# CHAPTER 2: Classification

The word classification is intimately associated with systematics; indeed, the two are often considered almost synonymous. It was noted in the first chapter that the common English usage of systematics implies that systematics is a product of classification. However, since classification often covers a wide range of different devices, it is necessary to define classification. To do this it is useful to consider classification as a special kind of a larger, more inclusive phenomenon which, for lack of a better term, can be called arrangement. It will be possible then to view classification as the kind of arrangement which leads to systematics in science.

Arrangement can be taken to encompass any activity which has as its product an order or orders, any procedure which leads to unitizing. One can talk about arrangement of ideas, thus speaking about arrangement within the ideational realm, and one can talk about the arrangement of things, arrangement applicable to the phenomenological realm. The way ordering is brought about, the nature of the units created, and the order which units display, can serve as the basis of distinguishing kinds of arrangement (Figure 3). It is obvious that arrangement is required for any kind of inquiry or, indeed, any kind of reaction to either ideas or things. As men we arrange things and ideas continuously in daily living, and we do so both overtly and covertly. For the purposes of scientific inquiry, the arranging must necessarily be done overtly so that the arrangement and the rationale for the arrangement can be conveyed. From the utility of distinguishing the phenomenological from the ideational, especially in terms of evaluation, it follows that arrangement may be approached along these same lines.

Classification will be restricted to arrangement in the ideational realm and defined as the creation of units of meaning by stipulating redundancies (classes). Grouping will be used to denote arrangement in the phenomenological realm and defined as the creation of units of things (groups). Grouping and classification are articulated with one another by means of identification, the process of using classes to assign phenomena to groups, essentially matching a system of classes with a body of phenomena to create groups which are analogous to classes. Following from the considerations undertaken in the first chapter, it is obvious that classes are useless, without groups, and that groups are meaningless without classes. In the course of day-to-day living, a distinction between classes and groups is not necessary, for no new information is being conveyed within a single cultural system and evaluation is not overtly conducted; however, for the purposes of scientific inquiry and the evaluation of its results, it is necessary to make such a distinction. Without it evaluation is impossible. The lack of such a distinction in much of the archaeological literature has created a great deal of the confusion in evidence and represents the transfer of a common sense approach to scientific inquiry.

The products of classification and grouping, classes and groups respectively, contrast as members of the ideational and phenomenological realms. Classes must be defined, cannot be described, and enjoy no objective existence. They are parts of ideational systems. Groups, on the other hand, are not and cannot be defined, but are described and are bound to a given position in time and space. The category “dog” is timeless-an individual case, Rover, is an historical phenomenon. Rover may be described, “dog” may be defined, and if we cite those things which cause Rover to be categorized as a dog we have identified Rover. The important thing is that “dog” and a given dog are two different, but related, things. Since our concern is expressly theoretical, the main concern will be with that aspect of arrangement called classification, but it is well to remember that -to realize any utility from classification it must be articulated by means of identification with groups of phenomena.

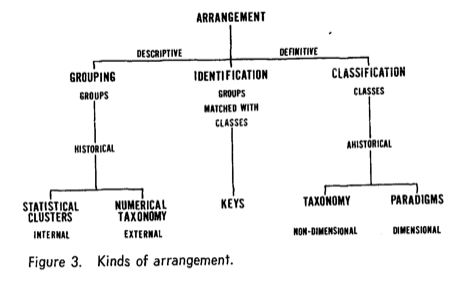


Figure 3. Kinds of arrangement.

Classification is directed toward the production of classes, units of meaning. Classes have a special relationship to definition; indeed, in many respects classes are identical with intensional definitions. A class, as a unit of meaning, can be thought of as a conceptual box created by its boundaries. The boundaries are established by stating the criteria which are required, the necessary and sufficient conditions, to be included within the box or class. The set of criteria which determine the boundaries constitutes an intensional definition of the class called its *significatum*. Classes consist entirely of their *significata*. Thus, since a class is created by the criteria for membership, all of its characteristics as a class are known and invariant. There is nothing to be described. The meaning of a class is its *significatum*. If an object, Rover, is assigned to a class, “dog,” by identifying in Rover those criteria necessary and sufficient to be a member of the class “dog,” then he may be considered a *denotatum* of the class “dog.” When another animal is assigned to the class, it is because the new animal displays those same characteristics which caused Rover to be called a “dog.” Calling both animals “dog” means that they are identical with regard to the conditions required of “dogs” and thus may be treated the same in any theory employing the class “dog” (e.g.,, to predict whether or not the new animal will bark or meow when it makes a noise). Referring to Rover as a “dog” means only that the displays the definitive characteristics of dog and nothing else. Obviously, assigning Rover to class dog will not tell you what color he is, though it might restrict the range of possibilities. Color is not part of the meaning of “dog.”

It is necessary to distinguish the process classification from classification in the partitive sense, a classification. A classification is a system of classes produced by means of classification. The application of classification results in the production of a set of classes, not a single class, which are linked with each other through their *significata*. It is the relationship of the elements in the *significata* of a set of classes that gives a classification its system nature. These links between *significata* are a direct function of the manner in which classification has been done, and they control the form of the classification. Kinds of classification and the linkages that they produce between classes will be treated in the following chapter. Here the focus is on the classes themselves and the general characteristics which are common to all forms of classification. Classification is best treated, once defined as the process for the creation of units of meaning by means of redundancy in terms of a series of axioms or consequences of the definition. In doing this, both the assumptions upon which it is founded and the rules for its operation may be made explicit. Choosing some consequences from an infinite field also provides an opportunity to look at classification along parameters which are a source of difficulty in prehistory, and thus to raise some assumptions associated with classification to the level of Issues. The five axiomatic issue-oriented statements below provide the parameters germane to the present task. They are presented in order from the most general to the most specific since the demonstration of one closely follows on the demonstration of the others. Each of these consequences will be considered m detail:

1. Classification is arbitrary (a particular classification is not inherent in any field or phenomena).
2. Classification is a matter of qualification (quality has primacy over quantity).
3. Classification states only relations within and between units in the same system (classification is an organizing device, not an explanatory device).
4. Classificatory units, classes, have primacy over the labels applied to such units.
5. Classifications, classification, and classificatory units have primacy over structures, structuring, models, and model building.

1. CLASSIFICATION IS ARBITRARY. From the outset, classification assumes a particular view of the world, in part as a consequence of being a kind of arrangement. The external world is conceived of as an unsegmented continuum of form through the dimensions of time and space. What appears to be unitary and discrete at one level of inquiry is composite at others and component at still others. Classification assumes that the external world, the phenomenological realm, can be most profitably conceived of as comprised of an infinite number of uniquenesses or instances. These instances take on the qualities of things or the qualities of events depending upon the point of view assumed by the viewer. Customarily, things are instances in which the dimension of time is perceptible. The customary division into things and events, however, is just that, customary, and not of general utility. Given this view of the world, it follows that chaos is inconceivable and therefore not a profitable notion in inquiry. Conversely, it is assumed that the infinite number of uniquenesses that constitute the phenomenological realm must have inherent order. If it is assumed that there is an order, inquiry takes the form of discovery; however, such an assumption greatly inhibits evaluation, for if an order is assumed, it is not possible to discover that multiple orders, or indeed no order, obtains in the phenomenological realm. Following from this, classification rests upon an assumption that the uniqueness of the phenomenological realm is capable of order, but not that any particular order is inherent.

These notions are not to be taken as any kind of ultimate truth, or even true in a more limited sense. They are heuristic devices and nothing more. To begin any reasoned pattern it is necessary to start someplace; the beginning is always assumptive. What is necessary is that the assumptions be made as innocuous as possible so that it becomes irrelevant whether or not they are true. The assumption made by classification, that the external world is composed of an infinite number of uniquenesses which are capable of order, is just an assumption, for it allows for the possibility that there may be a single universal order, several orders, or, in an oblique way, no order at all. Should the latter be the case, chaos is the result and is beyond our apprehension, thus identifiable.

Heuristic devices taking the form of primitive assumptions are necessary for the purposes of science, for only in this manner of conception is it possible to make the foundations of our knowledge susceptible to evaluation. To do otherwise is to assume that which science proposes to demonstrate. In the hard sciences, these basic propositions are of less importance, indeed trivial, for there is traditional consensus about these matters, now largely implicit. They become crucial in cases of constructing new sciences where such consensus has not been traditionally employed or achieved.

Given this conception of the phenomenological world, classification, as the ideational aspect of arrangement, can be viewed in its simplest form as the primary adaptive mechanism of all animate life. It provides the internal means for reducing reality's uniqueness to a manageable number of classes for which a finite organism has responses. It reduces the non-repetitive world to redundancy by stipulating identities and thereby creating classes of phenomena-indeed, creating the phenomena themselves. Looked at temporally, classification introduces the possibility of repetition of events as well as static categories of things.

It follows that classifications can be produced at an infinite number of levels, proceeding from the pole of total uniqueness to the pole of total unity or singularity. Total uniqueness is, of course, chaos which is undefinable and thus not classification. Total unity lumps everything into a single undefinable unit and again is not classification. Systems of units lying between these two poles are all potentially capable of definition and may be profitably considered classification. It is in this proposition that the first element of arbitrariness is introduced into all classification. In order to create a classification, the first step must be the stipulation of scale, the selection of one of an infinite series of scales, at which classes are to be formulated. A more detailed consideration of the notion of scale and related concepts is undertaken in Chapter VI; however, an example familiar to prehistorians is that of deciding what part of a discovery one will treat as artifacts-the site itself, its houses, or their post molds. Of course, all will be treated, but in different classifications. In prehistory, as will be pointed out later, the beginning point is the discrete object and other scales are reckoned from this point. In any case, classifications are always at some specifiable scale of phenomena. Insofar as scale is not inherent but a matter of selection, all classification is arbitrary.

A concurrent step is the subjective selection of the field for which the classification is to be constructed. Classifications never attend the totality of phenomena at a given scale, for, at least from the point of view of the systematist, one would be faced with a field of infinite size. At a given scale, say discrete objects, the field will be narrowed to some “kind” of discrete object. This means that if one is going to create a classification for animals (a kind of discrete object), animals must be defined external to the classification. You have to know what animals are before you can conceive of kinds of animals. Again, because selection is involved and because the definition of the field must lie outside the classification itself, arbitrariness is introduced into classification.

In day-to-day living both field and scale are covert and culturally controlled. The definition of fields and scales for classification are usually accomplished by the theory of a particular discipline and should be explicit to allow evaluation and revision. Further along we shall see that the definition of the concept “artifact” is crucial to prehistory for just this reason-it defines the field (at the level of discrete objects) for classification in prehistory.

Having defined the scale and field which a given classification is to attend, a third arbitrary element needs to be introduced before a classification can be accomplished. This is the discrimination of attributes of the field at a stated scale beneath that of the field. If, for example, one wishes to create a classification for animals, in addition to specifying the scale at which animal is conceived and defining what animals are, one will have to stipulate attributes of animals, parts of animals, which can be used to divide animals into kinds. An attribute is the smallest qualitatively distinct unit involved in classification. Essentially two things are involved in the discrimination of attributes: the stipulation of the scale at which they are formulated, and the division of the scale into the intuitive units called attributes.

The definition of the scale is just as arbitrary in the case of attributes as it is in the case of the field. Further, the division into discrete attributes must always be intuitive, for the definitions of the attributes will lie outside the classification. The discrimination of attributes; like the definition of the field, is customarily embedded in the theory of a particular discipline.

The attributes discriminated become the potential criteria for classification, but potential only, because further selection is required. The selection of attributes as criteria introduces the fourth and final arbitrary element. Following from the general assumptions made by classification, the attributes possible are infinite, and only a finite and usually very limited number of attributes can be employed in classification. Obviously, not all attributes can be used. Even if it were possible to use “all” attributes, there would be no point to doing so, for the product of using “all” attributes would be the division of the field into an infinite set of unique cases. The net result would be a statement that everything is different from everything else, a non-productive conclusion because this is assumed from the beginning and is certainly not a kind of classification. Which specific attributes are selected is usually controlled by the particular problem for which the classification is designed. For example, if one were interested in animal ecology, one might choose the food-getting habits of animals as the basis for a classification resulting in classes such as herbivores, carnivores, parasites, etc. Another problem dealing with animals, say their evolution, will make use of different kinds of attributes and result in a different set of classes.

In addition to selecting the kind of attribute, the systematist also selects their number, thereby establishing the level of classification. The larger the number of dimensions of attributes used, the more numerous the classes and the finer the discriminations will be. Ordinarily this decision is made with reference to the specific problem being treated; when it is done categorically the lumper-splitter controversy arises.

The discrimination of attributes and the selection of some of those attributes as criteria are frequently lumped as the analytic step in classification, because it is in making these procedures explicit that the classification of science differs most radically from everyday behavior. Literally, analysis means to break things down into their component pieces. While this is obviously not what is done in the discrimination and selection of attributes, structurally it is the same procedure, for it is the conception of component pieces. The analytic step is analogous to the “etic” part of the “etic-emic” dichotomy which has gained some currency in anthropology. Analysis accomplished at a scale beneath that of the field lies outside the bounds of classification and forms the basis for classification.

What constitutes analysis and what constitutes classification can be defined only in the context of a classification. Analysis (etic) and classification (emic) are relative in a general context. What is analysis at one scale is classification at the next lower scale. For example, one could create a classification for animals based upon locomotive apparatus, and then one could create a classification of locomotive apparatus which would be based on attributes of such apparatus. In the first case the locomotive devices are attributes; in the second they are the classes. This relative aspect of analysis and classification follows directly from the assumption that the phenomenological world is comprised of an infinite series of scales from the pole of total uniqueness to the pole of singularity.

Before leaving for the time being the notions of analysis and arbitrariness it might be well to note one important distinction not clearly evident in the foregoing discussion, namely, that the term “attribute” is ordinarily used to mean two decidedly different things. First, it is used to designate particular qualities of particular instances. In this sense attributes are unique, non-recurrent, and wholly within the phenomenological realm. Rover m our earlier example is unique in all of his attributes, Rover's color is Rover's alone. Attribute is used also to designate classes of attributes. The color category “brown” applied to Rover's color is an attribute in this second sense. Such classes of attributes as part of analysis are not the product of classification, but are intuitive, at least in relation to the scale at which classes are being formed. In the case of Rover, he has an attribute of color, which is assigned to a class of attributes “brown,” which in turn is intuitive insofar as the class “dog” to which Rover himself belongs is concerned. Again, attribute in the sense of some quality of an object or event is different from, though loosely related to, the name and category to which that quality is assigned. Hereafter, when discussing these kinds of things m a general context, attribute will be restricted to the unique classification quality of a specific instance in the phenomenological realm, and feature will be used to designate the classes of such attributes. Because these considerations are pragmatically trivial at this point in the development of the hard sciences, the distinction is not commonly made; however, in the case of prehistory the distinction is crucial and, indeed, has found recognition in two terms for many years.

To summarize this first axiom of classification it should be obvious that the term arbitrary is applied not to unreasoned or uncontrolled decisions and discriminations, but to the specific assumptions that are necessary to begin classification, given a conception of the phenomenological world as posited by classification. Arbitrariness means only that the discriminations made are not inherent in the phenomenological world as the only distinctions possible. Arbitrariness is necessarily introduced in all classifications at four points:

1. The stipulation of the field to be considered by the classification.
2. The stipulation of the scale within the given field at which classes are to be formed.
3. The stipulation of the attributes of the field, involving first the definition of scale beneath that at which classes are to be formed and then its division into attributes.
4. The selection of attributes as criteria, both number and kind, for defining classes. The first two elements “locate” where the classes are to be formed; the last two, usually grouped together as analysis or the analytic step, “locate” the means of creating the classes. In the sense employed here, all classification must be arbitrary. No classification can be natural. Arbitrariness inheres in these four sets of decisions which must be made and defined outside the classification itself.

2. CLASSIFICATION IS A MATTER OF QUALIFICATION. Whereas the first axiom attends the assumptive foundations of classification, this second statement focuses on characteristics of the process of classification. The distinction between quality and quantity, between units and counts, follows directly from the initial distinction between ideational and phenomenological and between definition and description. Thus the assertion that qualification logically precedes quantification is simply a more closely specified case of the priority of definition over description, here In the context of classification. The centuries-old debate among philosophers about quantity and quality is not relevant here, for the terms are defined much differently in that debate. As has already been indicated, a class is created by an intensional definition, by the statement of a necessary and sufficient condition or set of conditions. This axiom thus asserts that the necessary and sufficient conditions are the product of qualification. For the creation of classes, it is necessary that one have a scale and a field for which the classes are to be formed and features beneath that scale and within that field. The features primitive classes themselves, provide the conditions or criteria for the formulation of classes, and, as has already been shown, this discrimination of features is a matter of distinguishing qualities, not quantities. The manner in which features are employed to create classes varies from one kind of classification to another; however, the definition of a class is always a list of those features which a given thing within the field and at the given level specified for the classification must display in order to belong to a given class. In those cases in which more than a single feature is required, the linkage between features the means of combining them, is the physical entailment of 'their analogous attributes in the same object or event. Co-occurrence then, is the means of linking several criteria for a definition. For example, if a class is defined as “yellow-rough” than all objects assigned to this class as *denotata* must be both yellow and rough and only those objects both yellow and rough can belong. Objects by virtue of being yellow or rough cannot be considered *denotata* of this class.

Given that there is some current interest in arrangement especially in the biological sciences, and that sets of terms have been employed to talk about arrangements, it might be well to point out that classification is here taken to be “monothetic classification.” Within this framework its opposite, “polythetic classification, Is not considered classification at all, for it displays some . very different characteristics beyond the implied differences In the number of defining characteristics.

The assertion that quality is logically prior to quantity can be examine outside of the context of classification. You cannot count something until you have something to count. More often than not, when emphasis is placed on quantity this means only that the classification which produced the things being counted is covert. Only units may be counted, and units are the product (as well as the input) of classification. It is further obvious that if the units have not been defined prior to being counted, there is no way to know what the count means. If one sets out to count “apples” without any means of identifying apples, one might well end up counting apples, some oranges, and a few red rubber balls. Whether or not rubber balls were counted is largely irrelevant. What is important is that there is no way to tell whether or not there are any red rubber balls included in the count. For some purposes it might not matter, e.g.,, if you want to know something about roundish red objects; for other purposes it may be decidedly figure, e.g.,, to be able to distinguish food. Again, there is no way to judge to what purpose the counts may be usefully put unless the units which have been counted have also been defined.

Classification, then, operates solely with qualities. It uses intuitively discriminated qualities to create definable qualities at a higher level. No kind of quantitative information may be used in definition because units cannot be created utilizing continuous “attributes.” To make use of quantitative information, it is necessary to convert it into qualities. The most frequently occurring example is the use of metric data such as length, from which size is developed, is continuous because it is numerical. If, however, a set of things falls into two groups based upon length, ie., length can be shown to be discontinuous, then the two groupings can be regarded as sizes (large and small). If, however, length were found to be continuous, no conversion into size is possible without an arbitrary decision external to the problem. Indeed, when things such as length are convertible into qualities such as size, they are generally perceived as qualities of size in the first place.

Quality and classification do articulate with quantity in two very important manners, description and distribution. This articulation follows from the basic assumptions about the ideational and the phenomenological realms and their articulation with each other. Classification, we noted, is useless without groups; groups, meaningless without classes. Phenomena are the ultimate focus of any inquiry, and groups are aggregates of phenomena. Groups must be described and cannot be defined. Classification provides a means of creating groups and a framework for distinguishing kinds of phenomena. The *denotata* of a class constitute a group. Identifying X items as members of Class A convey only that the items all display the necessary and sufficient conditions for membership. The actual items themselves each consist of an infinite series of attributes, only a few of which are Incorporated as features in the class definition. The other attributes which one cares to distinguish and which constitute the bulk of the items included as the *denotata* of a class are variable by definition. Some may be coterminous with the group; some, while restricted to the group, are ·not universal within it; and still' others which occur either in some or all of the items also occur in other groups. These variables, of course, can be spoken of as variable only after the framework of definitive criteria, itself invariable, has been established. As variables they can be controlled; this is description, and it is here that quantity enters. The description of any set of things can be accomplished only by means of quantitative statements. If one wishes to say what the *denotata* of a class look like, this requires a statement of variable features. It is usually done either by listing the variables or by citing their frequency of occurrence in the group. Usually a mean and a range for each variable attribute can be given. A description, then, is a quantitative generalization about a set of historical phenomena. As such it is bound to that set of phenomena. If a new instance is identified as belonging to the same class and thus is included in the group, the description of the group will change to accommodate the new case. One point of articulation between classification and quantification is that quantification of some kind is always required to describe the *denotata* of a class.

The second important articulation is in the realm of distribution. Classification enables one to identify only a given instance as a particular kind of thing displaying a definitive set of attributes. Identification is not a useful end product because it does not convey anything which was not already evident in the classification. A frequent course is to measure the occurrence of the *denotata* of a class in dimensions outside the classification, such as time and space. This can be done simply by plotting the occurrence of the *denotata*, producing maps or graphs analogous to simple lists of variable attributes in description. More sophisticated distributions are possible, and these require more complex quantitative information than simple occurrence.

Isopatch maps, for example, involve frequency of occurrence through space. Seriations, familiar to all prehistorians, are special kinds of distributions through time, again often based upon frequency of occurrence. The specific forms need not concern us here. If it is desirable to deal with distribution of *denotata* of a class in a given problem, this must always be done quantitatively.

Another important articulation lies in the matter of correlation. Rather than measuring the behavior of the occurrence of a given class against a constant dimension such as time or space, the distribution may be measured against the distribution of other similar units (covariance). The potential of these techniques is recognized in much of what prehistory does today, and most of the more sophisticated statistical operations are means of implementing this kind of inquiry. While less obvious, what a description describes, what a distribution or correlation means is a function of the definition of the units whose variable behavior has been measured. Quantification articulates with classification in using, not defining, classes.

In summary, classification is a process involving units, both as an input and as an output. Units are qualities, not quantities, and thus classification involves only qualities. Quantification necessarily must follow qualification and plays a role in employing the classes in given situations, but quantification cannot enter into classification itself.

3. CLASSIFICATION STATES RELATIONS ONLY WITHIN AND BETWEEN UNITS IN THE SAME SYSTEM. This third axiom of classification attends the nature of the informational “content” that is built into classification. Classifications are systems of classes and, as systems, are closed. Statements made about a system apply only within that system. The informational content of classification is thus completely internal. As has been indicated earlier, classification consists of a series of linked *significata*. It follows that these relationships are structural and that the content of a classification is entirely formal. Content m the sense of things and events is introduced by identifying the *denotata* of a class, but the class itself has no specific phenomenological content.

It further follows from the previous discussion of classification as a series of linked *significata* that two kinds of relationships must obtain in all classifications, relations within classes subsumed under the *significata*, and relations between classes subsumed under the links between *significata*. The first kind of relationship, those obtaining within classes, is universal for all kinds of classification. Chaos is ordered by stipulating finite kinds of things to which the infinite number of actual instances can be assigned. The *denotata* of a class are considered redundant; they are identical in terms of the criteria for membership in that class. The relationship that obtains within classes then is one of equivalence or identity. Indeed, this is the only reason for classification, to create redundancy. The notion of equivalence or identity needs to be further explored, for, given the assumptive basis of classification, identity must be a relative condition. Obviously, identity obtains only within a classification. The basic premise on which classification is founded assumes that no two things in the phenomenological world are the same. If they were, there would be no point to classification.

Identity can mean only that within the framework of a classification, which is stipulated by the attributes chosen as criteria, things in a given set do not differ from one another. They obviously must differ from one another in respects not considered definitive. Furthermore, identity can obtain only when a scale is specified. This follows from the assumption that phenomena can be viewed at an infinite series of scales. What is unitary at one scale will be composite at a lower scale and component at a higher scale. Thus, not only is the notion of identity restricted to a definitive set of criteria, but also to a specific scale. The equivalences or identities embodied in a classification are the classes themselves. The *significatum* of each class is simply a statement of the terms of that equivalence.

The second kind of relationship that is embodied in all classifications is a relation between classes. The nature of this relationship differs from one kind of classification to another. However, there is one characteristic of between-class relationships that all kinds of classification share, namely, that this relationship is always an expression of some kind of non-equivalence. The non-equivalences which link classes in a classification are structured, and thus it is always possible to determine in what manner two given classes are non-equivalent. This is assessed by a comparison of the *significata*. For example, if Class 1 is defined by features a-c and Class 2 defined by features b-d, then the non-equivalence linking these two classes is identifiable as a+d. The specific forms of non-equivalence vary from one kind of classification to another, and this sort of variance will form the basis for the succeeding chapter on kinds of classification. Both the equivalences and non-equivalences embodied in classification have important bearing on the evaluation of classifications and will be treated in that context further along in the chapter. It is sufficient here to reiterate that: (1) classifications are formal; content is introduced only by identifying the *denotata* of a class; (2) two kinds of relationships obtain within all classifications, relationships of equivalence within each class and relationships of non-equivalence between classes; (3) classification provides a means of explicitly stating these relationships, the *significata* embodying the equivalences and the comparison of *significata* the non-equivalences; and (4) classifications, being formal structures, are organizing devices, not explanatory. Without content, explanation is not possible, and classification excludes all content from the start.

4. CLASSIFICATORY UNITS HAVE PRIMACY OVER LABELS APPLIED TO SUCH UNITS. This is not so much an axiom of classification as it is an answer to an issue. Obviously, classes must be identified by some device so that one can talk about them. They must be named, numbered, or otherwise provide with some kind of designation. Designation is an entirely arbitrary procedure outside of classification itself. Nonetheless a great deal of confusion often arises from a confounding of the label designating a class and the class itself. Semantic labels usually are inferences about a class (e.g.,, calling a particular kind of tool an axe, or biological species names part of an evolutionary scheme). A classification as a set of equivalences and non-equivalences enables one to say only whether a given thing is the same or different from another given thing. It cannot tell one why they are different, though how they are different is embodied in the non-equivalence. Why two things are assigned to different classes can be only a matter of inference and, as such is outside the classification. A great deal of time has been expended on how classes should be labeled (for instance, numbers and/or letters versus words; if words, which words, etc.); however, the important thing to recognize is that the label can never bear a necessary relationship to the class. It is always a label, simply a device to identify the class for purposes of discussion. What it is called is not important. The only necessity is that one be able to recognize the class by the label. A demonstration that a semantic label has been inappropriately chosen (e.g.,, showing that a class called axes are really hoes, or that species A. pox is really more closely related to B. rash) does not say anything about the classification, only about the inconsistency of some naming procedure.

5. CLASSIFICATION, CLASSIFICATIONS, AND CLASSIFICATORY UNITS HAVE PRIMACY OVER STRUCTURES, STRUCTURING, MODELS, AND MODEL-BUILDING. This is the least axiomatic, most commonsensical of the statements about classification. Models and structures are devices for illustrating relationships between classes which are not part of the same classification. It follows that one must first have the pieces before one can build something out of them and, furthermore, that the nature of the pieces is going to determine what kinds of things can be built.

## Evaluation

Classification assumes that the phenomenological world is capable of order; To bring order and meaning to phenomena, four assumptions are made, two which locate the classes (level and field), and two which stipulate the means for ordering (distinguishing attributes and selecting some as definitive). The product is a set of equivalences (classes) and non-equivalences (relations between classes). Although obviously based upon observations of the phenomenological world, classifications are formal structures and lie wholly within the ideational realm. Lacking phenomenological content, they are not explanatory but, rather, organize and unitize the phenomenological realm so that it can be explained.

Explanation is apart from classification and based upon inferences about the organization that is imparted to phenomena by a classification and the distribution and correlation of phenomena so organized.

One final aspect of classification needs to be considered evaluation. Irrespective of how the classification was formed, there are two elements involved in evaluation. Classifications are susceptible of evaluation as systems of the ideational realm in terms of their logical consistency. Further, they may be evaluated in terms of the choices exercised in the selection of the field, the scale of the classes, the discrimination of features, and the selection of a portion of these as criteria.

For a classification to be accepted as valid, it must be internally consistent. Decisions in the formulation of the classes incorporated in it must have been made with reference to a unified set of rules. Whimsical choices are not permissible for they destroy the system nature of the classification and negate any possibility of explicitly stating the relationships between classes. Examining a classification for internal consistency is an evaluation of the structure of the classification. If a classification is found to be inconsistent, it cannot serve as a classification because it does not provide any means of stating relations between classes.

The evaluation of classifications in terms of the four initial assumptions is much more complicated, because this is an evaluation of the classes themselves. The actual evaluation is of the choices made in: (1) selecting a field; (2) selecting a particular scale at which the classes are formed; (3) discriminating features for the creation of classes; and (4) selecting from among the discriminated features those which are to be considered definitive. Each of these sets of choices, if explicitly stated in the construction of the classification, is susceptible of evaluation in terms of parsimony and relevance.

To make such an assessment, it is necessary that the classification have a specific, explicitly stated purpose. Many, many “classifications” do not have explicitly stated purposes, and for this reason rational evaluation of the choices incorporated is impossible and the classifications have to be accepted or rejected on faith. Because this seems to be a problem area, it needs to be explored in detail. Perhaps the most frequently drawn, though implicit, criticism of purposeful classification is embodied in the notions of “universal,” “discoverable,” “natural,” or “descriptive” classes. The assumption behind all of these notions is that there is some kind of order in the phenomenological world which is inherent, or more inherent than other orders, and thus what one has to do is discover the order rather than create it. This kind of assumption is, of course, counter to the assumptions upon which classification is based and appears to derive from a lack of understanding or concern, or both, of operations involved in the construction of classifications.

Be this the case or not, one important thing is decidedly clear. If one assumes that there are “natural” classes or “universal” classes, the products of classification are untestable, incapable of evaluation. Their evaluation necessarily rests upon the demonstration of the assumption of universal order, or inherent order, which obviously cannot be done. If, on the other hand, one assumes that one is creating an order not discovering it, and thus must provide explicit statements about the choices involved rather than assuming that the choices are natural, these choices can be phrased as hypotheses about the relationship of the choices to the problem and to the stuff being ordered. We possess rational means of weighing the relative merits of hypotheses, and thus the assumptions which constitute the initial input into classification can be made problematical, testable, and a rational basis provided for using one over another. The utility of assuming only that phenomena are capable of order rather than ordered in some unknown but specific manner is obvious. The first assumption permits the possibility of evaluating the procedure; the second does not.

While the notion of “universal” classes is treated above as a kind of approach without purpose, it can also be looked upon as multipurpose classification, a classification which will serve for all problems. This view, too, requires careful examination. The desire for such classes seems to stem from a “need” to have a name for something, to be able to call a given thing the same thing forever and ever. Within our own cultural system this is, of course, possible. A cultural system is itself a filter which establishes by convention the relevance of certain kinds of criteria over others. The “universal” class would seem to be the application of one's uncontrolled common sense deriving from one's own cultural background to problems which lie outside that background. To create universal classes without assuming that some criteria are inherently more important for all purposes than others, and that there is a finite number of such criteria, requires that all attributes be considered definitive for the formulation of classes. Indeed, it is not too difficult to find this expressed in the literature as “all attributes have been considered” or something similar. This is clearly impossible. All attributes cannot be considered if the attributes are infinite.

But even more important is the nature of the product that would be produced if such could by magical means be accomplished. If all attributes were considered, the number of classes would equal the number of cases considered. There could be no difference between the classification and the phenomena themselves. There could be no kinds of things, and thus there would be no classification. This is certainly an unproductive view, for we already assume that everything is different from everything else. Elaborate procedures involving all attributes would provide nothing that one does not already know from the outset. The simple observation that such “classification” has never been done is ample evidence of its lack of utility. This particular approach has much in common with assuming that there is some kind of absolute “etic” level which lies beneath all other distinctions.

To establish a rational basis for evaluation of the selections that take place in creating classes, it is necessary that the reasons for those selections be known. The relevance of the particular choices made can then be weighed against the purpose of the classification. If a particular kind of organization is required for a given problem, the selections made can be weighed simply in terms of whether or not that organization has been achieved with those choices or whether a new set of choices is required.

Evaluation of the choices involved in classification does not end with weighing the classification against the purpose of the classification. It is quite possible that several discrepant classifications can accomplish the same organization. Some classification will do so, however, in a simpler manner than others. Parsimony and elegance enter into the evaluation here. Some classifications use as attributes inferences about the material being considered (e.g.,, inferences about the function of tools, the manufacture of tools or parts of them, etc.). Classifications which make use of this sort of feature are not parsimonious when compared with those which use as features attributes of the objects or events involved. Indeed, the use of inferences about events or things as attributes can never be justified, for those inferences undoubtedly have a foundation in features of the events or things, and the features themselves can provide the identical organization as the inferences without involving the demonstration of the inferences.

Some classifications are more elegant than others. For example, a given classification may produce many more discriminations or classes than are required for a problem. Another classification which produces those classes required for a problem and only those classes required is, in terms of elegance, the preferable classification. This latter condition, while it is the goal, is not frequently achieved, and so evaluation is really a matter of assessing how closely various alternative classifications approach it, rather than which one achieves such elegance.

In introducing each of the assumptive steps that must be taken to create a classification, the relevant sources for making the decisions have been indicated. The field and scale at which classes are established are usually controlled by the general theory of a discipline. These choices and the basis for making them, then, will be further considered in the specific treatment of prehistory in the second half of the book. The discrimination of features is obviously predicated on the establishment of the field and scale of the classes since the features must be discriminated at a scale beneath that of the classes. The choice of a particular set of attributes as criteria for classification and the number to be used (level) is predicated on the particular problem being considered and the kind of organization of phenomena required. Importantly, these selections must be susceptible to evaluation first in terms of their relevance (which requires a problem), and secondly in terms of their parsimony and elegance. The structure of the classification is evaluated in terms of its internal consistency. Further evaluation of the structure of classifications will be possible in terms of the use to which they are to be put after the various kinds of classifications possible have been considered.

Classification produces definable units which are capable of evaluation. The process does not differ structurally from common sense, intuitive discriminations except that the process is explicit. Once the field of the classification is established, ail analytic step is necessary to discriminate features to be used in creating units. The analytic step not only provides the means of definition by stipulating the conditions for membership in a given unit in terms of features but also provides the means of evaluation in its explicitness. Evaluation of a unit can be undertaken only when it is possible to assess the relevance of the defining criteria to the problem for which the classification is being created.

The role of classification in science is obvious. Classification is the means by which phenomena can be categorized and thus become subject to manipulation. It is not, however, the only means of categorization, but it does provide certain crucial elements not possible with other kinds of arrangement. The most important of these is the definable character of the categories. Since the categories can be explicitly defined, the means of identifying real phenomena can be accurately communicated from one person to another. Also, because the process of creating the classes is explicit, the units do not have to be taken for granted but are instead problematic, being subject to revision or change as demanded by evaluation.

Finally, the field of application is limited by the nature of classification. It can be used only to organize phenomena. It is entirely formal in structure and does not provide explanation, only organization. The organization may be used as the basis for inference, but this is a quantitative step beyond classification. Equally important, and closely connected to its organizational nature, classification must be problem-oriented. A single classification will not serve for all problems. The organization created by classification depends directly on the attributes treated as definitive of classes. The relevance of those attributes to a problem is the source of evaluation. Some organizations will be useful for some problems, but other organizations will be required for different ones. Except in the circumscribed context of our own social environments, a dog is not always a dog. He is a dog for some purposes only, and he is other things for other purposes.