, and *shift their centres* to Niko.[17] This yields a body of centred informational content re-

[16] In the sense that every hyperplan compatible with his planning state of mind yields, when evaluated relative to his belief worlds, the empty set. (One might try appealing to context-sensitivity and context-shifting for 'ought' here; but that would appear harder for 'Jay thinks anyone with an ailing pet ought to steal the remaining antidote'.)

[17] Or if you prefer: shift each centre to the agent who answers to Jay's individual concept for Niko relative to the corresponding world. (Compare Stalnaker 2008, ch. 3.)

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

flecting how Jay locates Niko in the world. For Jay to think that Niko ought to steal the antidote is for all of the hyperplans compatible with Jay's planning state, when evaluated at this shifted-centred information state, to call for antidote-stealing.

This kind of 'ought'-thought thus provokes a kind of *other*-location. We could call this kind of reading of a deontic clause *agent-relative*, since that is apparently what it is: its semantic contribution varies with the choice of subject. The sort of semantics needed to get the reading just described must deliver roughly the following:

$$[\text{OUGHT}_{\alpha}\ \phi]\ \langle c, h, s\rangle = 1 \text{ iff } \forall c' \in h(s_{\alpha})\text{: } [\phi]\langle c', h, s\rangle = 1$$

where α is the subject of the deontic clause.[18] The key change to the previous semantics is the idea that hyperplans are evaluated relative to an information state s_{α} whose centres have been shifted from the evaluation information state s. Being loose about use and mention in the obvious way, a simple definition of s_{α} would be:

$$s_{\alpha} = \{\langle \alpha, w\rangle\text{: } \exists x\text{: } \langle x, w\rangle \in s\}$$

Note that this proposal requires the clause embedded under the deontic modal to semantically contribute a set of centred worlds. Fortunately, that is already a leading idea about the interpretation of infinitival clauses. (See the great body of work building on Chierchia 1989.)

Would this agent-relative reading of an 'ought'-clause require a distinct lexical entry for 'ought'? What we have observed is only the need to re-centre the evaluation information state. For all we have noted, this shift may be induced by some element other than the deontic modal.

The preceding recommends the idea of adding structure for reflecting self- and other-locating information to the common ground. For initial forays into this, see Stalnaker (2008) and Ninan (2010*b*).

Probability-Sensitivity. Next we must note that 'oughts' are sensitive, not just to which possibilities are open or closed relative to the information, but also to what is likely or unlikely:

[18] Note that we assume our points of evaluation are now triples of a centred world c, a centred hyperplan h, and a self-locating information state s (a set of centred worlds).

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

(20) If the restaurant is probably open, we ought to go.
(21) If the restaurant is probably closed, we ought to stay home.

This suggests that hyperplans should be ultimately defined on information states having probabilistic structure.

Expectation Revisited. This probability-sensitivity hints at a way the concept of expectation might re-enter the scene. Suppose a hyperplan delivered, relative to a probability space, something more subtle than just *the thing to do*. Suppose it delivered an assignment of expectation values to outcomes, with these behaving formally like expected utilities of the usual sort. But don't think of the underlying utility values here as reflecting desire; we observed earlier that that gloss points the wrong way. Instead, adopt a more refined conception of plan-laden states of mind: the hyperplan indicates, for each of a relevant class of outcomes, how fit it is to be realized. On this idea, what one thinks ought to be the case *is* after all a matter of maximizing one's expectation of some kind of value, but the sort of value in question need not reflect one's preferences, or how much one desires the outcome; rather we let it reflect to-be-doneness, or choiceworthiness, or to-be-realized-hood. This is the idea that a normative state of mind, considered as distinct from a state of desire or preference, can be usefully modelled via expectation-like structure.

The idea is intelligible. Is it true? Why posit extra structure, and why have it be *expectation-like* in character? And why think *deontic modals* serve to express that kind of state of mind? Lassiter (2011) has conjectured (building on Goble 1996, Levinson 2003, among others) that giving a semantics for deontics exploiting such structure helps (*inter alia*) with two well-known puzzles about deontic modals: Ross's paradox (Ross 1941) and the case of the procrastinating professor (Jackson and Pargetter 1986). Cariani (2011) posits further structure too, though not expectation-like in character, to deal with the same problems. Kai von Fintel (2012) complains in both cases that the medicine is worse than the malady.

I cannot enter into these debates in a serious way here, so let me just say the following. There would be an intuitively pleasing symmetry about the package of credal expressivism for probability talk and some kind of (normative) expectation expressivism for deontic

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

talk. But it is quite unclear such a package can be had. The disanalogies between deontic modals and probability operators are non-trivial, and in respects that appear to weigh against a fundamentally quantitative model of deontic language.[19] But whether or not the semantics of deontic modals requires expectation-like structure, I hope the preceding makes plain how such a semantics could be incorporated into an expressivist conception of the pragmatics of deontic talk. The question of how an expressivism about deontic modal talk could possibly go is in many ways separable from the question of exactly what structure the semantics of deontic modals requires.

XII

Closing. I have claimed that credal expressivism in connection with probability talk is plausible; that plan expressivism in connection with deontic talk has promise; and that (normative) expectation expressivism remains at best an open question.

Do the views I have defended involve too large a departure from conventional ways of modelling linguistic communication? The more radical position, I think, is to maintain the status quo. It is ever so plausible that we have credence-like states of mind, and that we should often like to coordinate them. It is plausible, too, that we enter into states of mind of the plan-laden sort, and that we have a need to make and share plans together. If we are indeed creatures with probabilistically structured and plan-laden states of mind, why should we have adopted a linguistic practice compelling us to squeeze these highly structured states always into a simplistic propositional medium for conversational transmission? Why shouldn't we have fixed instead on a linguistic practice akin to what I have described, whereby we may give direct voice to the properties our

[19] First, probability operators are gradable, while deontics (and, for that matter, the 'pure' epistemic modals) seem not to be. (For some relevant discussion, see Yalcin 2007, Klecha 2011.) Second, deontics seem not to cry out for analysis in terms of a quantitive scale, as probability operators do. Third, preliminary evidence (unpublished studies by the author) suggests that deontic modals are far less sensitive to the contextually salient alternatives than probability operators. (Relevant here is Windschitl and Wells 1998, study 4.) Fourth, probability operators do not admit of the multitude of possible readings that the modal auxiliaries used to express deontic modality appear to allow.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

states of mind have in virtue of their probabilistic or plan-laden character? The easiest answer, it seems to me, is: no reason.[20]

Department of Philosophy
University of California, Berkeley
Berkeley, CA 94720-2390
USA
yalcin@berkeley.edu

References

Aloni, Maria, Alastair Butler, and Paul Dekker (eds.) 2007: *Questions in Dynamic Semantics*. Oxford: Elsevier.

Blackburn, Simon 1993: *Essays in Quasi-Realism*. Oxford: Oxford University Press.

Büring, Daniel 2003: 'To Want It is to Want to Be There: A Note on Levinson (2003)'. Paper for workshop on the Division of Linguistic Labour, Château de la Bretesche, France. http://www.linguistics.ucla.edu/general/Conf/LaBretesche/papers/buring.pdf.

Cariani, Fabrizio 2011: '"Ought" and Resolution Semantics'. Forthcoming in *Noûs*. doi: 10 .1111/j.1468-0068.2011.00839.x.

Charlow, Nate 2010: 'Restricting and Embedding Imperatives'. *Amsterdam Colloquium* 2009, *Lecture Notes in Artificial Intelligence*, 6042, pp. 223–33.

——2011: 'What We Know and What To Do'. Forthcoming in *Synthese*. doi: 10.1007 /s11229-011-9974-9.

Chierchia, Gennaro 1989: 'Anaphora and Attitudes *De Se*'. In R. Bartsch, J. van Benthem and P. van Emde Boas (eds.), *Language in Context*. Dordrecht: Foris.

Chrisman, Matthew 2011: '"Ought" and Control'. *Australasian Journal of Philosophy*, 90(3), pp. 433–51.

Fine, Terrence 1973: *Theories of Probability: An Examination of Foundations*. New York: Academic Press.

von Fintel, Kai 1999: 'NPI-Licensing, Strawson-Entailment, and Context-Dependency'. *Journal of Semantics*, 16, pp. 97–148.

——2012: 'The Best We Can (Expect To) Get? Challenges to the Classic Se-

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Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

mantics for Deontic Modals'. Presented 17 February 2012 at the Central Meeting of the American Philosophical Association, Chicago, IL. http://mit .edu/fintel/fintel-2012-apa-ought.pdf.

Gibbard, Allan 1990: *Wise Choices, Apt Feelings*. Cambridge, MA: Harvard University Press.

——2003: *Thinking How to Live*. Cambridge, MA: Harvard University Press.

Goble, Lou 1996: 'Utilitarian Deontic Logic'. *Philosophical Studies*, 82(3), pp. 317–57.

Hare, R. M. 1952: *The Language of Morals*. Oxford: Oxford University Press.

Hájek, Alan 2003: 'What Conditional Probability Could Not Be'. *Synthese*, 137(3), pp. 273–323.

Hacquard, Valentine 2006: *Aspects of Modality*. Ph.D. thesis, Massachusetts Institute of Technology.

Heim, Irene 1983: 'On the Projection Problem for Puppositions'. In D. Flickinger et al. (eds.), *Proceedings of the Second West Coast Conference on Formal Linguistics*, pp. 114–25. Stanford, CA: Stanford University Press.

——1992: 'Presupposition Projection and the Semantics of Attitude Verbs'. *Journal of Semantics*, 9(3), pp. 183–221.

Hulstijn, Joris 1997: 'Structured Information States'. In A. Benz and G. Jager (eds.), *Proceedings of MunDial97*. Munich: University of Munich Press.

Jackson, Frank, and Robert Pargetter 1986: 'Oughts, Options, and Actualism'. *Philosophical Review*, 95(2), pp. 233–55.

Klecha, Peter 2011: 'Positive and Conditional Semantics for Gradable Modals'. Forthcoming in *Proceedings of Sinn und Bedeutung* 16.

Klinedinst, Nathan, and Daniel Rothschild 2012: 'Connectives Without Truth-Tables'. *Natural Language Semantics*, 20(2), pp. 137–75.

Kolodny, Niko, and John MacFarlane 2010: 'Ifs and Oughts'. *Journal of Philosophy*, 108(3), pp. 115–43.

Kratzer, Angelika 1977: 'What Must and Can Must and Can Mean'. *Linguistics and Philosophy*, 1(3), pp. 337–55.

——1981: 'The Notional Category of Modality'. In Hans-Jürgen Eikmeyer and Hannes Rieser (eds.), *Words, Worlds, and Contexts: New Approaches in Word Semantics (Research in Text Theory 6)*, pp. 38–74. Berlin: de Gruyter.

——1991: 'Modality'. In Arnim von Stechow and Dieter Wunderlich (eds.), *Semantics: An International Handbook of Contemporary Research*, pp. 639–50. Berlin: de Gruyter.

——2012: *Modals and Conditionals: New and Revised Perspectives*. Oxford: Oxford University Press.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

Lassiter, Daniel 2011: *Measurement and Modality: The Scalar Basis of Modal Semantics*. Ph.D. thesis, New York University.
Levinson, Dmitry 2003: 'Probabilistic Model-Theoretic Semantics for Want'. *Proceedings of Semantics and Linguistic Theory*, 13, pp. 222–39.
Lewis, David 1979*a*: 'Scorekeeping in a Language Game'. *Journal of Philosophical Logic*, 8(1), pp. 339–59.
——1979*b*: 'Attitudes *De Dicto* and *De Se*'. *Philosophical Review*, 88(4), pp. 513–43.
——1980: 'Index, Context, and Content'. In S. Kanger and S. Ohman (eds.), *Philosophy and Grammar*, pp. 79–100. Dordrecht: Reidel.
——1988: 'Relevant Implication'. *Theoria*, 54(3), pp. 161–74.
Maher, Patrick 1993: *Betting on Theories*. Cambridge: Cambridge University Press.
Moss, Sarah 2011: 'Epistemology Formalized'. Forthcoming in *Philosophical Review*.
Ninan, Dilip 2005: 'Two Puzzles About Deontic Necessity'. In Jon Gajewski, Valentine Hacquard, Bernard Nickel, and Seth Yalcin (eds.), *New Work on Modality*, MIT *Working Papers in Linguistics*, 51, pp. 149–78.
——2010*a*: 'Semantics and the Objects of Assertion'. *Linguistics and Philosophy*, 33(5), pp. 355–80.
——2010*b*: '*De Se* Attitudes: Ascription and Communication'. *Philosophy Compass*, 5(7), pp. 551–67.
Portner, Paul 2005: 'The Semantics of Imperatives within a Theory of Clause Types'. In Kazuha Watanabe and Robert B. Young (eds.), *Proceedings of Semantics and Linguistic Theory*, 14. Ithaca, NY: CLC Publications.
——2007: 'Imperatives and Modals'. *Natural Language Semantics*, 15(4), pp. 351–83.
Rabern, Brian 2012: 'Monsters in Kaplan's Logic of Demonstratives'. Forthcoming in *Philosophical Studies*. doi: 10.1007.s11098-012-9855-1.
Rosen, Gideon 1998: 'Blackburn's *Essays in Quasi-Realism*'. *Noûs*, 32(3), pp. 386–405.
Ross, Alf 1941: 'Imperatives and Logic'. *Theoria*, 7(1), pp. 53–71.
Rothschild, Daniel 2012: 'Expressing Credences'. *Proceedings of the Aristotelian Society*, 112, pp. 99–114.
Schroeder, Mark 2008*a*: 'What is the Frege-Geach Problem?'. *Philosophy Compass*, 3(4), pp. 703–20.
——2008*b*: *Being For: Evaluating the Semantic Program of Expressivism*. Oxford: Oxford University Press.
——2011: 'Ought, Agents, and Actions'. *Philosophical Review*, 120(1), pp. 1–41.
Stalnaker, Robert 1978: 'Assertion'. In Peter Cole (ed.), *Syntax and Semantics*, 9, pp. 315–22. New York: Academic Press.
——1984: *Inquiry*. Cambridge, MA: MIT Press.

Proceedings of the Aristotelian Society, Vol. CXII, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x

——2002: 'Common Ground'. *Linguistics and Philosophy*, 25(5–6), pp. 701–21.
——2008: *Our Knowledge of the Internal World*. Oxford: Oxford University Press.
Stevenson, Charles 1937: 'The Emotive Meaning of Ethical Terms'. *Mind*, 46, pp. 14–31.
Sturgeon, Scott 2008: 'Reason and the Grain of Belief'. *Noûs*, 42(1), pp. 139–65.
Veltman, Frank 1996: 'Defaults in Update Semantics'. *Journal of Philosophical Logic*, 25(3), pp. 221–61.
Willer, Malte 2010: *Modality in Flux*. Ph.D. thesis, University of Texas at Austin.
——2012*a*: 'Dynamics of Epistemic Modality'. Forthcoming in *Philosophical Review*.
——2012*b*: 'A Remark on Iffy Oughts'. Forthcoming in *Journal of Philosophy*.
Windschitl, Paul D., and Gary L. Wells 1998: 'The Alternative-Outcomes Effect.' *Journal of Personality and Social Psychology*, 75(6), pp. 1411–23.
Yalcin, Seth 2007: 'Epistemic Modals'. *Mind*, 116, pp. 983–1026.
——2010: 'Probability Operators'. *Philosophy Compass*, 5(11), pp. 916–37.
——2011: 'Nonfactualism About Epistemic Modality'. In Andy Egan and Brian Weatherson (eds.), *Epistemic Modality*, pp. 295–332. Oxford: Oxford University Press.
——2012*a*: 'A Counterexample to *Modus Tollens*'. Forthcoming in *Journal of Philosophical Logic*.
——2012*b*: 'Context Probabilism'. Forthcoming in Maria Aloni, Vadim Kimmelman, Floris Roelofsen, Galit W. Sassoon, Katrin Schulz and Matthijs Westera (eds.), *Logic, Language and Meaning: 18th Amsterdam Colloquium, December 2011, Revised Selected Papers. FoLLI, Lecture Notes in Computer Science*, vol. 7218. Berlin: Springer.

Proceedings of the Aristotelian Society, Vol. cxii, *Part* 2
doi: 10.1111/j.1467-9264.2012.00329.x