A Sentential Theory for Propositional Attitudes*

In the next few pages, I would like to formulate some programmatic remarks for the theory of intentionality and, in particular, for the semantics of propositional attitudes. Specifically, I would like to indicate the general lines of a sentential theory whose main idea is that mental contents are linguistic items of a public language. Many different authors in the past have argued for inscriptional (Scheffler (1), Davidson (2)) or quotational (Carnap (3), Quine (4)) versions of the theory, but it has been subject to numerous criticisms. (a) It has been argued for instance that treating belief as a predicate of sentences (or tokens of sentences) allows for the reintroduction of paradoxes in a new intentional guise. (Montague/Kaplan (5), Thomason (6)) (b) It is also often seen as threatening in many different ways the very possibility of an epistemic logic. (Bealer (7)) (c) Moreover, the theory also fails to pass successfully Langford and Church's translation test. (8) (d) It involves a criterion of interchangeability that imposes too much restrictions and this leads to a too stringent definition of synonymy. And since speakers do not believe meaningless expressions, meanings remain in any case the important ingredients in mental contents (Cresswell (9)) (e) Finally, it usually leads to an inadequate characterization of *de re* attitudes. (Bealer (10)) In short, there are many difficulties that renders difficult even a sound *formulation* of the theory. My intention is to develop very briefly the general outline of a new sentential theory in which it will be shown that these difficulties can be resolved.

I

I now wish to formulate the main features of a new sentential theory of belief. First, the account is quotational (not inscriptionalist) and similar to the one developped by Carnap even if there are many important differences between the two. Secondly, I want to claim that there is a fundamental semantical ambiguity affecting most verbs of propositional attitudes and determining two different sorts of beliefs, desires, and so on. I will call those two readings the material and the intentional. Finally, the theory takes it for granted that we can make a distinction between character and content for many if not for most expressions of the language. I am referring here of course to Kaplan's distinction. Let us look at these proposals in detail.

First, I propose to analyse initially a sentence like "Pierre believes that London is pretty" as:

(i) $(\exists p)$ [(believes (Pierre, "p")) ‡("p" translates to "London is pretty")].

The account differs from Carnap's own analysis in many different ways. The "existential" quantifier is substitutional and not objectual. I do not quantify over linguistic expressions *qua* expressions and, for this reason, do not need to make an explicit reference to languages. In this new approach, expressions presuppose their

associated semantic rules and presuppose the existence of a language (a system of syntactic rules) to which they belong. Moreover, contrary to Carnap, I need not construe the belief predicate univocally in terms of a disposition to assent. Finally, I do not appeal to a relation of intensional isomorphism but rather to a weaker relation of translation.

The formula is substitutional and I have chosen to introduce a new notation (Kripke's) to represent this kind of quantifier. The informal reading of (i) is that the result of replacing "p" is true for at least one substitutional instance. It is equivalent to the disjunction of formulas that result from replacing the variable by a sentence in the substitutional class. (A universal substitutional formula is equivalent to the conjunction of the same atomic formulas.)

Let me now make some remarks of general interest on substitutional quantification. They will prove indispensable for my argument. To the variable, there corresponds what we call a "substitutional class" containing expressions of some sort as elements. The class is not a domain available for objectual quantification but rather a substitutional class available for substitutional quantification.

The variable occurs in a quotational context and these are very often described as the opaque contexts *par excellence*. Whether or not this is true, it is natural to allow substitutional quantification in these contexts. The result of putting a substitutional variable into quotes does not yield a name for the variable. It is rather more like a quotation function occurring all by itself. Quantifying substitutionally into a quotation context is simply binding the variable of the quotation function. Quotes are like descriptive functions that take objects as arguments and have also objects for values, unlike propositional functions whose values are truth values. However, they form a peculiar sort of descriptive function first because the value of the function is in these cases precisely its argument. Another peculiar feature is that, contrary to the descriptive functions in *Principia Mathematica*, the quotation function is primitive and cannot be defined.

It is very important not to confuse the substitutional quantifier with an objectual quantifier over expressions. A formula like (i) does not assert the existence of an expression. Existence is not asserted but presupposed semantically. The existence of expressions in the substitutional class is a condition that must be met for the formula to have any truth-value whatsoever. The existence or non-existence of expressions in the substitutional class determines whether the formula has a truth value or not. If an objectual quantifier were used, an empty domain would yield falsity. By contrast, a substitutional formula like (i) evaluated relatively to an empty substitutional class has a truth value gap. The formula is neither true nor false but it remains meaningful. This does not imply however that it is meaningful even in the absence of a language. The existence of a language understood in the sense of a system of syntactic and semantic rules is itself implied in the very notion of a substitutional class whether it is empty or not. Since propositional attitude verbs are represented as ranging over substitutional classes, this means that we cannot make sense of notions such as belief and intention without the notion of a language.

This brings us to another important question. It is essential that we treat any expression occurring in a substitutional class as already meaningful. There must be syntactic and semantic rules attached to any expression in a class. This constraint conditions the meaningfulness of all the substitutional formulas in the language. For such formulas to have meaning, its substitutional instances must also have meaning but they will not if meaningless expressions occur as substituends. This is true also in the case where the substituend occurs inside quotes in a given instance. Since quotes are no longer seen as devices for naming expressions *qua* expressions, but rather as a function taking expressions as arguments, these arguments must be meaningful for the result to be meaningful. The meaningfulness of expressions occurring in the substitutional class is therefore a stronger semantic constraint presupposed by the formula since it is a constraint that affects its meaningfulness and not merely its truth value. It is not necessary that the expressions belong only to one language. The class may contain expressions that belong to many different languages. It is not even necessary that the languages be actual. They could be merely possible languages.

We shall have to require also different substitutional classes for different kinds of expressions, that is, for expressions belonging to different syntactic categories. For example, there must correspond to (i) a substitutional class containing only closed sentences as elements.

More importantly, a substitutional class must contain expressions with a determinate order in the sense of Russell's theory of ramified types. This requirement is, in effect, a consequence of the meaningfulness condition imposed above. I said that a substitutional formula cannot be itself meaningful unless the expressions belonging to the substitutional classes are already meaningful. But under what conditions shall we obtain a substitutional language containing only meaningful expressions ? In order to answer this, let us try to imagine what would happen if formula (i) were to appear in its own substitutional class. The meaningfulness of (i) would be guaranteed by its own meaningfulness ! But we have already entered an infinite regress since as a member of its own substitutional class it will again require a substitutional class in which it will appear and which will again partly determine its own meaningfulness. Is such a language meaningful ? At first sight, it seems that it can be because it seems that we have only established that, under those circumstances, a sentence is meaningful only if it is meaningful.

In fact, it depends what we mean by "meaningful". The formula can certainly be "meaningful" if by that word we understand "having a linguistic meaning". But is it meaningful in the sense of expressing truth conditions ? A sentence has truth conditions only if it shows the conditions under which it is true. Now a formula like (i) would do that if it would show that it is true or that it is false under each of its substitutional instances. But would it be true or false in the particular case where the substituend is (i) itself ? The answer is that it would be true if the substituend is itself true and false if it is false. But the substituend can only be true or false if it has meaning and, therefore, truth conditions. We are back to square one because we were precisely wondering whether (i) had truth conditions.

We are now in a position to see that there is something wrong in allowing that a formula be a member of its own substitutional class because, in these circumstances, we must conclude that it has truth conditions only if it is true or false while a sentence can only be true or false if it already has truth conditions. Since the question is precisely whether (i) has truth conditions or not, it cannot be claimed that it is true or that it is false. And so the formula cannot tell whether it is true or false when the substituend is (i) itself. But telling that it is true or that it is false under each of its substitutional instances was precisely the condition that had to be met in order to express truth conditions. The conclusion is that (i) does not express truth conditions if it is allowed among the members of its own substitutional class.

A moment of reflection reveals that similar problems would reoccur if the substitutional class corresponding to (i) were to contain, perhaps not (i) itself, but a formula with the same substitutional class as the one corresponding to (i). The class would contain a formula that appears in its own substitutional class and we would have the same problems all over again. And if the conclusion is that it lacks truth conditions, this will again deprive (i) itself of expressing truth conditions.

We can imagine a third case in which a substitutional class violates the meaningfulness requirement imposed above. Let us suppose that the class corresponding to (i) contains neither (i) itself nor a quantified formula with the same class, but a formula with a substitutional class that contains either (i) itself or a substituend with the same class as the one corresponding to (i). This is also a case where (i) would not become true or false under each of its substitutional instances and thus would not express definite truth conditions. As a matter of fact, we could imagine an infinite list of instances of this third case. It can be generalized as saying that a formula like (i) does not express truth conditions if it contains a formula that involves, somewhere along the line for its definition, a substitutional class that contains a formula with the same substitutional class as the one corresponding to (i).

The three cases examined correspond to Russell's three formulations of the vicious circle principle. The principle states, first, that an entity cannot become an argument for a given function if it cannot be *defined* without defining the function. In this first formulation, what is ruled out is the possibility for a function to become its own argument. In its second formulation, it is said that an entity cannot be the argument for a given function if it *involves a reference* to the domain of the function. This rules out the possibility of having among its arguments a function that involves structurally a quantification over the same domain. In its third formulation, the principle states that an entity cannot be an argument for a given function if it *presupposes* that the domain of the function has already been defined and this rules out cases where the argument has (presupposes) a domain in which a function involves structurally a quantification over (or is defined by) the same domain.

I have formulated the principle for the case of propositional functions but it is clear that similar considerations could be made for closed formulas themselves. The conclusion is

that substitutional formulas require for their meaningfulness substitutional classes of a determinate order. These classes must satisfy the constraints imposed by ramified type theory. It is interesting to notice that Russell's theory has found in this way an independent justification. The severe restrictions imposed on domains by Russell in order to block the formulation of paradoxes are the same as the ones imposed on substitutional classes. It disposes of the criticism that ramified type theory has no justification but the resolution of paradoxes. Ramification is here imposed solely for the purpose of a coherent semantical interpretation of the formulas belonging to a substitutional language.

There seems to be also good reasons to reply to another traditional claim made against ramified type theory. It is usually suggested that such a theory is unable to account for self-reference in natural language. Examples purporting to show that self-reference takes place in natural language are usually of two kinds, those containing a demonstrative expression (viz. "This is a sentence") and those containing a general reference to an expression that happens to be the sentence itself. First, I think that most examples of the first kind are misguided by bad linguistic intuitions regarding the behaviour of demonstratives. I, for one, find it very difficult to read these occurrences as self-referential. A demonstrative, understood in the sense of Kaplan, for instance, must be completed by an act of pointing outside the linguistic context in which it occurs and so can hardly achieve self-reference. The second case is at first sight less controversial.
A sentence like:

(#) What is written at t and 1 is a sentence

seems to be true if (#) is the only written thing at t and 1 and, surely, if it is true it must have truth conditions ! But the temptation to believe it true can perhaps be accounted for as the intuition that a higher order formula saying that it is a sentence is true about it. As far as (#) itself is concerned, can it say that it is a sentence ? Where (#) receives a translation into a substitutional language, an affirmative answer would mean that it can appear as a member of its own substitutional class. We have already seen, however, that if this happens, (#) does not really express any truth conditions. It certainly is not deprived of linguistic meaning, but it is deprived of truth conditions. So the whole issue depends largely upon the plausibility of substitutional readings for those sentences. My purpose is certainly not to argue unequivocally in favour of one reading to the detriment of others, but rather to remove the apparent certainty with which people sometimes argue that there is self-reference in natural languages. It is as though one could presuppose that the ramified theory of types had to be reformative and could not aspire to achieve a certain degree of descriptive adequacy because, of course, there are genuine cases of self-reference in natural language! I would like to suggest that this confidence is not well founded and that there is no way to apprehend what is "really" going on in natural languages apart from particular theoretical frameworks. It is also very interesting to notice that the most convincing examples are ones in which a physical inscription is the referent. If so, we do not seem to have a clear case of self-reference because it is not the physical inscription itself that does the referring. If it is rather the content of the inscription that achieves the referential function, it is not a genuine case of self-reference.

So there does seem to be room for an answer to this other traditional criticism made against Russell's theory.

Before moving on, let me make two more remarks on the formula I chose to represent a propositional attitude sentence. As suggested above, the substitutional quantifier must not be confused with an objectual quantifier over expressions. We must qualify this by adding that if the formula is true, then there is a sentence such that Pierre believes it. An existential claim is part of the "truth conditions" of the formula if the latter are understood as including not only what is asserted but also what is semantically presupposed by it. This ontological commitment is not going to be expressed in the theory which explicitely gives the truth conditions (asserted) of the formula but it will appear in the meta-theory which explicitely states the presuppositions of the theory. And it is only because we want to reflect this meta-theoretical stipulation in the theory that we sometimes express the truth conditions of the sentence by using an objectual quantification over expressions. But it remains misleading to conflate the two sorts of quantifiers and it is better to keep these ontological commitments at the meta-theoretical level.

One final point should be made. Formula (i) has to be quantificational, asserting that a certain sentence is believed by Pierre and is such and such. It is a general formula because Pierre did not need to entertain any particular attitude towards an English sentence. And even if he is an English speaker, the truth of the sentence is compatible with the fact that he believes a sentence semantically equivalent to "London is pretty" but not identical to it. The correct analysis must therefore reflect this fact and must involve a general quantificational statement.

II

Quite apart from this, I would argue for a semantic distinction between material and intentional uses of belief predicates. (The "material / intentional" terminology is inspired by Elizabeth Anscombe (11)) I claim that belief attributions are of two kinds. They sometimes serve to report contents that can transcend the cognitive ressources of the agent either because the ascriber makes the report in his own perspective or because the agent is ignorant of some consequences of his beliefs, or even because the agent simply behaves in a way that reveals his beliefs whether he is willing to recognize it or not. In all these instances, the ascriber reports what is "in fact" believed by the agent. I call this the material use of belief. The quotational context is here perfectly extensional and allows for substitution of identicals. The sentence "Pierre materially believes "London is pretty"" could be partially elucidated as "Pierre behaves in a way that would satisfy what he in fact desires only if "London is pretty" were true". The definition contains an "only if" condition and not an equivalence because Pierre's belief does not imply that the sentence would be true only if his behaviour did satisfy his desires. The truth of the sentence is compatible with the fact that his behaviour does not satisfy his desires because it is a necessary condition and not a sufficient condition for such a satisfaction. The definition also contains a counterfactual condition because, otherwise, the mere fact that his behavior does not satisfy his desires would imply for any particular sentence that he

believes it. Of course, the definition allows for false beliefs. It is claimed that the truth of the statement is a necessary condition for the satisfaction of our desires but not a necessary condition for belief. Having a belief that p is compatible with the fact that one's behaviour does not in effect satisfy one's desires and the falsity of "p", according to the definition, implies only that the behaviour does not. The important thing in the case of a false belief is that the behaviour would have satisfied the desires only if "p" had been true.

The ascriber can also try to reproduce the actual content of the agent's belief, the very mode of presentation of the agent. In this case, beliefs are dispositions to assent. I call this the intentional use of belief. Here we have a more familiar intensional notion. The quotational context is in this case "opaque" and does not allow for the substitution of identicals. But since there are cases where quotational contexts are perfectly extensional, they cannot be held responsible for the failure of extensionality principles and be blamed for opacity. As we shall see, the opacity within quotational context is explained by the constraints imposed on intentional occurrences of attitudinal predicates and is therefore a feature of intentional concepts.

I will have more to say about intentional beliefs, but for the moment it can be pointed out that the notion of material belief enables us to refute a prima facie objection made to the quotationalist. Is is sometimes pointed out that he cannot account for ordinary belief ascriptions to animals. But what looks as evidence against sentential theories turns out to be evidence for the existence of material ascriptions of beliefs. As long as Fido behaves in a way that would be in harmony with what it wants only if the sentence "there is a cat in the tree" were true, we can say that Fido materially believes that there is a cat in the tree.

It is important not to confuse the material / intentional distinction with the distinction between *de re* and *de dicto* attitudes. There are *de re* and *de dicto* material attitudes as well as *de re* and *de dicto* intentional attitudes. For example, Oedipus may believe that he is going to marry Jocasta. But since she is his mother, he entertains about his mother the *de re* material belief that he is going to marry her. But we also have examples of *de dicto* material beliefs. For any sentence "p", if an agent believes "p" and "p" implies "q", then, as a matter of fact, he believes "q" and therefore has a *de dicto* material belief. Now imagine that an agent sincerely assents to the application of the predicate "is mortal" to an individual in the context, say the president of the United States. By an application of the disquotational principle, we could conclude that he has an intentional *de re* belief about the president of the United States. If on the other hand, he sincerely assents to the sentence "The president of the United States is mortal", he expresses an intentional *de dicto* belief. These results reveal not only that some (the material) *de dicto* contexts are extensional, but also that some (the intentional) *de re* contexts are intensional ! However this will come as a surprise only for those who insist in locating intensionality in quotational contexts themselves. If it is instead located in the constraints imposed by a certain concept of belief, the surprise is not so great. This new approach shows, by the way, that beliefs *de se* do not differ in any important respect from other *de re* beliefs. It is often thought that while *de re* beliefs allow for substitution of identicals, *de se* beliefs do

not. It is just that beliefs about one self are most of the time construed as intentional. Since there are clear cases of beliefs about one self that are material (as, for exarnple, when an agent has a belief about someone and does not realize he is looking into a mirror), the important difference lies not in the object of the attitudes (as a distinction between *de re* and *de se*) but rather as a distinction between material and intentional concepts.

It is also important not to confuse the distinction with the one between narrow and broad psychological states. Our distinction is made in the same spirit but, in contradistinction with the concept of a narrow state, the contents of intentional states are understood as linguistic items of a public language and are therefore not individuated individualistically. Finally, the concept of material belief does not imply a realist account concerning the existence of propositional attitudes. I only want to introduce a notion in which agents are related to contents that can transcend their cognitive capacities. The contents are those they "in fact" believe but it does not mean that there is a fact of the matter about beliefs.

The last feature of the theory I would like to put forward involves using Kaplan's distinction between content and character. (12) I would like to apply the distinction between linguistic meaning and content across the board to all the categorematic expressions of the language. This last claim carries with it an air of controversy only if it is thought that meaning must be determinate. But the objectivity of meaning does not require determinacy. The admission of linguistic meanings is compatible with the view that they can vary from one community to the other. Granted that we are able to do this, I believe that we are in a position to answer all of the above criticisms.

III

(a) In the analysis that I propose, the quantifier is substitutional and requires for its semantic coherence substitutional classes containing expressions of a specific order that satisfy the constraints of ramified type theory. (13) As I said before, substitutional formulas have truth conditions only if their substitutional instances have determinate truth conditions, but this can only happen if the substituends themselves have determinate conditions of satisfaction. And it turns out that the substituends would not satisfy this requirement if they made reference to (were defined by or presupposed) the class to which they belong. Thus, substituends will have conditions of satisfaction only if they have a specific order. This will be true for all substituends and will therefore apply to the substitutional formulas themselves, and not only to the expressions belonging to their substitutional classes, because they themselves belong also to substitutional classes. The conclusion is that the formulas of a substitutional language belong to a ramified language and so cannot induce paradoxes. This result is obtained without recourse to an artificial hierarchy of meta-languages. Furthermore, we need only one belief predicate and it is not necessary to add subscripts to different occurrences of the verb. "believes" is a "transcendental" predicate (i.e. a predicate that occurs at all levels in the hierarchy) like "true" and in ramified type theory only predicates of definite orders need subscripts to

indicate their range of significance. In the case of semantical and "intentional" predicates, ramification is being taken care of by the substitutional classes themselves and not by a hierarchy of predicates. The explanation is roughly as follows. A predicate like "x is bald" has a specific range of significance since it applies to individuals. A subscript must therefore be added to it in order to indicate its range. But "believes" and semantic predicates like "true" for instance have no specific range of significance and therefore need no subscript. But the formulas of a substitutional language require for their own significance that the substitutional classes be already defined. When a belief predicate in a substitutional formula applies to a class of sentences containing no transcendental predicates, the requirement that the class be already defined coincides with the requirement that the predicates in the class have a specific range of significance. In this sense, substitutional quantification provides an independent justification for ramification. But the belief predicate does not itself have a specific range. For this reason, when a belief predicate applies to a class containing transcendental predicates, ramification into orders is imposed solely in virtue of the constraint that the substitutional classes be already defined and not in virtue of specific orders already indicated by those predicates.

If what I said so far is correct, a sentential theory couched in a substitutional language has clear advantages over previous quotational accounts for the resolution of paradoxes. It has been claimed that by treating epistemic verbs as predicates of sentences, we run the risk of reintroducing paradoxes in a new "intentional" guise. And it has been shown by Montague and Kaplan that by treating "know" as a predicate of sentences and by accepting certain axioms governing its use, paradoxes can be reinstated. Now the problem is that the only apparent solution for the quotationalist is to impose a hierarchy of epistemic predicates similar to the hierarchy of truth predicates. And such a solution is very highly problematic for many different reasons. It involves the introduction of a potentially infinite list of primitive predicates in the language, thus violating Davidson's learnability constraint. It involves adding subscripts to all epistemic predicates in the language and, for that reason, it must be suggested either that competent speakers somehow are sensitive to the hierarchy or that the proposal is reformative, as Tarski's solution to the paradoxes is "reformative" when applied to natural languages. Finally, the artificiality of the solution reveals itself in a striking way in the manner in which it deals with epistemic and modal logical truths where the intuitive character of those truths is entirely lost. I shall be dealing with some of those difficulties in the next section, but it can already be said that our account circumvents most if not all the problems that I just alluded to. We do not need to postulate an infinite list of predicates and we do not need to add subscripts to epistemic verbs. So we do not need to postulate a hierarchy of epistemic predicates and do not need to suggest that competent speakers somehow have a grasp of such a hierarchy. In this sense, the approach need not be reformative.

The "regimentation" of propositional attitude sentences into a substitutional language satisfying the constraints of ramified type theory will appear to many as abstruse, complicated and completly counterintuitive. In answer to this, I wish to make the following remarks.

1.- First, regimentation merely serves to spell out in a perspicuous way an information that is implicitely contained in a sentence. In this light, the use of a logical notation can

be seen as an artefact of the model. It is of course not suggested that speakers who use language have an implicit mastery of logic or that they make use in a "mental language" of symbols that correspond to the symbols of a logical language. This is a point pertaining to the use of any logical notation in the representation of a natural language.

2.- Secondly, logical notation serves to specify information that belongs to the content of the sentence and not to its linguistic meaning. I wish only to claim that the content of a propositional attitude sentence could be represented by a quantificational formula of a substitutional language and I do not need to postulate in the mind of the speaker such a quantificational knowledge. The competence of speakers does not go beyond a mastery of the linguistic meaning.

3.- Now if this is true, it appears that we need not claim that speakers somehow have a grasp of an implicit hierarchy of belief predicates and of their ramification into different orders. Since we conceive them as transcendental predicates, we need not argue that there is an order registered in their very linguistic meaning that would somehow be understood by any speaker of the language.

4.- As far as the other predicates are concerned, it is entirely another matter. We are committed to the view that a grasp of the linguistic meaning of a predicate like "is bald" goes hand in hand with the understanding of its range of significance, i.e. a knowledge that it applies to individuals, but this is surely much more intuitive.

5.- Notice also that we need only to project in the mind of the competent speaker an understanding of a certain hierarchy of types and not of the orders in which these types can be ramified, since these orders are specified by a quantificational structure and quantificational structure, as it was just observed, merely serves to capture information appearing in the content of a sentence and not in its linguistic meaning.

6.- It is important to understand the role played by the substitutional quantifier in the analysis of belief sentences. It enables us to explain three observations that we can make concerning our ordinary belief ascriptions. It very often seems that the expressions occurring in that-clauses are themselves part of the belief contents and that a change in the expression used may affect the truth of the belief ascription. Secondly, it is clear that the expressions occurring in a that-clause are used and not mentioned for themselves. That is, they clearly occur along with their linguistic meaning and not as meaningless symbols. Third, it is clearly counterintuitive to suggest that belief ascriptions are always implicitely the ascription of meta-linguistic beliefs (beliefs about the meanings of words). It is hard to reconcile these three features of belief ascriptions within traditional approaches. But it is precisely the work effected by the substitutional quantifier. With it we can formulate a quotational theory in which belief contents are expressions that belong to a language and have semantic rules but it is also an account in which these facts are not asserted but presupposed. So what seems a counterintuitive claim turns out to be a very careful explanation of intuitive observations made concerning ordinary belief ascriptions.

7.- The proposal of a "regimentation" of propositional attitude sentences into a substitutional language is compatible with the existence of alternative logical forms. I do not deny that for other purposes, it might be useful to make use of another logical reconstruction.

8.- The proposal is also compatible with Wittgenstein's view of logic as "normative" and as something that we create only for the purposes of partial elucidations of the language.

We certainly need not commit ourselves to the view that logical forms are really "out there" in reality and that in speaking a language, "we operate a calculus according to definite rules".

So one should not be impressed by symbolic notation if it serves the purposes of a partial clarification of the language. In this respect, "regimentation" is perhaps not a happy expression because it suggests that we intend to propose a reform of natural language while our proposal is compatible with the claim that natural languages are perfectly well in order as they stand.

(b) As far as the status of an epistemic logic is concerned, the following things must be said in favour of our account. We are not committed as in other traditional quotational theories to translate each logical truth of modal or epistemic logics by an infinite hierarchy of meta-linguistic formulas each one containing a distinct primitive epistemic predicate. As it was pointed out, we do not need to admit many different primitive belief (or other epistemic) predicates and even less an infinite list of them. So we do not need to add subscripts to them. Furthermore, we do not need to appeal to a hierarchy of meta-languages. Ramified type theory does not require meta-languages because ramification takes place in the domains or in the substitutional classes. It is true that in a substitutional language, the "domains" are classes of linguistic expressions but the important difference is that, as part of the domains of interpretation of formulas and not in the formulas themselves, ramification takes place outside the realm of what is required of a semantically competent speaker. And because of this, we can also claim that the logically competent speaker need not have any access to the infinite list of disambiguated logical formulas of a ramified language. Let us look at this more closely.

I said that some of the features of traditional quotational accounts are no longer present when the account is couched in a ramified type theory. No appeal need to be made to a hierarchy of meta-languages, to a hierarchy of epistemic predicates and therefore to an infinite list of primitive predicates in the language. But still, since we are in a ramified type theory, functional and propositional variables always have domains of a specific order and this implies that an epistemic logical truth expressed in the operator approach will have to be translated by an infinite list of formulas in the predicate approach. And it appears that we still lose some of the intuitive appeal of the operator approach. The problem concerns any formula that involves a quantification over propositional and functional variables. In ramified type theory, we cannot quantify over the universal class of propositions and functions and not even over the class of functions of any given type.

It is true that in a totally disambiguated logical notation, functional and propositional variables should perspicuously refer to their domain of application. And since there is an infinite hierarchy of such domains, to each ambiguous formula, there corresponds an infinite list of totally disambiguated formulas that translate it. Nevertheless, the logical truths (if there are any) of an epistemic logic that can be formulated in a language with operators on statements can be captured also in a substitutional language without losing their intuitive appeal. This is because the functional and propositional variables of a substitutional language semantically presuppose their range of significance and do not

explicitely refer to it. It is not an idiosyncratic property, quite the contrary, and it reveals a fundamental difference between substitutional and objectual variables. In a substitutional language we find room for what Russell called "systematically ambiguous" formulas. (14) We are not cheating and violating ramified type theory by allowing formulas to occur without subscripts added to propositional variables. It is just that they are semantically presupposed and not explicitely being referred to. The only expressions that must carry with them such subscripts are the non-transcendental functional expressions belonging to the extra-logical vocabulary. Kaplan's distinction between character and content is therefore present even in the formulas of a substitutional language. Logical formulas are disambiguated and explicitely refer to the order of their corresponding substitutional classes only in the content that they specify. Logically competent speakers have access usually only to the character of substitutional formulas and therefore to systematically ambiguous expressions. Therefore, the intuition behind any truth in epistemic logic expressed with operators can be captured by the character of a systematically ambiguous formula in a substitutional language. For example, the reflexivity of knowledge is in the operator approach expressed as

(p) (a) (K_a (p) Å $K_a K_a$ (p))

(where the variable 'a' ranges over agents) will be expressed in a substitutional language by the following systematically ambiguous formula:

(ΠP) (Πx) [knows (x,"p") Å knows (x, " knows (x, "p") ")]

where the symbol "Π" stands for the universal substitutional quantifier.

Objections to quotational theories that invoke the viability of epistemic logic are very often ill-conceived. For instance, it is false to suggest that a quotational theory of belief blocks all possible inferences. All the inferences one is interested to make can be made when the verb is understood in the material sense. This is because quotational contexts following a material belief predicate are perfectly extensional. It should also be pointed out that many inferences are in any case not logical but are instead very often founded upon the meaning of the predicates themselves and the choice of a particular logical form for that-clauses does not interfere with any inference based on the meaning of the intentional predicates.

There are many different reasons for choosing to represent propositional attitude verbs as predicates of sentences (or propositions) and not as operators on statements. The multiplication of intensional logics forces a simplification. Instead of having many independent intensional logics, we get a single one in which the operators are replaced by predicates of a higher order. The so called axioms of epistemic and modal logics reveal in this way their true nature as meaning postulates governing the applications of certain predicates. Second, the choice of representing attitudinal verbs as predicates instead of operators concerns ultimately the scope of logic. It is in my view much more natural to treat epistemic verbs as part of the extra-logical vocabulary and not as part of the basic logical operators of the language. Finally, the operator approach allows for *de re*

formulas in its very syntax and I think it is more natural to think of *de re* attitudes as imposing distinct concepts and therefore requiring the introduction of distinct predicates as it is the case in the predicate approach. In this way, a commitment to Aristotelian essentialism in quantified modal logic will not be implied in the very meaningfulness of quantified modal statements by the admission of externally quantified variables that behave as rigid designators, but will rather be a consequence of accepting the truth of certain statements. Similarly, we will no longer need to allow a notion of "knowing who (what)" a person (thing) is to account for the very meaningfulness of externally quantified variables in quantified epistemic logic.

(c) Church has argued that quotational theories very often fail a translation test. Consider, for example, a sentence like

(ii) Pierre believes that London is pretty

Carnap's analysis would read as follows:

(iii) (Ee)(EL) [(Pierre believes e) ‡ (eΔL) ‡ (e means in L what "London is pretty" means in English)]

Instead of "meaning" or a synonymity relation, I could speak of "intensional isomorphism" and write that e is, relatively to L, intensionally isomorphic with "London is pretty" relatively to English. This would be more faithful to what Carnap had in mind. If (iii) is an adequate characterization of what is expressed in (ii), we should want to say the same thing about the French translations for (ii) and (iii):

(iv) Pierre croit que Londres est jolie

(v) (Ee)(EL)[(Marie croit e) ‡ (eΔL) ‡ (e signifie en L ce que "London is pretty" signifie en anglais)]

The difficulty is well known. A mono-lingual speaker of French could understand (iv) without knowing that the content of Pierre's belief can be rendered by the English sentence "London is pretty" or he could be informed of (v) without knowing what Pierre believes.

Church's initial objection is that (ii) cannot be inferred from (iii) and so (iii) cannot be a correct analysis of (ii). The translation test merely serves to reveal this inadequacy. The inference cannot be acccepted unless a premiss is added stipulating that "London is pretty" means that London is pretty. But if we were to interpret the word "English" in (iii) as referring not to a particular linguistic practice but rather to a system of semantic rules, the additional premiss would no longer be required because (iii) would now implicitely refer to it. Now since Carnap's proposal precisely presupposes that a language should be understood as a system of semantic rules, we can grant him at least provisionally a way out of the difficulty.

Church would then object that (iii) is still not a good candidate for synonymy with (ii) because the same proposal made for a sentence in another language, for instance (iv), yields something like:

(vi) (Ee) (EL) [(Pierre croit e) ‡ (eΔ L) ‡ (e signifie en L ce que "Londres est jolie" signifie en français)]

Carnap's proposal must be wrong because (iv) is intensionally isomorphic with (ii) while (vi) is not intensionally isomorphic with (iii).

If we take a language to be merely that thing spoken and written at t by S and, therefore, define the notion pragmatically, then the good translation for (iii) in French will be (v) but the latter surely does not convey the same information as the French translation of (ii), namely (iv). If we suppose that the notion of language is a system of semantic rules, then (iii) makes reference to a sentence with its semantic rules and it is now plausible to argue that it is a correct account of (ii). But the same proposal applied in another language will produce a formula like (vi) which is not synonymous with (iii). In short, where"language" is defined pragmatically, a good translation reveals the inadequacy of the proposal. And where it is defined semantically, the inadequacy of the proposal is revealed by the fact that the analysis in two different languages ((iii), (vi)) yields results that are not intensionally isomorphic.

Quotationalists have very often answered Church's criticisms by pointing out that one need not assume that there subsists an intensional isomorphism relation between languages represented by a function mapping sentences of one language unto others in another language. (15) And yet this is something that Church presupposes when he complains to Carnap that the result of applying his analysis to a sentence in a language is not intensionally isomorphic with the result of applying the same analysis to its good translation in another language. (16) But there is still something important left once this assumption is removed and replaced by the more moderate claim that the two analysans are not good *translations* of each other.

In order to answer Church's objection, we must adopt an analysis couched in a substitutional language. With a substitutional formula, the existence of a language is presupposed and need not be asserted. Moreover, the expressions occurring inside quotes are not named *qua* expressions (either as concrete marks or sounds or as abstract verbal forms) but rather as expressions in "use", i.e. presupposing their semantical rules. I have also suggested that propositional attitudes sentences are lexically ambiguous and have at least two distinct readings, the material and the intentional. These features of our theory is what enables us to pass successfully Church's translation test. Since the quoted expressions are in "use" and are not being referred to as belonging to a language, it is acceptable under certain circumstances to translate a quoted sentence by a quotation of a good translation in the home language. As a matter of fact, this should be the general rule unless some restrictions are imposed by the linguistic context in which we find the quotation. When the quotation occurs in a context in which a material concept of belief is involved, no particular restriction is imposed by the context. This is because the

particular linguistic vehicle is here unimportant and is not used to convey the particular mode of presentation of the agent. But when the quotation appears in a linguistic context in which an intentional notion of belief is used, the situation is entirely different. In this case, the particular linguistic vehicle serves to convey precisely the agent's mode of presentation. A correct translation of an intentional belief sentence must involve an homophonic translation of the quoted sentence.

So belief sentences are ambiguous and have two readings, material and intentional, and it can be argued that a correct translation of an English belief sentence into French can involve a French translation of the that-clause only when the verb is used in the material sense. When it is used in an intentional sense, the translation must be homophonic. Speciflcally, "Pierre believes that London is pretty" is ambiguous between

(vii) Pierre materially believes: London is pretty

and

(viii) Pierre believes intentionally: London is pretty

Their object-language translations in French are

(ix) Pierre croit matériellement: Londres est jolie

and

(x) Pierre croit intentionnellement: London is pretty

respectively. Accordingly, there are two different analysans requiring different kinds of translation. When the verb is used in a material sense, the French translation of the quotation in the English sentence must involve a quotation of a French sentence. When the verb is used in the intentional sense, the French translation must involve an homophonic translation of the English quotation. If so, the results of applying the quotational analysis to the two French translations in the object language will yield two formulas that are good translations of the two formulas that we get when we apply the same analysis to the two object language sentences in English.

If I am right, a sentence like "Pierre believes that London is pretty" is ambiguous and should be analysed differently depending on whether the verb is used in the material or the intentional sense. This means that our original analysans is itself ambiguous and should itself receive two different readings. In order to arrive at these analysans it is necessary to give a more precise analysis of the notion of an intentional belief. I would like to define intentional beliefs partly in terms of material beliefs. Intentionally believing "p" is materially believing "p" and materially believing that one materially believes "p". A reflexive constraint conditions the existence of intentional beliefs. If Pierre intentionally believes that London is pretty, he materially believes "London is pretty" and represents himself as doing so. But since all occurrences of the verb are material, the whole formula remains entirely extensional and there is no way to prevent us from

undesirable substitutions. So a further condition needs to be imposed. The two components of an intentional belief that p, the belief in "p" and the reflexive condition, must both be *basic*. This means that they must not be externally inferred (i.e. inferred by an external agent) from other beliefs held by the person to whom the ascription is made. For instance, if Pierre believes "London is pretty" and represents himself as doing so, and if his belief is intentional, I cannot conclude, on the basis of my own knowledge that London is Londres, that his *de dicto* beliefs involve "Londres". If I allow myself to do so, the notion of belief I am using is not the intentional. In an intentional use of the notion, all the notions are basic and do not allow an extemal application of different logical and semantic principles.

The notion of a basic belief is crucial to my account. It is the only fundamental notion needed in order to define the different kinds of belief ascriptions. There are basic and non-basic occurrences of material beliefs. A material belief will be basic when it is directly inferred from the behaviour of the agent. For example, Fido's barking at the bottom of the tree is in certain circumstances enough evidence to conclude that he materially believes there is a cat in the tree. In certain circumstances, the behaviour of agents is also enough evidence to conclude that they materially believes that their house is on fire. The belief that the house is on fire and p or non-p, on the other hand, or the belief reported in a foreign language, are good examples of non-basic beliefs, because they are usually not inferred directly from the behaviour of the agent. In the case of a belief reported in a foreign language, the ascriber implicitely invokes extemal principles of translation. Of course, the beliefs could become basic for agents that explicitely assent to the sentences. This could happen especially if the agent is a logician (in the first case) or if he is bilingual (in the second case).

Similarly, reflexive beliefs can be both basic or non-basic. If an agent assents to a first person belief sentence, it is a good ground for ascribing a basic reflexive belief. But if he represents himself as believing that Hesperus is a planet and I infer from this, via substitution, that he represents himself as believing that Phosphorus is a planet, the reflexive belief is not basic.

It is important not to confuse basic beliefs and beliefs in one's own mother tongue. The basic beliefs of a monolingual speaker are all in his own mother tongue. But dogs can have basic beliefs even if they do not have a mother tongue and multilingual speakers can have basic beliefs in many different languages. And of course, believing a sentence in one's own mother tongue is not a sufficient condition for having a basic belief towards that sentence. There are some beliefs formulated in my own mother tongue that I never really considered but that are logical consequences of some of my intentional beliefs.

Whenever I ascribe a belief in the material sense, I may or may not succeed in putting the agent in a basic relation of belief with a particular content. This may be because my ascription involves using principles of translation in a foreign language or because I am externally applying principles of logic to his set of basic beliefs. The question is not whether we can apply these principles because we certainly are entitled to do so when we are dealing with material beliefs. The point is only that when we do so, we no longer are

ascribing a basic material belief. Of course, if an agent basically believes materially "Hesperus is a planet", he also basically believes materially "Phosphorus is a planet". This is because the latter belief can very often also be directly inferred from the agent's behaviour if the first one is. We did not need to invoke the principle of substitution in order to conclude that the agent also believed "Phosphorus is a planet". However, if the only evidence we had was a sincere assent to the sentence "Hesperus is a planet", then the other belief (the one involving "Phosphorus") would be non-basic. But if the behaviour of the agent includes more than his dispositions to assent, both beliefs can be basic. For instance, if the agent is asked to draw the picture of a planet and starts to draw a picture of Venus, we can directly infer from his behaviour that he believes not only that Venus is a planet but also that Hesperus is a planet and Phosphorus is a planet. If the situation is as I described it, these are all basic beliefs.

It is very important to notice that in the ascription of a material belief, we only assert the existence of a basic belief and introduce a translation for its content. A that-clause is a specification of content via translation. Since the use of translation principles in general turns the ascriptions into a non-basic form (except when translation is homophonic), many ascriptions in which a that-clause is used are not basic. It is not necessary to avoid using a that-clause in order to ascribe a basic belief to someone, but a that-clause is used typically to operate a specification of content via translation. This is the reason why a belief sentence must be translated as a general (quantificational) statement asserting that there is a particular basic belief of the agent whose content is being translated. When the translation of the content in the basic belief is homophonic, the ascription of a belief using a that-clause is itself going to be basic.

It should be pointed out that the distinction between basic and non-basic beliefs does not depend upon the actual hierarchy of beliefs in the agent's "inner story". The agent can arrive through a very long inferential process at the conclusion that a certain sentence is true and then start to behave sincerely as if the sentence were true. This might in turn provide evidence to the effect that he basically believes that it is true. The important point is not that the belief must not be inferred but rather that it must not be externally inferred from his other beliefs. We must also allow for the possibility that a fundamental belief in the agent's inner story, i.e. one on the basis of which he infers his other beliefs but is not itself inferred from others, is not basic in our sense because it cannot directly be inferred from his behaviour but is only arrived at through inferential means that are externally applied to his other beliefs. The distinction between basic and non-basic beliefs is a distinction between two kinds of belief ascriptions and does not necessarily correspond to a real distinction. I am simply trying to spell out what is contained in the concept of an intentional belief ascription and I am trying as much as possible not to draw any ontological conclusion from this conceptual analysis.

Intentional beliefs are always basic. There is no such thing as an intentional non-basic belief. They are beliefs that we directly ascribe to agents most of the time within their mother tongue and without externally applying principles of inference. An intentional belief that p is basic and is a belief for which a reflexive condition applies. In other words, the agent must also believe basically that he believes "p". The crucial distinction

with material beliefs lies in the fact that the reflexive belief must be basic. It is hard to imagine a case in which the agent would have a basic reflexive belief that he believes a sentence "p" but no disposition to assent to "p". Discovering a counter-example would show that I have failed to produce necessary and sufficient conditions. Unconscious intentional beliefs in the psycho-analytical sense, for instance, could be invoked. But it seems to me that there is always room to argue that the reflexive condition always goes hand in hand with a disposition to assent. It is just that, when the belief is unconscious and repressed, the disposition to assent is itself repressed. If so, all cases where an agent basically has a reflexive belief that he believes "p" are also cases where he is disposed to assent to "p". If this is correct, then whenever a reflexive belief towards a sentence "p" is the case, the only adequate translation for "p" is homophonic. Intentional belief ascriptions can be made with the use of that-clauses and so involves both a reference to basic beliefs and a translation, but the translations must then always be homophonic. It is not necessary to specify explicitely that the translation involved in the intentional ascription is homophonic. It is the only translation available.

So instead of (i), we now have two analyses for "Pierre believes that London is pretty". The material reading is:

(xi) (∑p) [(believes $_b$ (Pierre, "p")) ‡ ("p" translates to "London is pretty")]

where the subscript indicates that the belief is basic. And the intentional reading is:

(xii) (∑q) [(believes $_b$ (Pierre, "London is pretty")) ‡ (believes $_b$ (Pierre, "q")) ‡ ("q" translates to " Pierre believes "London is pretty" ")]

(xi) and (xii) count as our analyses for (vii) and (viii) respectively. It is important to realize that the ascription of a basic belief does not mean that the whole belief content must receive an homophonic translation. In (xi) for instance, it is said that there is a basic belief towards a sentence "p" and here translation can be homophonic or not. If it is not, the whole material ascription is not basic. In (xii), the translation of the whole content of the reflexive belief ("q") must not be necessarily homophonic either. That is, Pierre need not believe the propositional attitude sentence "Pierre believes "London is pretty" ". The only requirement is that he represents himself as believing "London is pretty", that very sentence and no other one. It is only that part of the reflexive belief that must receive an homophonic translation. For instance, in (xii), "q" could have been adequately translated as "I believe "London is pretty" ".

In order to satisfy Church's translation test, we should be able to provide good translations for (xi) and (xii) that are simultaneously adequate analyses for the French translations of (vii) and (viii) in the object-language, namely (ix) and (x). These are:

(xiii) (∑p) [(croit $_b$ (Pierre, "p")) ‡ ("p" est traduit par "Londres est jolie")]

(xiv) (∑q) [(croit b (Pierre, "London is pretty") ‡ (croit b (Pierre, "q") ‡ ("q" est traduit par "Pierre croit b "London is pretty" ")]

Given the restrictions imposed on the translations that are occurring in any intentional ascription, it is only natural that such restrictions should also apply when these intentional ascriptions are themselves subject to translation. Since no particular restrictions are imposed on translation within a material ascription of belief, we can translate these belief ascriptions freely by providing a translation in the home language for the sentence believed. In the case of intentional belief ascriptions, there are such restrictions imposed on the translation taking place within the ascription and this is why these restrictions must be taken into consideration when it is time to translate the whole intentional ascription. And so Church's test is passed with success.

(d) In addition, I believe that the theory can provide interesting solutions to different philosophical puzzles that arise in connection with belief (Mates (17), Burge (18), Kripke (19)). It could be argued that these puzzles can only be solved if a quotational theory is adopted. Mates' puzzle arises in connection with iterative applications of the belief predicates and shows the failure of substitution of synonymous expressions in such contexts. Putnam's solution appeals to differences in logical structure and this serves to show that agents are related to contents having a certain syntactic structure and confirms the sentential account. (20) Burge's own examples point in the same direction and it seems plausible to draw the same conclusions for all cases and not only in iterative contexts.

For his part, Kripke does not deal directly with the problem of synonymy but he gives new grounds for doubting that the discovery of such a criterion is what is required to explain the failure of the different extensionality principles. He shows that puzzles can still arise even when we do not use the substitution of identicals. This removes one traditional motivation for looking for a synonymity criterion. Substitution of identicals provides the usual test for referential opacity. If substitution is to blame, referential opacity is diagnosed and reference to senses is usually invoked as the explanation of opacity. But if substitution of identicals is not to blame, referential opacity no longer obviously is the phenomena to be explained. The other moral to draw from Kripke's puzzle is that difference of sense is in any case not an available solution, no matter what problem has to be explained. Whether or not "Londres" and "London" are synonymous, they are good translations of each other and this, along with disquotational and translational principles, is all we need to generate a puzzle. A solution to Kripke's puzzle is available to us as long as we adopt a sentential theory of belief couched in a substitutional language, our distinction material and intentional belief ascriptions and Kaplan's distinction between character and content. The solution is that Pierre indeed has contradictory beliefs in the material sense but does not have any intentional contradictory beliefs. The reason is that, as mentioned above, we believe sentences that presuppose their semantic rules and the language to which they belong. And depending on the use of the verb involved, there are two different conventions governing the translations of quotations. If the translation of the quotation in a material reading is a quotation of a good translation in the other language, translation must be homophonic when, by

contrast, the verb is used in the intentional sense. (21) If so, Pierre intentionally believes "Londres est jolie" and "London is not pretty" but he does not intentionally believe "Londres n'est pas jolie" or "London is pretty". We are unable to get an intentional contradictory belief. The solution need not be spelled out in detail. It is essentially the same as in Church's translation test.

Apart from the puzzle concerning Pierre, Kripke also develops a puzzle in which the very same expression is used. It is the Paderewski case. It is designed for those who think that the principle of translation is to blame for generating the puzzle. Since my own account seems to lean heavily on a solution involving distinct conventions regarding translations, it might be wondered whether it is still possible to block variants of the puzzle in which no translations are involved. It is here among other places that Kaplan's distintion between character and content can be put to use. It must be noticed first that the name "Paderewski" cannot be conceived as having a stable character if all the premisses in the argument are maintained. Kripke presupposes that the agent has enough logical acumen and is able to notice a contradiction in any given formula. It follows that he could not simultaneously endorse "Paderewski had musical talent" and "Paderewski did not have musical talent" unless it is possible that the name refers to a distinct individual in different contexts. Whether or not the name refers to many individuals, this fact must not be part of the speaker's semantic competence. The only way to make this possible is to allow names to have linguistic meaning. A name like "Paderewski" would have a linguistic meaning rendered by the description "The individual named "Paderewski"", which is compatible with the fact that the name refers to different individuals in different contexts. Whether or not we choose this particular linguistic meaning, we must allow names to have unstable character. Speakers would know a priori that names have a stable character if they had no linguistic meaning. And they could not assent to contradictory sentences involving proper names as it is assumed in Kripke's argument. Where we adopt a framework in which belief contents are linguistic items, Pierre's contradictory beliefs involving Paderewski are like beliefs about sentences containing indexical expressions. It should not come as a surprise to learn that a speaker may in a given context assent to "He is a man" and in another to "He is not a man". The solution to this puzzle is that Pierre believes sentences, has access to linguistic meanings and believes that the character associated to the name "Paderewski" is unstable. If we introduce a name with a stable character, say "Paderewski*", we might be able to derive that Pierre believes materially that Paderewski* had musical talent and did not have musical talent. But we shall be unable to show that he intentionally entertains these beliefs.

The other puzzle considered by Kripke is the one which concerns the contradictions we find ourselves as ascribers if a stronger disquotational principle is accepted. The principle will state that a speaker is disposed to assent to a sentence "p" if and only if he believes that p. This at first sight seems to create a difficulty for the quotationalist, for he is usually committed to the view that beliefs are dispositions to assent. It is here that our distinction between material and intentional beliefs finds its most striking application. The strong disquotational principle is acceptable only in the intentional sense. It is false when it is understood in the material sense for material beliefs are not dispositions to assent. For material beliefs, it is wrong to assert that if Pierre does not have a disposition

to assent to "London is pretty", then he does not believe that London is pretty. We were able to conclude that Pierre materially believes that London is pretty but we are now unable to infer that the contradiction holds because the strong disquotational principle does apply to material beliefs. When the verb is used in the intentional sense, we are entitled to assert that if he does not have the disposition to assent to London is pretty, then he does not intentionally believe that London is pretty. But we still do not get a contradiction because we were unable to establish in the first place that he intentionally believed London to be pretty.

All these puzzles provide arguments for the adoption of a sentential theory of propositional attitudes. The particular analysis adopted is interesting because it avoids a usual difficulty for the quotationalist. Standard theories are confronted to a dilemma: either they construe beliefs as relations to sentences *qua* sentences but then do not capture what is going on in the use of that-clauses; or else, they might want to suggest that belief contents are sentences that "wear their semantical interpretations on their sleeves", but then the syntactic component no longer seems necessary. (22) Our analysis in terms of substitutional quantification avoids this dilemma because belief contents are now construed as sentences that semantically presuppose their semantical rules and the language to which they belong. This last point is crucial and explains the superiority of substitutional quantification over objectual quantification in the analysis of belief sentences.

Indeed, it would be possible to use objectual quantification over a domain of meaningful expressions but then an explicit reference would be made to expressions and their semantic interpretation and it would be impossible to account for the ignorance of the linguistic meaning. Where quantification is substitutional, beliefs are directed towards linguistic expressions and no explicit reference is made to their meanings. It is then possible to allow for the ignorance of meanings. This result is obtained without the need to complete the analysis by an explicit reference to languages like in a Carnapian analysis because the quoted expressions presuppose the existence of the language to which they belong.

The final observation to be made is that the quotational account does not by itself imply any particular restriction on substitutivity when the epistemic verb is material since the latter is an extensional notion contrary to the intentional case where no substitution whatsoever is allowed unless additional premisses are introduced. This twofold solution to the problem of interchangeability reveals the flexibility of our account and renders somewhat anachronic the traditional objections. The twofold solution to the problem of interchangeability must not be reduced to two extreme positions, one in which "anything goes" and all inferences are acceptable, and the other in which no inferences are allowed at all. In the material sense, inferences are acceptable as long as they follow the patterns imposed by already acceptable rules of logical inference, of translation and of truth conditional equivalence. And as far as the intentional sense is concerned, substitution of synonymous expressions (expressions with the same linguistic meaning) will be allowed as long as we presuppose that the agent is semantically competent and knows their meanings.

(e) I do not see any particular difficulty involved in introducing distinct n-adic predicates of belief in order to account for *de re* (or "relational") attitudes. In particular, I do not see any particular cardinality problem. We are at best committed to the logical possibility of a language containing an infinity of n-adic belief predicates, but we are by no means committed to the actual existence of such a cardinality. Therefore, we are not guilty of violating Davidson's learnability requirement.

The most serious difficulty concerns not the rejection but the admission of *de re* attitudes. In the usual operator approach, this involves "quantifying in", allowing variables to be bound from outside within the epistemic operators. In the predicate approach, *de re* attitudes are represented by a formula in which "exportation" of the bound variable takes place, to use Quine's happy phrase. (23) But this is unsatisfactory even for Quine because it leaves open the possibility that an agent entertains contradictory beliefs. (24) The solution to this age-old problem can be formulated within the predicate approach. It involves first the introduction of a notion of material belief. We have no difflculty in allowing for contradictory material beliefs because it simply means that "as a matter of fact", i.e. unintentionally, it turns out that A believes of a single entity that it is φ and not φ.

Now if we apply our ideas to the problem of *de re* attitudes, we get the following results. A sentence like (ii) will have at least two *de re* readings, one material the other intentional. The material reading is as follows:

(Ex) (∑φ) [(x is London) ‡ (believes $_b$ (Pierre, "φ", x)) ‡ ("φ" translates to "y is pretty")]

The intentional reading is:

(Ex) (∑φ) [(x is London) ‡ (believes $_b$ (Pierre, "y is pretty", x)) ‡ (believes $_b$ (Pierre,"φ", x) ‡ ("φ" translates to n Pierre believes $_b$ "y is pretty" ")l

There could be a z identical to x about which Pierre believes that it is not pretty. From this, we could get by substitution that Pierre believes of one and the same thing that it is "pretty " and "not pretty". But we have externally applied the principle of substitution and so the beliefs are not basic and therefore not intentional either. We are even entitled to draw a consequence to the effect that Pierre believes "pretty and not pretty" of x. But now we get such a belief by an external application of the law of introduction of conjunction, and so it cannot be basic, by definition, and cannot be intentional either. Pierre has only a contradictory material belief and this is not problematic. We are not able to get that Pierre *basically* believes that he believes "y is pretty and not pretty" of one and the same thing.

We are in a position to draw certain conclusions regarding opacity. First, as it was pointed out, we have a perfectly legitimate extensional notion of belief which allows for existential generalization and substitution of identicals. So in one sense of the term, "belief" is neither referentially nor quantificationally opaque. In the intentional sense, it is

referentially opaque but we can have cases where an intentional belief sentence is quantificationally transparent. This happens when the sentence reports a *de re* intentional belief. It is not a case of "quantifying in" because there is no "operator" in the scope of which quantification is taking place. And so we do not need either to allow for the possibility of quantifying within a "context" that is referentially opaque. In the traditional approach, the "scope" of the operator is allegedly held responsible for opacity and it is hard to see why the very same context should be quantificationally transparent. But it seems to be the only move available for those who share this approach and still want to allow for intentional *de re* beliefs. We seem to be arbitrarily stipulating certain features about the scopes of these operators. In the predicate approach, those features reveal their true nature as semantic properties of intentional n-adic belief predicates.

This is roughly how I think most of the difficulties concerning the formulation of a sentential theory can be solved.