行政院國家科學委員會補助專題研究計畫成果報告

A Quantificational Analysis of $\mathcal{D}$that

指示詞 **$\mathcal{D}$that** 的量限分析

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中文摘要

此報告的目的在於呈現指示詞 ‘that’ (以下簡稱 *D*that)的量化分析。弗烈格(Frege)對指示詞的處理、卡普藍(Kaplan)與派瑞(Perry)對弗烈格的批評，以及伊凡斯(Evans)與尤葛若(Yourgrau)對弗烈格的辯護，將在本文中重新審視。並討論曲那(Künne)、哈寇特(Harcourt)及卡爾(Carl)的處理方式。筆者將提出對 *D*that 的量化分析，視 *D*that 爲一種量詞，當述詞應用在 *D*that 所指涉對象時，*D*that 提供一具體的量限功能。最後我將指出根據一階語言中所謂的索引量詞來形式化 *D*that 的兩種不同方式，及分別適當的語意。基於第一種進路的邏輯系統將可被建立，而基於第二種進路的邏輯系統之難處則有詳盡的討論。

關鍵字：*D*that，指示詞，明示，意思/指涉的區別，專名，完整原則，量化

Abstract

I. The background

Demonstratives (such as ‘that’, ‘I’, ‘now’, ‘here’, ‘actual’, and alike) are referring expressions of a special type with several peculiar characteristics which referring expressions of other kinds do not have, including noticeably, *context-sensitivity* (or *context-dependency*, or *indexicality*), *lack of descriptive content*, and *cognitive-situational immediacy*. In view of these characteristics, Frege seemed to fail to offer an account of the sense of demonstratives coherent with his semantic theory. According to Frege (1984/[1892]; [1918/9]), a referring expression in a sentence used to express a though has a sense, which is supposed to be the *cognitive value* of the given expression. Moreover, the reference of a referring expression, if there is any, is supposed to be determined via the sense of that expression, taken as the mode of presentation. Now, it seems perfectly sensible to claim that a sentence with a demonstrative as its grammatical subject, say ‘That is a book’, can be used to express a thought. And in ordinary discourse, it seems beyond reasonable doubt to claim that an occurrence of ‘That’ in a sentence of this kind would has an object as its reference. But, it is also agreed that the occurrence of ‘That’ in this case, as a demonstrative, which is in essence an expression lack of descriptive content, would have no alleged Fregean’s sense. Be that as it may, the *cognitive-situational immediacy* of demonstratives indicates that the reference of a demonstrative would not be determined via its sense.

David Kaplan in a series of papers on demonstratives (1990/[1978], 1989/[1979], 1989, 1989a, 1990) argues that Frege's semantic analysis of demonstratives is inadequate. According to Kaplan, the demonstration indicated by the use of a demonstrative in a sentence is nothing more than a function which takes a certain possible world w and a fixed time t as its argument so that a certain object can be taken as its value (Kaplan 1990/[1978]: 28). Following Kaplan's footsteps, John Perry claims that we should not conflate epistemological issues with the pure semantic analysis of demonstratives. For Perry, Frege's original notion of sense is supposed to perform a variety of functions, which are hardly satisfied altogether by a single theoretical device. Consequently, an adequate analysis of the demonstratives must take into account the role of a demonstrative in use, which is in essence a rule ‘taking us from an occasion of utterance to a certain object’. (Perry 1990/[1977]: 55)

In defense of Frege's analysis, Evans (1990/[1981]:87) proposes that the way of thinking of an object to which the general Fregean conception of sense direct us is, in the case of a dynamic Fregean thought, a way of keeping track of an object. Thus the sense of a demonstrative, such as ‘today’ on a special occasion (say on d), can be treated as a function which takes whoever is thinking of d as the current day as its argument and the very day d as its value. Evans then uses the method of abstraction to formulate such a required function in terms of the ë-operator, that is, ë($R(x,d)$), where $R(x,d)$ is a relation to characterize the required function. For instance, since any two utterances of the sentence ‘Today is F’ on d expresses the same thought, we might equate the thought with the triple, *namely*

Along a similar line of thought, Carl (1994) claims that Frege seemed to hold that sentences containing demonstratives are not incomplete sentences, nor do they have an incomplete sense. Nonetheless, Carl (1994) maintains that Frege was not concerned with applying the sense/reference distinction to demonstratives. According to Carl, Frege would not consider the question of how to refer to objects by using demonstratives, or what kind of sense we can attribute to them. For Carl, a sentence containing demonstratives is an incomplete expression of a thought. Therefore, the key question with regard to the use of demonstratives is this: How do we manage to express a thought by sentences containing demonstratives and to communicate them to others?

The main burden of this project is to provide a satisfactory analysis of demonstratives. Since there are a variety of demonstratives, it would be implausible to produce an overall account of demonstratives of all kinds in a short-term project. This report therefore merely focuses upon a satisfactory analysis of ‘that’ used as a demonstrative. Following Kaplan's terminology, let us use the term ‘$\mathcal{D}$that’ to denote occurrences of ‘that’ used as demonstratives.

II. The underlying thought: Toward a quantificational analysis of $\mathcal{D}$that

It is striking that grammatically a demonstrative can be also used as a subject (or logical subject) of a sentence and that a sentence containing a demonstrative as its subject can be used to express a complete thought. Moreover, whenever a sentence containing a demonstrative as its subject is uttered, the speaker indeed intends to refer, via an use of the very demonstrative, to a particular thing in the desired domain of discourse, which is supposed to be the reference of the very occurrence of the demonstrative in use, and which is supposed to be the object that the thought expressed by the given sentence is said to be about. Therefore, it seems perfectly sensible to maintain that a sentence containing a demonstrative is not merely a complete expression but also used to express a complete thought. Moreover, an occurrence of ‘$\mathcal{D}$that’ used in this way *does* have a sense in addition to its reference. In view of these aspects of the use of demonstratives, it seems to me that the difference between demonstratives and referring expressions of other types (such as proper names and definite descriptions) may not be so sharp in essence as that philosophers have usually recognized.

If our foregoing observation is on the right track, then it seems patent that an analysis of the use of $\mathcal{D}$that must meet the following conditions:

(i) An analysis of $\mathcal{D}$that must be able to explain the principle of completion, by showing that a sentence with an occurrence of $\mathcal{D}$that as its grammatical subject not only can be used to express a complete thought, but also must be itself a complete expression.

(ii) An analysis of $\mathcal{D}$that must be able to explain what is the sense of $\mathcal{D}$that in a sentence in which it occurs and how the supposed reference of the very occurrence of ‘$\mathcal{D}$that’ is determined via its sense. In particular, such an analysis must be able to explain a predicate so that the associated predicate can be applied only to the value of the variable bound to the given occurrence of $\mathcal{D}$that. I believe that if this is a right approach, then we can have a unified explanation of referring expressions—referring expressions of all kinds can be treated as quantifiers, including indexical expressions of other sorts such as ‘today’, ‘here’ or ‘I’, and so on. And I hope this result can enhance one of my belief that predication should play a central role in the theory of meaning.

From a syntactic point of view, a quantificational treatment of $\mathcal{D}$that would meet the first requirement for an analysis of $\mathcal{D}$that we have just stated, namely it meets the principle of completion. Moreover, from a semantic point of view, the notion of quantification itself should be able to show how the supposed reference of an occurrence of ‘$\mathcal{D}$that’, taken as a quantifier, is determined via its sense—in this case, that is, the quantificational power of $\mathcal{D}$that. What remains is to show that we can also establish an appropriate semantic treatment to exemplify the context-sensitivity of $\mathcal{D}$that, that is, to show how different uses of the term $\mathcal{D}$that take us *from different occasions of utterances to distinct objects*.

It is worth noting that in ordinary discourse, the use of a sentence containing ‘$\mathcal{D}$that’ as an referring expression is different from sentences with other kinds of referring expressions. Particularly, we would not ask whether a statement ‘That is an F’ is true or not. Instead, we can only ask whether or not an utterance of ‘That is an F’ is true with respect to a certain occasion on which the sentence ‘That is an F’ is utterred. In other words, we can ascribe truth to an utterance of ‘That is an F’ only when appealing to a certain occasion on which the speaker who utters the very sentence in fact points to an object in the domain of discourse and that object does have the property F. Accordingly, for an appropriate semantics for the use of ‘$\mathcal{D}$that’, specification of the construction of occasions and that of a function from uses of ‘$\mathcal{D}$that’ to occasions are called for.

On the basis of these observations, we can now give a quantificational analysis of ‘$\mathcal{D}$that’. In particular, I will show how to formulate the occurrences of $\mathcal{D}$that in ordinary discourse into quantifiers of a special kind, called indexed quantifiers, in a first-order language, and appropriate semantic treatments for indexed quantifiers will be given on the basis of our quantificational analysis of $\mathcal{D}$that.

III. A Quantificational theory of $\mathcal{D}$that

We have already noted that the evaluation of an utterance of a sentence with ‘$\mathcal{D}$that’ as its grammatical subject can be done only when a certain occasion is taken into account. Accordingly, different specification of the construction of occasions may render different (interpretation) function of occurrences of ‘$\mathcal{D}$that’, i.e., a function from occurrences of ‘$\mathcal{D}$that’ to occasions. And this in turn may render different ways of formulating the occurrences of ‘$\mathcal{D}$that’ in ordinary discourse into a formal language.

no matter whoever she/he is, points to the same object in the domain of discourse and use an occurrence of '$\mathcal{D}$that' to refer to the very object. Thus, we may treat all occasions of this kind, different as they can be, as a type of occasions. And we may then assume that, associated to each group of occurrences of '$\mathcal{D}$that' in ordinary discourse, there is a type of occasions, on each of which the speaker, no matter whoever she/he is, always points to the same object. We can further define a function d from types of occasions to the domain of discourse so that its value will serve as the semantic value of every occurrence of '$\mathcal{D}$that'. Of course, when two occurrences of $\mathcal{D}$that are to be associated with distinct types of occasions, they are used to refer to different object. Intuitively, we may enumerate all occurrences of $\mathcal{D}$that in ordinary discourse in accordance with the associated types of occasions. This can be achieved by adding appropriate subscripts to each occurrence of $\mathcal{D}$that. We may call an occurrence of '$\mathcal{D}$that' with appropriate subscript an indexed '$\mathcal{D}$that'. For example, consider two occurrences of $\mathcal{D}$that in a sentence 'That is a book' uttered by John and Merry on two distinct occasions. If they are pointing to the different objects, then they are on distinct type of occasions. We may then say that John utters that 'That$_1$ is a book', while Merry states that 'That$_2$ is book'. If they are pointing to the same object, then they are actually on the same type of occasions. Hence both are using '$\mathcal{D}$that' with the same indexical subscript. Intuitively, indexed '$\mathcal{D}$that' can be treated as a constant quantifier in the sense that different occurrences of the same indexed $\mathcal{D}$that will be used to refer to the same object on all occasions.

On the basis of the foregoing analysis, we can now give a formal language for $\mathcal{D}$that. Let $\mathcal{L}$ be a standard countable first-order language with identity. $\mathcal{L}^*_{\mathcal{D}}$ is an expansion of $\mathcal{L}$ by adding to the alphabet of $\mathcal{L}$ a collection $\mathcal{D}$ of (indexical) quantifier $\mathcal{D}_0$, $\mathcal{D}_1$, $\mathcal{D}_2$, . . . , $\mathcal{D}_n$, . . ., equipped with an extra formation rule for indexical quantifiers: If φ is a formula, so is $\mathcal{D}_i x\varphi$, for any $\mathcal{D}_i \in \mathcal{D}$. That is, $\mathcal{L} \subseteq \mathcal{L}^*_{\mathcal{D}}$ $(= \mathcal{L} \cup \mathcal{D})$. The notion of the scope of an occurrence of the quantifier '$\mathcal{D}_i$' in a formula is defined in the usual way.

Now let $\mathcal{M}$ be an $\mathcal{L}$-structure. Assume that there is a collection $\mathcal{O}$ of types of occasions, each of which is informally understood as a type of occasions on which a speaker (in a particular time t at a particular location l) using an indexed '$\mathcal{D}$that' to refer to a thing in some structure. And define a mapping d from $\{\mathcal{M}\} \times \mathcal{O}$ to $\mathcal{A}$ (the domain of $\mathcal{M}$). Intuitively, a triple $\langle \mathcal{M}, o, a \rangle$ for some $o \in \mathcal{O}$, $a \in \mathcal{A}$, can be understood as stating that the object a in $\mathcal{M}$ is precisely the object to which the speaker is pointing when uttering a sentence with 'That$_i$' as its grammatical subject.

Now, let

$$\mathcal{M}^*_{\mathcal{D}} = \langle \mathcal{M},\ d,\ I(\mathcal{D}) \rangle,$$

Where $I(\mathcal{D})$ is a function from $\mathcal{D}$ to the function d; i.e., $I: \mathcal{D} \rightarrow d$. Intuitively, I can be construed as an assignment which assigns to each indexical quantifier $\mathcal{D}_i$ a type of occasions o, for some $o \in \mathcal{O}$, in $\mathcal{M}$, so that the value of $d(\langle \mathcal{M}, o \rangle)$, $d(\mathcal{M}, o)$ for short, will be the object to which the speaker uttering a sentence containing $\mathcal{D}_i$ intends to refer. Putting this in another way, this can be understood as an assignment of the variable x bound to the indexical quantifier $\mathcal{D}_i$ in $\mathcal{M}$, which takes some object, say and (ii) for an analysis of $\mathcal{D}$that. It also shows how different uses of $\mathcal{D}$that take us from different occasions of utterances to distinct objects. Moreover, we can easily construct a required logic of $\mathcal{D}$that. However, this approach apparently violates the required context-sensitivity of demonstratives in the strict sense. Apparently, in ordinary discourse we by and large would not use the word ‘That’ with subscripts. The loss of the context-sensitivity of $\mathcal{D}$that in the strict sense would make the foregoing formal language and its semantics inappropriate, let alone the establishment of such a logical system of $\mathcal{D}$that. A different specification of occasions and the required function is then called for, to which we turn our attention now.

Sticking to the context-sensitivity of $\mathcal{D}$that, no occurrences of ‘$\mathcal{D}$that’ with subscripts are permitted. This implies that no so-called types of occasions will be associated with occurrences of ‘$\mathcal{D}$that’; instead, associated to every occurrence of ‘$\mathcal{D}$that’, there is an occasion on which the speaker intends to point to an object in the given domain of discourse when uttering a sentence with ‘$\mathcal{D}$that’ as its subject. And the required formal language will include a sole indexical quantifier. Let $\mathcal{L}$ be a standard first-order language with identity. $\mathcal{L}_{\mathcal{D}}$ is an expansion of $\mathcal{L}$ by adding to the alphabet of $\mathcal{L}$ a quantifier $\mathcal{D}$, together with an extra formation rule for the indexical quantifier ‘$\mathcal{D}$’: If φ is a formula, so is $\mathcal{D}x\varphi$. Now, let $\mathcal{M}$ be an $\mathcal{L}$-structure. Assume that there is a collection $\mathcal{O}$ of occasions, and a mapping d from $\{\mathcal{M}\}\times \mathcal{O}$ to $\mathcal{A}$ (the domain of $\mathcal{M}$). Intuitively, a triple $\langle \mathcal{M}, o, a\rangle$ for some $o\in \mathcal{O}$, $a\in \mathcal{A}$, can be understood as stating that the object a in $\mathcal{M}$ is precisely the object to which the speaker is pointing when uttering a sentence with ‘$\mathcal{D}$that’ as its grammatical subject. To be more precise, let us call an occasion o *faithful* to a particular occurrence of ‘$\mathcal{D}$that’ in a sentence containing ‘$\mathcal{D}$that’ as a logical subject when the speaker *does* utter that sentence on the occasion o and intends to point to an object by using the very occurrence of ‘$\mathcal{D}$that’ as a demonstrative. Now, let

$$\mathcal{M}_{\mathcal{D},o} = \langle \mathcal{M}, d, I(\mathcal{D})\rangle,$$

where $I(\mathcal{D})$ is a function from $\{\mathcal{D}\}$ to d. Intuitively, I assigns a faithful occasion o, for some $o\in \mathcal{O}$, to an occurrence of the indexical quantifier $\mathcal{D}$, so that the value of $d(\mathcal{M},o)$ will be the object to which the speaker uttering a sentence containing $\mathcal{D}$ intends to refer. This can be understood as an assignment of the variable x bound to the indexical quantifier $\mathcal{D}$ in $\mathcal{M}$, which takes some object, namely some $d(\mathcal{M},o)$, in $\mathcal{M}$ as the semantic value of the bound variable x. Now, if the assignment of the occurrence of $\mathcal{D}$ in a given sentence, say $\mathcal{D}x$ö(x), takes $d(\mathcal{M},o)$ as its value and the object $d(\mathcal{M}, o)$ satisfies $\varphi(x)$, we say that on the faithful occasion o, $\mathcal{D}x$ö(x) is true in $\mathcal{M}$, in symbols, $\mathcal{M}_{\mathcal{D},o}$ ▪ $\mathcal{D}x$ö(x). The semantic rules we need are the followings:

(S1) $\mathcal{M}_{\mathcal{D},o}$ ▪ ö iff $\mathcal{M}$ ▪ ö, for ö, any $\mathcal{D}$–free formula.

(S2) For any occasion $o\in \mathcal{O}$, $\mathcal{M}_{\mathcal{D},o}$ ▪ $\mathcal{D}x$ö(x) iff $I(\mathcal{D}) = d(\mathcal{M}, o)$, for o, the occasion faithful to the given occurrence of $\mathcal{D}$, and $\mathcal{M}$ ▪ $\varphi(x)$ $[d(\mathcal{M}, o)]$.

We can further extend the notion of a faithful occasion to a set of occurrences of $\mathcal{D}$. For simplicity, let us consider only a finite number of occurrences of $\mathcal{D}$. Let $\langle\mathcal{D}\rangle_n$ for some $n\in \mathcal{N}$, a finite set of faithful to the two occurrences of $\mathcal{D}$, respectively such that for the first occurrence of $\mathcal{D}$, $I(\mathcal{D}) = d(\mathcal{M}, o_1)$ and $\mathcal{M}$ ▪ $\varphi(x)$ $[d(\mathcal{M}, o_1)]$, while for the second occurrence of $\mathcal{D}$, $I(\mathcal{D}) = d(\mathcal{M}, o_2)$ and $\mathcal{M}$ ▪ $\varphi(x)$ $[d(\mathcal{M}, o_2)]$.

Finally, we may say that

(S) $\mathcal{M}_{\mathcal{D}}$ ▪ $\mathcal{D}x$ö(x) iff for all faithful occasion $o \in O$, $\mathcal{M}_{\mathcal{D},o}$ ▪ $\mathcal{D}x$ö(x).

This completes the required semantics for a formal language containing $\mathcal{D}$ (to stand for the demonstrative '$\mathcal{D}$that') as an indexical quantifier. One can see that this semantics indeed meets the three conditions we put forth before for an appropriate analysis of $\mathcal{D}$that. Yet, it is somehow questionable to construct a logical system of $\mathcal{D}$that in the language $\mathcal{L}_{\mathcal{D}}$ on the basis of the established semantics. Admittedly, the classical concept of logical consequence would no longer hold because we can only talk about the logical consequence of utterances, rather than that of sentences/formulae. Similarly, most of theorems/validities in classical logic would no longer hold. For example, the well-known law of excluded middle collapses on the above semantics, unless we put forth a stipulation which asserts that all occurrences of $\mathcal{D}$ in a single (compound) sentence will take the same object as the semantic value of the associated variables. For the law of excluded middle states that $\mathcal{D}x$ö$(x) \vee \neg$ $\mathcal{D}x$ö(x) holds in every model $\mathcal{M}_{\mathcal{D}}$, and this in turn requires that for all $o \in O$, $\mathcal{M}_{\mathcal{D},o}$ ▪ $\mathcal{D}x$ö$(x) \vee \neg$ $\mathcal{D}x$ö(x). But it is clear that the fact that in some $\mathcal{M}_{\mathcal{D}}$, $\mathcal{D}x$ö(x) fails to be true on some occasion o would not imply that $\neg$ $\mathcal{D}x$ö(x) will be true on the same occasion. For we may assign different objects in $\mathcal{M}$ to distinct occurrences of '$\mathcal{D}$' in '$\mathcal{D}x$ö(x)' and '$\neg$ $\mathcal{D}x$ö(x)', which is equivalent to '$\mathcal{D}x\neg$ö(x)'. It is then striking that classical logic cannot serve as the required underlying system for a desired logic of $\mathcal{D}$that. To my knowledge, so far no prevalent logical system can be suitable for such a desired logical system. At the moment, the closest one, perhaps, is a certain version of relevant logic. But some more arguments and further discussions are required. It seems to me that for the construction of a logic of demonstrative $\mathcal{D}$that, the best we can do is to adopt the first way of formulation and the proposed semantic treatment with the cost of the loss of context-sensitivity in the strict sense.

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