THEORY OF GROUPS OF PERMUTATIONS, MATRICES AND KINSHIP

A Critique of Mathematical Approaches to Prescriptive Marriage Systems

PIN-HSIUNG LIU

The applicability of mathematics to the study of Anthropology, especially to kinship structure, has long been discussed by social anthropologists. Studies to this aim have been undertaken especially in connection with the analysis of kinship terminology or section systems. These began toward the end of the last century so the term 'kinship algebra' has a long history.

Unfortunately, because most anthropologists are unfamiliar with mathematics, only pseudo-mathematics has been applied. Symbolic notations have been used, but these involve only description and no manipulation. Many papers have brought forth brilliant analyses and ingenious models, but a real scientific base for the mathematical approach has never been established. Not unexpectedly, the 'mathematical' results were extremely vague and scanty, and this has caused anthropologists to neglect the mathematical approach. The lack of a foundation in pure mathematics also made the leading scholars condemn kinship algebra as pseudo-science (e.g., Malinowski 1930). Thus for a long time kinship algebra has been treated as a step-child and subordinated to the traditional discipline, and no progress has been made in it. This stagnation continued until very recently.

Now a new breakthrough has come from an adjacent science. By introducing the method of 'componential analysis' from the field of linguistics the study of kinship algebra has been revived. The accomplishments of Lounsbury (1956, 1964), Hammel (1965) and others in the study of kinship terminology have restored its reputation. Also, through impulses from modern achievements of the natural and physical sciences, anthropologists have been compelled to make epistemological and methodological reappraisals of their traditional methods. Then, through the advocacy of such outstanding anthropologists as Lévi-Strauss (1949, 1953) and Leach (1961), the new concept of structural 'models' or the problem of mathematical applications to kinship study again evoked serious attention. They have become primary topics in current anthropology.

One of the remarkable tendencies in modern mathematics is the developing emphasis on a qualitative orientation, in contradistinction to the quantitative point of view of traditional mathematics. As one outcome of this development, mathematics has directly or indirectly brought new methodological tools to the study of social sciences, which have been accepted widely and rapidly. Thus, in the field of anthropology, such subjects as mathematical logic, set theory, group theory, game theory, topology, cybernetics and others are thought indispensable for the study of kinship structure.

The realization of this has come mainly, not from anthropologists, but from mathematicians interested in kinship problems, especially in the section system of the Australian aborigines, exploring a new mathematical approach in this field.

In 1949 André Weil, in the appendix to Part I of *Les Structures Elêmêntaires de la Parêntê* by Lévi-Strauss, first applied real mathematics to analyze certain types of marriage laws. Proposing a new conception of 'marriage types', Weil points out that the theory of groups of permutations is applicable to the study of the section system. Since this time Weil's unique suggestion has shaped the mode of mathematical approaches to kinship study. But there are certain flaws in the approach, resulting from the misunderstanding of some anthropological phenomena. This may be partly caused by the fact that the mathematicians are not well informed of ethnographical resources. Hence Weil was trapped, through sampling error, into a discussion of the matrilateral cross-cousin marriage system based on a controversial example. This has not only influenced the theoretical development of the field but also introduced the bias that has hindered the solution of unilateral cross-cousin marriage systems. Certain mistakes of Weil and his successors which to date have not been clearly pointed out will be discussed in this paper.

Weil acknowledges that if a society practices the section ('class' in his usage) system the marriage laws have to satisfy the following conditions (White 1963: 151–157):

(A) For each individual, male or female, there is one and only one type of marriage which he (or she) has the right to contract.

(B) For each individual, the type of marriage which he (or she) is capable of contracting depends solely on his sex and the type of marriage of which he (or she) is the issue.

Then Weil takes a society of four sections practicing the following marriage rules as an example for his analytical method (see Fig. 1):

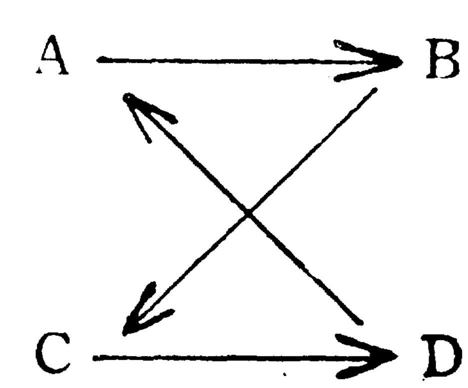

Fig. 1

There are four types of marriage: (M_1) male A, female B; (M_2) male B, female C; (M_3) male C, female D; (M_4) male D, female A. Let us further allow that the children of a mother of class A, B, C, D be respectively of class B, C, D, A. Then our table is the following:

Type of parents' marriage	M_1	M_2	M_3	M_4
Type of son's marriage $f(M_i)$	$=M_3$	M_4	M_1	M_2
Type of daughter's marriage $g(M_i)$	$=M_2$	M_3	M_4	M_1

f and g function to determine the type of marriage of a child issuing from a marriage of type M_i (i being one of the number 1, 2,...., n). Moreover, in other words the second line and the third are simply arranged in a different order from that of the previous line. Thus it reveals that the theory of permutations is applicable to this study. Then Weil introduces a new condition:

(C) All males ought to be able to marry the daughter of their mother's brother.

For this, the following demonstration is given:

Let us express it algebraically. Consider a brother and sister, issues of a marriage of type M_i: the brother must contract a marriage $f(M_i)$ so that his daughter will contract a marriage $g[f(M_i)]$; the sister must contract a marriage $g(M_i)$ so that her son will contract a marriage $f[g(M_i)]$; the condition (C) is thus expressed by this relation:

$$f[g(M_i)] = g[f(M_i)].$$

Weil's demonstration appears very reasonable, and seems beyond any argument. He postulates that a 'marriage cycle' which is necessary for the regulation of a unilateral cross-cousin marriage system has been established among the four sections, namely, by the rule that male A marries female B, male B marries female C, male C marries female D, and male D marries female A. Thus the marriage cycle penetrates the four sections and the above-mentioned demonstration proves that the marriage meets condition (C). That is, it is a matrilateral cross-cousin marriage, or to speak properly, a father's sister's son/mother's brother's daughter marriage. But, is Weil's assumption really valid? My answer is no. It is worth while to study Weil's scheme from a new angle. Let us examine the kind of descent rule that is practiced in the four section system drawn up by him.

In the male line, according to Weil's denotation, A's son is C, C's son is A, thus A and C are placed in the position of alternate generations or form a 2-generation cycle to compose one patri-descent line or group. In the same way B and D compose another patri-descent line or group. Weil's four sections now split into two even parts, each representing a patri-descent group. In the female line, where A's daughter is B, B's daughter is C, C's daughter is D, and D's daughter is A, the four sections are involved in a four generation cycle to compose one matri-descent line or group. Now we realize the society depicted by Weil is an extraodinary one; it is exogamous from the point of view of patrilineality, but endogamous from the point of view of matrilineality. This phenomenon is quite different from what is known for any 'four section' system, which is exogamous from the point of view of both descent principles where sections of both descent groups intersect each other.

It is an established theory in social anthropology that at least three descent groups are necessary to form a marriage cycle for the practice of unilateral cross-cousin marriage. Weil's four sections take the form of a marriage cycle, but a section can not be substituted for a descent group, or vice versa. Weil's society is not composed of four but of two patri-descent groups; theoretically no 'remote exchange' can be set up between the two descent groups since no matrilateral cross-cousin marriage can take place. But in reality this is not the case. Let us re-examine Weil's marriage rule.

Consider a brother and a sister, issues of a marriage of type M_1; the brother must contract a marriage $f(M_1)=M_3$; the sister must contract a marriage $g(M_1)=M_2$ so that her daughter will contract a marriage $g[g(M_1)]=M_3$; thus a brother must contract a marriage with his sister's daughter. It is true for whatever type of marriage the parent belongs to. The above-mentioned condition is thus expressed by the following relation:

$$f(M_i) = g[g(M_i)].$$

In a word, the four section system discussed above is not a society organizing a marriage cycle by four descent groups and practicing matrilateral cross-cousin marriage as Weil thought, but a society composed of two patri-descent groups or one matri-descent group and the underlying mechanism controlling the system is a kind of oblique marriage, i. e., 'brother/sister's daughter marriage' or 'uncle/niece marriage'.

If in a given society cross-cousin marriage between first cousins is prescribed, then it automatically follows that marriage between second or more remote cousins is also found; similarly, if uncle/niece marriage is prescribed, then matrilateral cross-cousin marriage should also occur in view of overlapping relationships resulting from the nature of the system itself. To characterize a system by a necessarily concomitant secondary feature, for instance to label the former as a 'second-cousin marriage system' or the latter as a 'matrilateral cross-cousin marriage system' leads to serious methodological error. Considerable confusion could result from thinking of a system such as that shown by Leach (1961:60, Fig. 6.) as one characterized by 'Patrilineal descent; marriage with m. B. d. and/or own sis. d.,' when it might better be thought of as 'uncle/niece marriage' or in the term of 'marriage with own sis. d. and/or m. B. d.' It should be noted that Leach himself uses this diagram merely to illustrate overlapping, but my point is that it could be misleading. Similarly, Weil's explanation of matrilateral cross-cousin marriage using a system more basically thought of as characterized by uncle/niece marriage is also questionable.

In addition to this Weil proposes another case of a four section system to explain the definition of new terms, 'reducible' or 'irreducible' society, offered by him. If we follow out the marriage and descent rules given by Weil, we could recognize the society as being characterized by the possession of four matri-descent or two patri-descent groups, and the system as regulated by an absurd 'father/daughter' or 'mother/son' marriage.

At the end of his article Weil introduces another mathematical device, the addition of an 'n-tuple modulo two system', to analyze the controversial Murngin system and support Lévi-Strauss's famous hypothesis. The Murngin system will be dealt with fully in my article '*Formal analysis of prescriptive marriage systems: the Murngin case*', so this problem will be not discussed here.

Robert R. Bush, in his extremely significant extension of Weil's method (see White 1963, Appendix 2), concludes that the algebra of permutations, special topics in group theory, matrix algebra, and operator algebra are appropriate for the study of section systems. Thus Bush introduces the concept of a mathematical 'operator' demonstrating that 'permutation matrices' are an effective tool for analysis, and that the types of marriage $X_1, X_2, \ldots, X_n$ form the vector $[X_1\ X_2\ \ldots\ X_n]$, and given the operators F and G (equivalent to Weil's function f and g) in the form of matrices. The operators are computable: If the product is $FG=GF$, this implies that matrilateral cross-cousin marriage is permissible. They are also computable with themselves to produce 'identity operator I', for example, $F^n=I$ or $G^n=I$. n represents the generation cycle for a given descent line; n is never larger than the number of elements in the vector operand.

In contrast to Weil, Bush makes use of actual societies such as Kariera, Tarau and Arunta, for which anthropological data exist. Among them the Tarau system is regulated by a matrilateral cross-cousin marriage system in which the number of sections and the number of descent groups coincide. In this case the marriage cycle consisting of its four sections is synonymous with the marriage cycle consisting of four patri-descent groups. This is the only possible type of matrilateral cross-cousin marriage system having four sections.

Developing Weil and Bush's theory and method, Kemeny, Snell and Thompson contribute some sections in their text-book, *Introduction to Finite Mathematics* (1956), to an algebraic analysis of the Australian marriage rules. They first systematize the properties of the societies to be investigated as an integrated set of axioms. Then using these plausible axioms they show there are only a few allowed societies with a given number of marriage types. These are a major advance over the previous work, but there are still deficiencies in their discussion. First, they adopt an unsuitable example to discuss for the demonstration of matrilateral cross-cousin marriage. Second, the permutation matrices assigned for the operators S and D (equivalent to Bush's F and G) are given inversely. The latter mistake is carelessness, but the former one introduces a serious theoretical fallacy. In this case to adopt the equation, $DS=SD$, implying mother's brother's daughter/father's sister's son marriage, or matrilateral cross-cousin marriage, as the primary marriage rule is not proper. The lack of a criterion or axiom to distinguish the false item leads them to commit the same mistake as Weil.

The following properties are selected as valid:

$$S^3=I, \qquad D^3=I, \qquad S^{-1}=D, \qquad D^{-1}=S.$$

They are to be read in anthropological parlance as follows:

> The three sections compose one patri-descent line and simultaneously compose a matri-descent line in reverse order to the former. Both descent line are regulated by the principle of the 3-generation cycle and characterized by the 'father/daughter' or 'mother/son' marriage.

Other equations such as $D^2=S$, or $S^2=D$ are secondary features, and they are valid as primary feature only under the condition that the given sections are divided into two to produce either patri- or matri-descent groups (cf. Weil's first case). Now the fallacy of the equation $SD=DS$ as the primary feature becomes evident, for no matrilateral cross-cousin marriage system can be established if only one, either patri- or matri-, descent group exists.

In contrast to the above-mentioned pioneer papers, an elaborate and important study of the prescriptive marriage system, *An Anatomy of Kinship*, with the subtitle of *Mathematical Models for Structures of Cumulated Roles*, was published by Harrison C. White in 1963. This book is comprised of three chapters. In Chapter 1 roles and kin trees are discussed, and the closed social structures of interlocked compound roles built by Australian aborigines are analyzed. Chapter 2 is the cream of this essay. All distinct kinship structures which satisfy the Kemeny-Snell-Thompson axioms are systematically derived and described, and a simple type of graph is used to depict the results for cases typical of each subtype for each of the four major classes (bilateral, matrilateral, patrilateral and others) of kinship systems. In Chapter 3 the major field report on each of several well-known tribes is analyzed to see what ideal model of a closed and consistent kinship structure best fits existing data. At the end of the book Weil's article (now translated from French into English) and Bush's unpublished mimeo are reprinted as appendices.

Perceiving that marriage type is not a concept to be found in the field notes of anthropologists or the thinking of members of the societies, White suggests that a considerable reformulation of the Kemeny-Snell-Thompson approach is desirable. Instead of having one matrix represent the transformation of parent's marriage type into son's type, and another similar matrix represent daughter's marriage type, White deals with one matrix for transforming husband's section (clan in White's usage) into wife's section (W), and another for transforming father's section into children's section (C). Using both W and C as generators, the kinship structure of all derivations is interpreted mathematically. Can White's reformulation eliminate the fallacy introduced by his predecessors? Let our examination concentrate on the item of Chapter 2 Section 8 (White 1963: 52–56), where the matrilateral marriage system is discussed:

Assume that $WC=CW$, but $W^2 \neq I$ so that $WC \neq CW^{-1}$ and $CW \neq W^{-1}C$. ...., let q be the order of W and p the order of C. Thus $C^p=I$, and $W^q=I$, $q>2$.

This is the condition proposed by White for the matrilateral marriage system. It is necessary, but not sufficient. Then three types of matrilateral marriage system are derived from this theorem:

(1) Assume $W=C^j$, where j is the smallest positive integer for which the equation holds. Then $1 \leq j < p$; $p>1$; and also $j \neq p/2$, or else bilateral cross-cousin marriage would be allowed.

(2) Assume $W \neq C^j$ but $W^2=C^m$, where $1 \leq m < p$, since $m=p$ corresponds to bilateral marriage, and $p>1$ for the same reason.

(3) Suppose $W^a \neq C^b$ for any $1 \leq a < c$, no matter what b is, $1 \leq b < p$. Then assume $W^c=C^m$ for $1 \leq m \leq p$. (Only in Case 2, where $c=2$, is $m=p$ excluded, so as to rule out bilateral marriage.)

Among them only Case 3 is valid, and the other two are questionable. Let us examine one of the diagrams shown in White's Fig. 2.13.a (1963: 53) for $j=2$ and $p=5$ for Case 1. According to the designations of the diagram, the following permutation matrices for C and W may be derived:

$$C = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \end{pmatrix} \qquad W = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$

By the multiplication of the operators or generators, we could get the following equations:

(a) $C^5=I$ (b) $W^5=I$ (c) $W=C^2$ (d) $W^2=C^4$

(e) $W^3=C$ (f) $W^4=C^3$ (g) $WC=CW$.

These equations imply: The five sections compose one patri-descent group (a) and practice grand-father/grand-daughter marriage (c); the other five equations are concomitant secondary features which are valid as the primary feature only under the condition that the numbers of the power of W are equal to the numbers of patri-descent groups (b, d, e, f) or more than three patri-descent groups exist (g) in the given society. Under the condition of (a) these five are all unfeasible as primary ones.

In the same way we could demonstrate that the society given in White's Fig. 2.13.b is regulated by grand-mother/grand-son marriage.

For Case 2, the four section society depicted in Fig. 2.14 (1963: 54), is regulating by following permutation matrices for C and W:

$$C = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix} \qquad W = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$$

Through the manipulation of the operators, the following equations are gained:

(a) $C^2=I$ (b) $W^4=I$ (c) $W^2=C$ (d) $WC=CW$

These equations imply: The four sections are divided into two parts and compose patri-descent groups respectively; they are regulated by the principles of alternating generations or 2-generation cycles (a). An oblique marriage, namely uncle/niece marriage, is practiced by them (c). The other two equations (b) and (d) are invalid for this case. The former needs four patri-descent groups and the latter three or more patri-descent groups.

In the same way the societies depicted in White's Fig. 2.15a and b (1963: 55), could be both demonstrated to be composed of two patri-descent groups and regulated by uncle/niece marriage.

From the disussions above, we have seen that the mathematical approach proposed by Weil and developed by the mathematicians does not allow distinction between oblique marriages—in this case they are micro or incestuous ones—and cross-cousin marriages. This defect is caused by the confusion of sections and descent groups. The Kemeny-Snell-Thompson axioms or those revised by White are apparently insufficient. Thus modification and clarification are desirable. Whether the new principle of the 'marriage cycle' proposed by Russel M. Reid (1967) as the ninth axiom could cover the deficiency is worth examining.

Reid admits that the marriage cycle is the essential feature of the model resulting from White's eight axioms and defines it as "closed and nonintersecting loops of wife-taking ties connecting a fixed finite number of segments of a marriage system." Thus the ninth axiom postulates that all such cycles in the same system must contain the same number of segments. This axiom is necessary to satisfy the requirement that the algebraic group contains a unique element I. In the situation just described, $I=W^m$, where m is the number of segments in each cycle. Reid translates this equation into nonalgebraic terms as that m successive wife-taking links will always complete a loop. Then Reid concludes that for all of the Australian examples m is 2. This conclusion is not always valid, for it denies the existence of unilateral cross-cousin marriage systems. White has already pointed out that $I\neq W^2$ is the basic condition for the realization of unilateral cross-cousin marriage systems (1963: 42). The equation implies that at least three descent groups are necessary for an organization of the marriage cycle. But this property seems to be ignored or overlooked by the proposer. Reid's new axiom has the latent faculty to clarify it, but owing to his ignoring of the unilateral cross-cousin marriage system and the relationship between marriage rules and descent groups, Reid missed the opportunity to realize it.

Another proposal of Reid of adopting new generators F and M instead of White's C and W is constructive, as F defines the relative positions of individuals with their fathers and M likewise with their mothers. But mathematically these new generators produce quite the same effects as those proposed by Bush and his successors. In this case the abolishment of the generator W causes Reid's ninth axiom to become useless.

In spite of this criticism it is not my intention to condemn the mathematical approach and deny its merits. Once its faults are clarified—to which aim an attempt has been made above—the mathematical approach proves to be highly efficient for the advanced study of kinship theory. As compared with the astonishing quantity of field data accumulated, kinship study is still stagnating in the descriptive stage, and its theoretical accomplishment seems poor. For example, for such basic problems as the origin of incest taboo, the formation of genealogical space and its structure, the genetical study of the section system or other descent groups, no acceptable hypotheses have ever been proposed or even discussed. The mathematical method has only taken its first step and its effective range is very limited; however, considering the role played by mathematics in the field of natural sciences, the results to be expected by its application for anthropology surpass our imagination. If it is our ultimate aim to establish kinship study as a pure science, there is no reason why anthropologists should hesitate to accept mathematical method. It is true as Leach (1964) has already pointed out that most anthropologists are quite unfamiliar with mathematics. But the anthropologist should attempt to conquer the mathematical difficulties and at the same time it is hoped that mathematicians on their part concern themselves with anthropological problems. Only a cooperation between anthropologist and mathematician can successfully explore the limitless scope of kinship study.

This paper is one of the results of my mathematical study of the kinship systems during the academic year 1966-1967, made possible by the generous assistance of the Harvard-Yenching Institute.

While writing this article, I used the English translation of Weil's paper. After this article was written I was able to reexamine Lévi-Strauss' treatment of the Murngin system, and it appears that the four section system accepted by Weil as one of matrilateral cross-cousin marriage was in fact proposed by Lévi-Strauss as the prototype of the Murngin system. Lévi-Strauss' construction of his Murngin theory on this premise might have been avoided if Weil had been able to point out the error in time.

REFERENCES CITED

BUSH, ROBERT R.

1963 An algebraic treatment of rules of marriage and descent. Appendix II *of* An anatomy of kinship. H. C. White. Englewood Cliffs, N. J., Prentice-Hall. pp. 159-172.

HAMMEL, E. A.

1965 A transformational analysis of Comanche kinship terminology. American Anthropologist 67, No. 5, Pt. 2: 65-105.

KEMENY, J. D., SNELL, J L. and G. L. THOMPSON

1956 Introduction to finite mathematics. Englewood Cliffs, N. J., Prentice-Hall. pp. 343-353.

LEACH, EDMOND R.

1961 Rethinking Anthropology. London School of Economics Monographs on Social Anthropology No. 22, London, The Athlone Press.

1964 Review of An anatomy of kinship: mathematical models for structures of cumulated roles, Man Vol. 64, p. 156.

LÉVI-STRAUSS, CLAUDE

1949 Les structures élémentaires de la parenté. Paris, Presses Universitaires de France.

1953 Social structure. *In* Anthropology today.

LOUNSBURY, FLOYD G.

1956 A semantic analysis of the Pawnee kinship usage. Language 32: 158-194.

1964 A formal account of the Crow- and Omaha-type kinship terminologies. *In* W. H. Goodenough, ed., Explorations in cultural anthropology. New York, McGraw-Hill.

MALINOWSKI, BRONISLAW

1930 Kinship. Man 30, No. 17.

REID, RUSSEL M.

1967 Marriage systems and algebraic group theory: a critique of White's An anatomy of Kinship. American Anthropologist 69: 171-178.

WEIL, ANDRÉ

1949 Sur l'étude algebrique de certains types de lois de mariage (système Murngin). *In* Appendice a la Premiere Partie, Les structures élémentaires de la parenté. Claude Lévi-Strauss, Paris, Presses Universitaires de France, pp. 278-285. Also translated by C. White as Appendix 1 *in* An anatomy of kinship. H. C. White. Englewood Cliffs, N. J., Prentice-Hall.

WHITE, HARRISON C.

1963 An anatomy of kinship: mathematical models for structures of cumulated roles. Englewood Cliffs, N. J., Prentice-Hall.

論親屬結構的數學研究

（摘　要）

劉　斌　雄

從十九世紀末以來，社會人類學者開始注意應用數學於親屬結構研究的問題，但由於人類學者的不嫻熟於數學，他們的嘗試一直沒有成功。

一九四九年，法國著名的數學者 André Weil 發表一篇婚姻方法代數學研究之論文後，親屬結構數學研究的可能性始被實現。Weil 着眼於婚姻類型（marriage type）的特殊性質，指出可應用數學的排列羣論（theory of groups of permutations）來從事分組制的研究。

之後 R.R.Bush，將 Weil 的方法再加發展，認為使用數學中的排列代數（algebra of permutation）或羣論中的一些特別的定理，或矩陣代數學（matrix algebra）等，更適宜於研究婚姻與分組制。此外，他更導入了運算數（operator）的概念，來證實排列矩陣更有益於分析之用。

其後又有三個數學者 Kemeny, Snell 及 Thompson，共同發展前人的方法，他們收集了一些調查過的實例，將之系統化而組成一套公設（axiom），確立分組制的理論體系。

到了一九六三年，H.C. White 推出以分組制為研究對象的鉅著。書中對 Kemeny-Snell-Thompson 公設有所修正並能滿足這些公設的各種親屬結構，給與有系統的描述。

從 Weil 到 White，親屬數學在方法上發展的神速，是使人瞠目的。但他們在資料的處理上有些瑕瑾，致使數學方法的效果大大的減小。Weil 一開始就把舅姪婚制的四分組社會誤做母系交表婚制的社會來討論，使他的數學方法建構在錯誤的資料

上。錯誤的主因是他不能把分組與嗣系羣分清，反而把他們相混合，或者缺乏對分組制婚姻規則與嗣系羣數目間有一定關係的認識之故。後來數學者所發展的方法，譬如運算數及排列矩陣的應用，是容易指出 Weil 的錯誤的，但數學家們反而把 Weil 的錯誤繼承下來，使他們的論著中把父女婚、母子婚、祖孫婚等荒唐的婚姻制當作母系交表婚制討論。