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# Notes on Early Chinese Logic (III)

V. The Mohist *hiao* and some related problems. — The logic of terms (as opposed to the logic of propositions) embraces the calculus of classes and the calculus of functions. After having briefly dealt with the rôle and the main features of the propositional calculus as actually used in early Chinese reasoning (ch. IV of the present study) and the Chinese theory of classes as represented in the *Kung-sun Lung tsï* (chapters II—III of my study), it is now time to turn to the calculus of functions which — at least in some of its subdivisions — is also not without a specific rôle in early Chinese logic.

The logical notion of function, fundamental in the calculus now in question, corresponds to some extent with the grammatical notion of predicate. It is also worth while to remind the reader that the modern calculus of functions can be conveniently subdivided according to whether: 1° the functions involved refer to one or more than one argument (or variable) and in particular two arguments (we shall not be concerned with functions of more than two arguments); 2° the argument(s) is (are) of the thing-type or of the function-type. With regard to the former distinction we speak of one-place functions and two-place functions (the latter are commonly called relations), while with regard to the latter we can speak of functions of the first type and functions of a higher type. Consequently, in the framework of the calculus of functions we distinguish the following subdivisions: (a) simple calculus of one-place functions of the first type (i.e., the part of the calculus dealing with expressions like $\varphi x$, etc.); (b) simple calculus of two-place functions of the first type (relations between arguments of the thing-type, for which I shall use the notation $x\ R\ y$, etc.); (c) higher calculus of one-place functions (operating with expressions like $\Phi\varphi$ — where $\Phi$ represents the function of a higher type and $\varphi$ its argument which is itself a function of the first type); (d) higher calculus of two-place functions (of a higher type), i.e., the calculus of relations occurring between function-arguments (as for instance $\varphi\ \Phi\ \psi$) or a thing-argument and a function-argument (heterogeneous functions as for instance $x\ \Phi\ \varphi$)[1]. The calculus of relations in the narrow sense of the term and

[1] These general remarks are, of course, meant as a mere introduction to specific Chinese problems to be dealt with in the present chapter and the following ones.

in its most important practical applications usually corresponds to (b), that is to say, the simple calculus of two-place functions — which also appears to be one of the most important parts of the calculus of functions (in the broad sense of the term) as actually represented in early Chinese philosophical reasoning. For this reason it deserves to be dealt with in a separate chapter (VIII), while the present and the following chapters are devoted to the remaining subdivisions of the calculus of functions (especially (a) and (d)).

It must be said in advance that the calculus of functions as thus delimited does not play any very important rôle in early Chinese logic. But since traces of it appear to subsist even in the Chinese logical theory (poor as it was) and, on the other hand, are certainly discoverable in some actual reasonings (even if these are neither numerous nor typical), the problem cannot be omitted from the present investigation. By the way, as we shall see later, the analysis of the samples of Chinese material in which the elements of the calculus now in question are involved will at the same time yield marginal results which themselves are not without interest from both the logical and the linguistic point of view. Before proceeding to this, I shall examine in the present chapter a hypothetical but very specific case which directly concerns the logical theories of the Mohists. This takes us back for a while to the problem of the alleged "Chinese syllogism" already spoken of in chapter II.

It has previously been remarked (RO XXVI, 1, p. 8) that Hu Shï was right in criticising the "syllogistic" theory which Chang Ping-lin believed he had found in the 'dialectical chapters' of the *Mo-tsï*. For his part, Hu Shï tried to interpret as a specific non-syllogistic form of deductive reasoning what the Mohists called the *hiao* 效 (*cf.* Hu Shih, *The Development of the Logical Method in Ancient China*, 3rd ed., Shanghai 1928; pp. 95—98). Hu's theory, in its turn, was critically discussed and rejected by H. Maspero (*Notes sur la logique de Mo-tseu et de son école*, T'oung Pao XXV, 1928; see especially pp. 10—18), who, contrary to the Chinese scholar, claimed to have established that the *hiao* had nothing to do with deductive reasoning but was merely "une définition du raisonnement par l'exemple tel qu'il était pratiqué dans l'école de Mo-tseu" (*ibidem*, p. 18). A recent Chinese writer, Chan Kien-feng (*Mo-kia-ti hing-shï lo-tsi*, Wuhan 1957) took

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For a scientific outline of the modern calculus of functions the reader is referred to H. Reichenbach, *Elements of Symbolic Logic*, 6th ed., New York 1960; *cf.* especially §§ 17 and 39. I follow Reichenbach rather closely, but the terminology and the notation I have used differ from his in some points. In particular, I put the relational functor between its arguments, — which makes the corresponding formulae more spectacular: $x\ R\ y$ — instead of Reichenbach's $f(x, y)$, etc. Let it also be remarked that the Greek capitals ($\Phi$, $\Psi$) introduced in ch. II of the present study (see RO, XXVI, 1; pp. 8—17) represented functions of class-arguments, while in the following chapter (VI) the same capitals will be used to represent functions of function-arguments (including heterogeneous functions). This ambiguity should not disconcert the reader.

up the problem, claiming to establish that the *hiao* was a form of reasoning comparable to both the Greek and the Indian form of syllogism (*ibidem*, pp. 80—86). Finally, J. Needham suggested that the Mohists conceived the *hiao* as 'model-thinking' consisting in following the 'methods of Nature' (*Science and Civilisation* II, p. 184).

Leaving out of consideration Chang Ping-lin's speculation (which is manifestly unfounded and which, by the way, is not connected with the specific problem of the *hiao*), the very divergence of opinions concerning the rôle of the *hiao* in the Mohist dialectics shows that the problem is neither clear nor simple. Indeed, both the scarcity and the ambiguity of philological data in the present case make any tentative solution merely conjectural. It is the same with my own hypothesis which, however, I think useful to put forward in view of the fact that the problem was never touched upon by a sinologist elementarily trained in symbolic logic. Moreover, the interpretation which I am going to put forward appears to be philologically better founded than any other so far produced, and there is, as we shall see, some textual evidence indirectly corroborating my theory.

There is nothing improbable in the assumption that the Mohists, interested as they were in 'dialectical' speculations, had also been dealing with some problems concerning deductive reasoning and that traces of such theories survive in the 'dialectical' chapters of the *Mo-tsï*, — unfortunately badly corrupted as they now stand. If so, the *hiao* is the only technical term among those defined in ch. 45 of the *Mo-tsï* (*Siao-ts'ü p'ien*), which may well refer to a kind of deductive procedure. If so, the latter must have been a form of reasoning belonging to the calculus of functions. To show this, we have first to turn to the definition of the *hiao* given in the *Siao-ts'ü p'ien* chapter of the *Mo-tsï*, which however must be supplemented by some information collected from the 'canonical' chapters.

Now, the definition of the *hiao* in the *Siao-ts'ü p'ien* is as follows: 效者爲之法也, 所效者所以爲之法也, 故中效則是也, 不中效則非也, 此效也 — which I thus tentatively translate: "The *hiao* is the norm of becoming; the *hiao*-ised (i.e., what is inferred from the *hiao*) is by what the norm of becoming [is established]; if the 'because' is conform to the *hiao*, [the reasoning] is correct, and if it is not conform to the *hiao*, [the reasoning] is incorrect; such is the *hiao*"[2]. The above definition involves at least one technical term, *fa* 法 'norm', which,

[2] *Cf.* the translations by Hu Shï (*Development*, p. 96): "The *hsiao* or reasoning from a mold consists of setting up the form. That which is modeled after is that which is to be set up as the form. When the cause or the because (故) conforms to the *hsiao* or mold, it is right (true). When it does not conform to the *hsiao*, it is wrong (false). That is called *hsiao* or deduction"; and Maspero (*Notes*, pp. 7—8): "L'imitation consiste à prendre un modèle. Ce qui est imité, c'est ce qui est pris pour modèle. C'est pourquoi si c'est adéquat à l'imitation, (le raisonnement) est correct; si ce n'est pas adéquat à l'imitation, (le raisonnement) est faux. Telle est l'imitation". *Cf.* also J. Needham, *Science and Civilisation* II, pp. 183—184.

in its turn, in ch. 40 of the *Mo-tsï* (*King shang*) is defined as follows: 法所若而然也. This latter definition, I think, can be literally conceived as: "The norm (*fa*) is whereby 'if..., then so'"[3] — the final part of which, to my mind, is an astonishingly clear reference to a specific kind of implication in the logical sense of the term. This definition of the *fa* is further 'explained' in ch. 42 (*King-shuo shang*): 意規員三也俱可以爲法 "The idea [of a circle], the compasses, and the actual circle — all the three can be taken as a norm [for something being a circle]" — which, as Hu Shï thinks (*Development*, p. 96), allows of reasoning in the following way: "This is a circle, because it is described with the compasses in a certain manner", etc. Improving on Hu Shï in this point I shall say that the definition of the *fa* together with its illustrative explanation directly refers to conditional statements of the kind: "If something is conform to the idea of a circle, this something is a circle", or: "If something is described with the compasses in a specific way, this something is a circle", etc. — in symbolic notation: $\varphi x \supset \psi x$ — which strictly corresponds to the *definiens* 所若而然. On the other hand, the very 'explanation' as given in the *King-shuo* shows that the *fa* ("whereby 'if..., then so'") was conceived as the mere antecedent conditioning the consequent rather than the whole implication 'if..., then so', and that it corresponded to the propositional function $\varphi x$ of the formula $\varphi x \supset \psi x$. It also goes without saying that there is some semantic confusion in the *Mo-tsï* passages under discussion, since in the *King-shuo* the *fa* is spoken of as a thing (or the idea of a thing) according to which the 'circleness' of something can be established, while in the definition itself, as we have seen, the same *fa* appears to be an abstract 'norm' (having the form of a propositional function in our interpretation), but such incidental confusion is certainly pardonable in the case of the early Chinese dialecticians. What is most important, is that the *fa* involved in the definition of the *hiao* seems beyond any doubt to be strictly connected with the *fa* spoken of in the other two passages quoted, — and this, I think, gives us a valuable clue to the interpretation of what the Mohists understood by the *hiao*. The bare translation of the definition of the *hiao* that I have given is by no means illuminating, but it becomes much clearer if we bear in mind that the 'norm' involved in this definition is — according to the other definition — "whereby 'if..., then so'".

In short, I am inclined to think that the *hiao* was conceived by the Mohists as something like an all-statement arrived at by some inductive procedure and accepted as true, which, consequently, was capable of serving as a general premise for deriving particular specialised statements. More specifically, the *hiao* must have been something like what is called the 'general implication' in modern logic: $\prod_x (\varphi x \supset \psi x)$, that is

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[3] *Cf.* Hu Shï (*Development*, p. 95): "A form is that according to which something becomes"; Maspero (*Notes*, p. 11): "La norme est ce à quoi il faut se conformer pour que les choses soient telles".

to say: "for every $x$: if $\varphi$ of $x$, then $\psi$ of $x$". Such a general implication, if true, allows, of course, of specialised true statements of the form: $\varphi x_k \supset \psi x_k$ — in which the argument $x_k$ represents an individual thing from among those constituting the extension[4] of the propositional function $\varphi x$:

$$[\underset{x}{\Pi}(\varphi x \supset \psi x)] \supset (\varphi x_k \supset \psi x_k)$$

The latter part of the above formula, that is to say, the specialised statement implied by the corresponding (left-side) general implication (*hiao*) and in some sense contained in this general implication I consider as the '*hiao*-ised' (所效者) spoken of in the main definition. Reverting to the latter, we see that the '*hiao*-ised' is defined as "by what the norm of becoming [is established]" (*cf. supra*, p. 105), and this appears to be an allusion to the inductive procedure by which the general implication can be arrived at:

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[4] It is not by a mere chance that I have used this term, since the Mohists must have had a comparatively clear idea of what we call the extension of the propositional function, that is to say, the class of things satisfying the given function. In ch. 41 of the *Mo-tsï* (*King hia*) we read (I follow Hu Shï, *Chung-kuo chê-hüe-shï ta-kang*, 10 ed., 1924, p. 206, in supplying the bracketed character 類): 一法者之相與也盡[類]若方之相合也 "The mutual conformity of what are of one norm (*fa*) exhausts [the whole class], as for instance the mutual affinity of [all] squares"; this statement is further 'explained' in ch. 43 (*King-shuo hia*) as follows: 一方盡類，俱有法而異，或木或石，不害其方之相合也，盡類猶方也，物俱然 "One square (i.e., the property of squareness) exhausts the whole class [of squares]; if all have [the same] norm (*fa*, that is to say, the norm of 'squareness' in the present case), even if they are otherwise different, either of wood or of stone, [this difference] does not do harm to their mutual affinity as squares; if the whole class are like a square, all the particular things (*wu* 物) are so". To my mind, both quotations clearly refer to any whole class (*tsin-lei*) of things satisfying the given 'norm', or, as I should put it, the given propositional function — such a class being precisely what we call the extension of the propositional function. By the way, the reader will note that the present discussion indirectly corroborates the interpretation of the 'norm' in terms of the corresponding propositional function $\varphi x$ (*cf. supra*, p. 106). It is also worth while to emphasise that the Chinese commentators, unaware of the logical problems involved as they were, used to interpret the passages here in question in a way not very different from mine. Thus, in Sun I-jang's commentary (following Wang In-chï) we read the gloss: 同法者之彼此相如也，皆若物之方者之彼此相合也 "The mutual conformity of things of the same norm is just like the mutual affinity of all squares among the things". On the other hand, Maspero, to whom I owe the translation of *fa* as 'norm' (as against Hu Shï's 'form', which is certainly not to the point, *cf. supra*, p. 106, footnote 3), in the present case for some unknown reason preferred to interpret the Chinese term as 'modèle, type' and effaced the real import of the passages under discussion as referring to the extension of the 'norm' (see *Notes*, p. 11).

$$\left.\begin{array}{l}\varphi x_1 \supset \psi x_1 \\ \varphi x_2 \supset \psi x_2 \\ \ldots\ldots\ldots \\ \varphi x_n \supset \psi x_n\end{array}\right\} \underset{x}{\Pi}(\varphi x \supset \psi x)$$

In other words: It is by the examination of the particular cases, $\varphi x_1 \supset \psi x_1$, etc., that the corresponding all-statement (*hiao*) is arrived at; thus, any particular case is 'by what the all-statement is established' (or, speaking more strictly, a part of it) and is actually contained in this all-statement. Once the given *hiao* is accepted as true, we are allowed to derive from it any corresponding particular statement, which simply means taking such a statement out of the *hiao* in which it is contained. The truth of the *hiao* itself is tacitly assumed, and the only condition of correctness spoken of in the Chinese definition is that the 'because' (*ku* 故) — sc. the 'because' of the specialised statement — should be conform to the *hiao*. This makes me think that the specialised statement inferred from the *hiao* had the form "$\psi x_k$, *because* $\varphi x_k$" rather than $\varphi x_k \supset \psi x_k$, which, by the way, would be in perfect agreement with the intensionalistic character of Chinese logic (*cf.* ch. IV of this study, RO XXVI, 2; pp. 94—95). None the less, the 'because' is, logically speaking, the antecedent $\varphi x_k$ of the specialised statement, and the condition spoken of in the Chinese definition is fully understandable. This condition of the *ku* being conform to the *hiao* requires, first, that the function $\varphi$ in the antecedent of the specialised statement should be the same as the one in the antecedent of the *hiao* (more strictly: the same as the propositional function in the antecedent of the operand of the *hiao*); second, that the argument $x_k$ be taken from the extension of the propositional function $\varphi x$. Consequently, this double condition warns against reasoning according to invalid formulae of the kind: $* [\underset{x}{\Pi}(\varphi x \supset \psi x)] \supset (\chi x_k \supset \psi x_k)$, and at the same time prevents us from reasoning according to the equally invalid formula $* [\underset{x}{\Pi}(\varphi x \supset \psi x)] \supset (\varphi' x_k \supset \psi x_k)$.[5]

It also appears that the *ku* of the '*hiao*-ised' is a particular case of the *fa* (of the *hiao*), and the double condition spoken of, if stated more accurately, should have been 故中法則是也 rather than 故中效則是也. Moreover, the final part of the Chinese definition ("such is the *hiao*") referring, as it seems, to the whole including the specialised statement derived from the all-statement or *hiao*, suggests that the Mohists were not conscious of using the term *hiao* in two senses: *sensu stricto* it meant the all-statement or general implication in its capacity of premise for deriving specialised statements therefrom, while *sensu lato* it meant

[5] With regard to the latter case the reader will note that if the argument $x_k$ is taken from outside the extension of the propositional function $\varphi x$, $\varphi x_k$ is false: $(\varphi x_k)'$, which equals to: $\varphi' x_k$. Of course, the equivalence $(\varphi x_k)' \equiv \varphi' x_k$ holds good except for the cases in which $x_k$ is an 'empty' argument (that is to say, represents no object at all), — but I think that such cases should be excluded from the Mohist problem under discussion.

the whole inferential procedure corresponding to the general formula that I have given. Leaving out of consideration the question of the inferential procedure as distinct from the derivational formula composed of an all-statement (the antecedent) and a specialised statement (the consequent) — the distinction which the Chinese thinkers were certainly not aware of, *cf.* ch. IV of this study, RO XXVI, 2; pp. 95—96, footnote 6 — and limiting ourselves to the formula already given, we can summarise the results of the present investigation as follows:

效 (*sensu lato*)

效 (*sensu stricto*) 所效者

$[\underset{x}{\Pi}\,(\varphi x \supset \psi x)] \supset (\varphi x_k \supset \psi x_k)$

法 故

The *hiao* thus conceived is perhaps the Mohist counterpart of the scholastic *dictum de omni*: "Quidquid de omnibus valet, valet etiam de (quibusdam et de) singulis". It also resembles in more than one respect the so-called "Indian syllogism" which, as S c h a y e r demonstrated years ago (see his study *Z badań nad logiką indyjską* I, p. 100; *cf.* ch. I of this article, RO XXVI, 1, p. 8), also belongs to the calculus of functions and can be reduced to the following formula of this calculus: $\{[\underset{x}{\Pi}\,(\varphi x \supset \psi x)] \,.\, \varphi x_k\} \supset \psi x_k$. There is also some incidental but otherwise important terminological correspondence between the Mohist *hiao* and the Indian reasoning in so far as the Mohists, as we have seen, used the term *ku* ('the because', literally 'cause, reason') for what corresponded to $\varphi x_k$ of the '*hiao*-ised', while the Indian logicians adopted the term *hetu* 'cause' for the corresponding link $\varphi x_k$ of their form of reasoning (*cf.* S c h a y e r, *ibidem*). But there are also differences between the Mohist *hiao* and the "Indian syllogism". Besides those to be seen from the difference of structure of the corresponding formulae, the Mohist and the Indian, the chief difference lies in the fact that the Indian form included an illustrative 'example' as one of its components — which, of course, does not appear in S c h a y e r's formula, but which accounts for sometimes calling the Indian form "the inductive-deductive syllogism" (see for instance J. N e e d h a m, *Science and Civilisation*, II, p. 423) — while there is no such 'example' in the Mohist *hiao* as I conceive it. Contrary to M a s p e r o (*cf. supra*, p. 140), I am convinced that the *hiao* had nothing to do with the "raisonnement par l'exemple" of any kind in spite of the reference to the inductive procedure in the very definition of the *hiao*.

As is easily seen, my interpretation of the Mohist *hiao* put forward in this chapter is in some sense similar to that of H u S h ï — although not identical with it[6] — while

[6] This similarity lies mainly in the fact that I conceive the *hiao* as a kind of non-syllogistic deduction, and so does H u S h ï. Furthermore, in view of the specific

it is entirely different from Maspero's. Rejecting the latter's theory as I do, I must say a few words on the controversy between Maspero and Hu Shï.

Maspero's main objection against Hu's interpretation of the *hiao* as deduction is that it involves both the interpretation of the terms *fa* and *ku* as technical terms of Mohist logic and also their identification as "deux termes s'appliquant à la même chose" (*Notes*, p. 13). Indeed, Hu Shï says, *Chung-kuo chê-hüe-shï ta-kang*, p. 206: — 類的法卽是一類所以然的故. For his part, Maspero argues that such an identification is arbitrary, and that, what is more, in the definition of the *hiao* neither *fa* nor *ku* has any specifically logical meaning, the latter term being a mere conjunction 'therefore'. Contrary to Maspero, I think that there is sufficient evidence to the effect that both *fa* and *ku* were used as technical terms in the Mohist theories (in so far as these were logical), but I partly share the French scholar's objections against their identification. As is easily seen from my own interpretation (and still more so from the corresponding general formula given on p. 109), the *ku* is by far not identical with the *fa*, since the latter forms part of the general implication or *hiao* (*sensu stricto*) — while the former is connected with the specialised statement derived from the *hiao*. As has already been said, the *ku* is only a particular case of the *fa*, and it also appears that the *fa* was perhaps obscurely identified (as a *pars pro toto*) with the whole of the *hiao* (*sensu stricto*) rather than with the *ku* (of the '*hiao*-ised'). I also have to emphasise that my way of interpreting the *hiao* (*sensu lato*) as a specific formula of deductive reasoning has the advantage of holding good even if we follow Maspero in considering the word *ku* of the definition as a mere 'therefore'. Then the corresponding part of the main definition (see *supra*, p. 105), would read: "... therefore if [the reasoning] is conform to

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correspondence of the grammatical notion of predicate and the logical notion of function (*cf. supra*, p. 103), it is also possible that Hu Shï's qualification of the *hiao* as "a theory of correct predication" (*Development*, p. 97) is an anticipation of my own interpretation in terms of the calculus of functions. Maspero seems to have entirely misconceived Hu Shï in this point, since while rejecting Hu's interpretation of the *hiao* as 'deduction' he at the same time accepts the Chinese scholar's dictum of 'correct predication' as fully justified and arbitrarily connects this dictum with the Confucian doctrine of the 'rectification of names' (*Notes*, p. 4). On the other hand, there are considerable divergences in details between Hu Shï and myself, and I would never follow him in translating *hiao* as 'deduction' *tout court*. Nearly everything so far spoken of in this study directly concerns deductive forms of reasoning as found in Chinese philosophical texts, and so will it be in the following sections. Thus, it goes without saying that deduction (*sensu lato*) has various forms in the early Chinese philosophers and that it can by no means be reduced to the *hiao* alone. This latter, to say the best, appears to be only one kind of deduction, and a very specific one at that, not deprived, as we have seen, of some 'inductive' admixture (at least in the definition itself). On the translation of the very term *hiao*, *cf. infra*, p. 111 ff.

the *hiao*, it is correct; and if it is not conform to the *hiao*, it is incorrect''[7]. As is easily seen, the reducing of the word *ku* from a supposed technical term to a conjunction does not affect the deductive character of the whole formula (nor that of the inferential procedure based on it). What is more, in the case of *ku* rendered as 'therefore' the condition of 'being conform to the *hiao*' — and not *'being conform to the *fa*', *cf. supra*, p. 108 — becomes perhaps clearer, as it then refers to the whole of the '*hiao*-ised' (not to its antecedent alone).

It is now time to say a few words about the very term *hiao*, deliberately left untranslated in this paper. I must remark in advance that for the time being my terminological discussion will be more negative than positive. Not only the Mohist use of the term can be due to complex (and not necessarily consistent) semantic associations, but, as we shall see later, we can hardly arrive at a good etymological rendering of the term in its specific Mohist sense even if my own 'terminological' theory be accepted. In anticipation of what will be said later, I propose to continue to leave the term untranslated, or — if some rendering is necessary — to translate it as 'formula'. It is none the less worth while to discuss the matter in some detail, since the results, although mostly negative, will at least show the inadequacy of the former renderings of the term (M a s p e r o's in the first place), and the discussion itself will bring us into the very middle of the much more important problem of the (indirect) textual corroboration of the whole of my own interpretation.

M a s p e r o, in accordance with his interpretation of the whole problem, insisted on translating the term *hiao* as 'imitation' (*cf. supra*, p. 105, footnote 2). The 'technical' definition of the *hiao* in the *Siao-ts'ü p'ien* (especially as I conceive it) itself gives no clue to such a translation (and, strictly speaking, contains no clear suggestion for any 'etymological' translation of the term), and M a s p e r o's rendering is justified only in so far as one of the common meanings of the character 效 is 'to imitate, to follow'[8]. But leaving aside the fact that the French scholar was under the influence of the whole of his interpretation which is considered here erroneous, we must state, first, that in the present case the very transition from the verbal meaning 'to imitate' to the nominal one 'imitation' (a *nomen actionis*?) is rather theoretical and finds no corroboration in texts; second, that the word *hiao* has also other semantic values, widely different from 'to imitate'. With regard to the former objection let it be said that the nominal correlate of the verbal *hiao* (conceived as 'to imitate')

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[7] The first scholar who noticed that we can interpret the Mohist definition as referring to deduction even if we grant M a s p e r o his 'therefore' is J. N e e d h a m, *Science and Civilisation*, II, p. 184. On the whole, however, my interpretation differs considerably from N e e d h a m's.

[8] Besides the definition of the *hiao*, which, as we know, is taken from ch. 45, the character appears in the vast body of the *Mo-tsï* only twice, in chapters 9 and 39 (according to the index in the Harvard-Yenching *Concordance to Mo Tzŭ*). In both cases it has a verbal function and means 'to imitate'.

is 'model' rather than 'imitation'[9]. With regard to the latter objection it should be emphasised that among the meanings different from 'to imitate' there is at least one: 'effect; to have effect; efficacy', which perhaps better than any other can account for the word *hiao* being used to designate what corresponded to the general implication in our terminology. This assumption is understandable if we remember that the 'general implication' of the Mohists must have been conceived chiefly in terms of the cause-and-effect nexus. One also might argue that there is not only close connection between the *fa* and the *hiao* (this connection itself being undeniable in the light of the very definition of the *hiao*), but that, in fact, the terms *fa* and *hiao* refer to two aspects of the same complex idea (corresponing to that of our general implication) — the *fa* (= 所若而然) being chiefly concerned with the antecedent as entailing the given effect and the *hiao* (= 'effect') emphasising the consequent as necessarily resulting from the given condition (for the possibility of identification of the *hiao* and the *fa*, *cf.* also *supra*, p. 110). I think that the results so far arrived at of the present 'etymological' discussion are convincing, but for the time being I consider them mere suggestions. I do not positively insist on them, since they are chiefly meant to show that Maspero's 'imitation' is far from being the best translation of the term (even from the purely lexical point of view), and that it should be replaced by another rendering fitting both the etymology of the term and my interpretation of the logical aspects of the whole problem. What is more, we can go a step further in our search for what might terminologically and factually correspond to the Mohist *hiao*, — a step which will make us see more clearly the inadequacy of the former renderings of the word (and of the former interpretations in general) and which, by the way, will corroborate the assumption that *hiao* in its Mohist sense can derive from 'effect; efficacy' rather than from anything else. But the importance of this step exceeds by far its etymological or terminological implications, since it is strictly connected with the much more important problem of positive textual evidence for the whole of my own interpretation of the Mohist *hiao* as a specific logical formula. Thus, before proceeding to further terminological discussion, I shall turn first to the more relevant aspects of the problem now in question.

As has already been remarked, all the interpretations of the specific Mohist problem discussed in this chapter are necessarily conjectural, and so it is likewise with my own interpretation in terms of the modern calculus of functions. In the case under discussion we are specially handicapped by the fact that the only place in the 'dialectical' chapters of the *Mo-tsï* where the *hiao* is spoken of is the definition in the *Siao-ts'ü*

[9] *Cf.* for instance H. Dubs, *The Works of Hsüntze* (London 1928), p. 91, who adequately renders the phrase 大儒之效 (being the sub-title of ch. 8 of the *Sün-tsï*) as "The *model* of the great Confucians". On the other hand, for the very title of ch. 8, 儒效, Dubs evidently follows Yang Liang's gloss: 效功也, and translates (*ibidem*): "The merit of the Confucian". For Dubs's rendering of *hiao* as 'reason(s)', see *infra*, p. 119.

*p'ien*, — the definition which, as we have seen, is in itself far from being clear or linguistically unambiguous, and which, consequently, theoretically allows of widely divergent interpretations. Nowhere else in the *Siao-ts'ü p'ien* or other 'dialectical' chapters of the *Mo-tsï* (or in the vast body of the *Mo-tsï* in general) is there any reference or allusion to this *hiao*. Moreover, among the many specimens of actual reasoning attested in Chinese philosophical texts there is none directly or indirectly referred to as a *hiao*-reasoning, while it goes without saying that only such references would yield a conclusive test for the divergent interpretations of the ambiguous definition of the *hiao* as found in the *Siao-ts'ü p'ien*[10].

There is, however, one single piece of textual evidence — as far as I know never cited in the discussions on the Mohist *hiao* — which, even if not fully conclusive, shows the inadequacy of the former interpretations and which, to my mind, strongly corroborates my own interpretation. It is true that the evidence in question is rather indirect and incomplete, since it involves no actual *hiao*-reasoning in the Mohist sense of the term (as I have said, there is no instance of actual reasoning qualified as *hiao* in Chinese texts). It can only be conceived as referring to what I consider as the *hiao sensu stricto* (or 'general implication'), that is to say, the left-side part of the whole formula of the Mohist *hiao sensu lato* in my interpretation, — but these limitations cannot possibly invalidate the corroborative force of the evidence. It is also true that the passage here in question does not derive from the *Mo-tsï* but is drawn from a philosopher reckoned to belong to the Confucian school, namely the *Sün-tsï*. This fact, however, only shows that the notion of the *hiao* (*sensu stricto*), corresponding to our all-statement or general implication, was not an exclusive property of the Mohist dialecticians. Without entering upon the rather intricate problems of relative chronology and those of a possible influence on the Confucian *Sün-tsï* by the Mohist dialecticians (the *Sün-tsï* being probably of a later composition than the 'dialectical' parts of the *Mo-tsï*), we can state that the notion of *hiao* (at least in its narrow sense) must also have been known and occasionally used outside the Mohist school, — although it is certainly the merit of the Mohists to have theoretically worked on this notion and developed it to a logical formula of reasoning.

I mean the *Sün-tsï* passage in ch. 15 (*I-ping p'ien*) relating one of the philosopher's speeches held before King Hiao-ch'eng of Chao; the event must have taken place somewhere in the middle of the third century B.C. I give the Chinese text of the most essential part of the passage according to the *Sï-pu ts'ung-k'an* edition of

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[10] Maspero's assumption that the reasoning constituting the beginning of ch. 14 of the *Mo-tsï* is an instance of the *hiao* conceived as 'imitation' (the *hiao* or "ce qui imite" corresponding to the 'example', and the '*hiao*-ised' or "ce qui est imité" being the "raisonnement principal") is purely arbitrary, and there is nothing tn the Chinese text justifying this assumption (*cf. Notes*, p. 3 and 18). By the way, the *Mo-tsï* reasoning in question is very inadequately analysed by Maspero, see ch. VII of my study.

the *Sün-tsï*, X, 15, ff. 4v-5r. (For the passage in question the differences between the *Sï-pu ts'ung-k'an* text and that of Wang Sien-k'ien's ed. are insignificant and do not affect our problem.) Says the philosopher:

(a) 臣請遂道王者諸侯强弱存亡之效安危之埶 (b) 君賢者其國治 (c) 君不能者其國亂 (d) 隆禮貴義者其國治 (e) 簡禮賤義者其國亂 (f) 治者强 (g) 亂者弱 (h) 是强弱之本也

In translation[11]:

"(a) I should like to be permitted next to speak of the *hiao* ( 效 ) of kings and feudal lords as being strong or weak, [of the *hiao*] of their preservation or ruin, and of the *shï* ( 埶 ) of [their being in] safety or danger. (b) If the prince is a worthy one, his country is well-governed. (c) If the prince is without ability, his country is in disorder. (d) If [the prince] exalts the rules of conduct and honours justice, his country is well-governed. (e) If [the prince] belittles the rules of conduct and holds justice lightly, his country is in disorder. (f) If [the prince's country] is well-governed, [the prince] is strong. (g) If [the prince's country] is in disorder, [the prince] is weak. (h) Such are the roots of being strong or weak".

Leaving aside for a while the problem of the 'etymological' meaning of the word *hiao* in the present case (as well as that of its parallelism with the word *shï*) it seems evident that the word stands in our text as a quasi-technical term coming very near to (if not identical with) its specific Mohist use. We are fully entitled, I think, to consider what follows in the Chinese text, that is to say, the sentences (b)-(g), as actual examples of the *hiao* spoken of by the philosopher in the introductory sentence (a). If so, we must emphasise, first of all, that this *hiao* cannot possibly have anything to do with Maspero's "reasoning by means of an example", or Needham's "model-thinking following the methods of Nature", or Chan Kien-feng's alleged syllogistic reasoning — since there is nothing in the Chinese text now under

[11] In H. Dubs, *The Works of Hsüntze*, pp. 161—162, the passage is rendered too freely to suit my purpose. In particular, Dubs who rightly rendered (b) and (c) as conditional sentences, unnecessarily modified the syntactic construction in his rendering of (d) — (g) and wrongly restituted the word 'country' as the subject of the latter sentences. As a matter of fact, in the Chinese original the syntactic construction of all the six sentences here in question is essentially the same, and the subject (although left unexpressed in (d) — (g)) is always 'The prince'. The parallel terms *hiao* and *shï* (conceived as 'reasons' and 'circumstances' by Dubs and left untranslated in my rendering of the passage) will be discussed *infra*, pp. 118–119.

discussion that would justify any of these assumptions. On the other hand, our text positively and undeniably shows that the *hiao* — at least as conceived by Sün K'ing as the presumable author of the *Sün-tsï* — corresponded to the Mohist *hiao sensu stricto* as I have interpreted it in this chapter. Indeed, each of the sentences (b)-(g) of our text is to be logically analysed as an all-statement (or general implication) of the form $\underset{x}{\Pi}(\varphi x \supset \psi x)$. Symbolising the functions which successively appear in our text by means of $\varphi_1$ — $\varphi_4$ and $\psi_1$ — $\psi_4$ ($\varphi_1$ = "is a worthy prince", $\psi_1$ = "his country is well-governed"; $\varphi_2$ = "is a prince without ability", $\psi_2$ = "his country is in disorder"; $\varphi_3$ = "is a prince who exalts the rules of conduct and honours justice"; $\varphi_4$ = "is a prince who belittles the rules of conduct and holds justice lightly"; $\psi_3$ = "is strong"; $\psi_4$ = "is weak") we obtain the following series of formulae strictly corresponding to the given sentences:

(b) $\underset{x}{\Pi}(\varphi_1 x \supset \psi_1 x)$
(c) $\underset{x}{\Pi}(\varphi_2 x \supset \psi_2 x)$
(d) $\underset{x}{\Pi}(\varphi_3 x \supset \psi_1 x)$
(e) $\underset{x}{\Pi}(\varphi_4 x \supset \psi_2 x)$
(f) $\underset{x}{\Pi}(\psi_1 x \supset \psi_3 x)$
(g) $\underset{x}{\Pi}(\psi_2 x \supset \psi_4 x)$ [12]

I think that the above analysis is clear enough to justify my remarks which preceded it. The correspondence of sentences (b)-(g) and their analytical formulae with what I consider the Mohist *hiao* (*sensu stricto*) is undeniable, and, as is easily seen, each of the given formulae allows of deriving specialised statements (that is to say, instances of the '*hiao*-ised' in my interpretation) which must be accepted as true if the corresponding all-statement is accepted as such. For instance, (b) as a *hiao sensu stricto* allows of deriving statements of the kind: "If Prince So-and-so is a worthy one, his country is well-governed" or, as the Chinese philosopher would probably put it, "The country of Prince So-and-so is well-governed, because this Prince is a worthy one". Such a statement is a case of a correct '*hiao*-ised' (and a correct derivational procedure from the given *hiao sensu stricto*, that is to say, a correct case of the *hiao sensu lato*) since its *ku* ("Prince So-and-so is a worthy one") is 'conform to the *hiao*' according to the Mohist definition. The problem, however, lies in the fact that there is no such operation corresponding to the Mohist *hiao sensu lato* in our *Sün-tsï* passage nor, as far as I know, anywhere else in early Chinese literature. That is precisely why I have already qualified the evidence from the *Sün-tsï* as incomplete and not fully

[12] Of course, the formulae are to be read as follows: "for every $x$: if $x$ is a worthy prince, $x$'s country is well-governed", and so on.

ising the consequent of its operand[18]. That is why, as has already been said *supra*, p. 111, I insist on leaving the term untranslated (or translating it, if absolutely necessary, as something like 'general formula', — which however does not render the specific connotation of the term).

To sum up: I do not venture to say that my interpretation of the Mohist *hiao* is fully adequate, and I concede that some of its very important points remain conjectural. None the less I think that it is strongly — although incompletely — corroborated by the textual evidence drawn from the *Sün-tsï*, and that it is also corroborated to some extent by the parallel terminological considerations. In all, I believe that the present theory is better founded than any other so far produced.

Another indirect piece of evidence speaking in favour of my interpretation of the Mohist *hiao* in terms of the calculus of functions, as presented in this chapter, is the undeniable fact that the elements of this calculus are otherwise involved in the actual instances of reasoning as found in the body of the *Mo-tsï*. Such an instance will be analysed in the next chapter of this study.

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[18] Let me emphasise that according to my theory the term *hiao* in its Mohist sense only d e r i v e s from 'effect'; this does not mean that I propose simply to render the term as 'effect'.