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Classification, Typology, Taxonomy

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Summary

The semantic field associated with the term ‘classification’, three main intellectual and/or practical operations, and three different products, can be identified — there being no one-to-one correspondence between operations and products.

Through intensional classification, the extension of a concept at a given level of generality is subdivided into two or more narrower extensions corresponding to as many concepts at lower level of generality; this subdivision is obtained by stating that *an aspect* of the intension of each of the latter concepts is a different partial articulation of the corresponding aspect of the intension of the higher concept.

Through extensional classification, the objects or events of a given set are grouped into two or more subsets according to the perceived similarities of their states on one or (more frequently) several properties; subsets may be successively grouped into subsets of wider extension and higher hierarchical level.

Through classing, objects or events are assigned to classes or types which have been previously defined, usually by an intensional classification, but possibly by an extensional one operating on a different set.

When only one fundamentum divisionis is considered, a classification scheme is produced — usually by an intensional classification. The extensions of each class must be mutually exclusive, and jointly exhaustive. Classes need not be at the same level of generality, and may be ordered.

When several fundamenta are jointly considered, a typology is produced. This may be done through either intensional or extensional classification. The underlying category space may be “reduced” or reconstructed through “substruction”.

When several fundamenta are considered in succession through a series of intensional classifications, a taxonomy is produced. Specific concepts/terms (such as taxon, rank, clade) are needed to deal with taxonomies.

In the final chapter it is argued that the role of classification has been improperly assessed by several different quarters: in particular by those who credit it with ontological capacities and tasks; by those who see classificatory procedures as an old-fashioned activity to be abandoned in favour of more “scientific” measurement; and by those who blame the retarded development of an “explanatory” social science on the undue attention paid to classification by many of the founding fathers of sociology and cognate disciplines.

1. CLASSIFICATION AS AN OPERATION

The term ‘classification’ (hereafter simply ‘cl.’) is indifferently used for several different operations and for several different products of such operations. It is also used for those sectors of botany and zoology where classification (as an operation) is most frequently resorted to.

By analyzing the formal definitions and implicit acceptations of the term ‘cl.’as an operation, three main families of meanings of that term may be clearly recognized:

(a) cl. as an intellectual operation whereby the extension of a concept at a given level of generality is subdivided into several (two or more) narrower extensions corresponding to as

many concepts at lower level of generality; this subdivision is obtained by stating that *an aspect* of the intension of each of the latter concepts is a different partial articulation of the corresponding aspect of the intension of the higher concept. Notice that in principle all other aspects of the intension of the higher concept are carried into each of the lower concepts: if we classify dogs by colour, the class of black dogs is characterized by all properties of "dogness", except those incompatible with "blackness" — if any (see par. 1.1.2).
In the same family of meanings belong similar operations performed either simultaneously on several aspects of a concept or successively on concepts of decreasing generality;
(b) cl. as an operation whereby the objects or events of a given set are grouped into two or more subsets according to the perceived similarities of their states on one or (more frequently) several properties; subsets may be successively grouped into subsets of wider extension and higher hierarchical level;
(c) cl. as an operation whereby objects or events are assigned to classes or types which have been previously defined. In most instances, classes have been defined through an operation of type (a); however, they may also have been defined through an operation of type (b), and then brought to bear on objects or events not belonging to the original set. Often — especially in zoology and botany — rather than single objects, a set of objects are assigned which are deemed identical for the purpose at hand.
In operations of family (a), classes or types (for the different concepts behind these two technical terms, see par. 1.1.2) may very well be established after a recognition of the empirical distribution of states on one or more properties exhibited by the objects or events of a set. However, the stress is on defining the intension of each newly-formed class or type, i.e. on clarifying it as a concept, and denominating it by a suitable term or expression. On the other hand, operations of family (b) typically start from a data matrix, i.e. a vector of objects/events whose states on a vector of variables (i.e., operationally defined properties) have already been ascertained and coded. After groups (and possibly super-groups) of objects/events have been formed by whatever procedure, the preoccupation *may* ensue of finding a unifying concept (or at least a term or expression) for each particular combination (of states on the variables considered) identifying a group.
Accordingly, in order to distinguish the two kinds, operations of family (a) could be named *intensional* cl., and operations of family (b) *extensional* classifications.

1.1. *Intensional Classification*

The intellectual operations we have just characterized as belonging to family (a) are almost universally labelled 'classifications'. Alternative labels that we know of are 'division' (Cohen and Nagel 1934, 223-43) and 'categorization'(Scheffler 1967/1983, 49 ff.). Sometimes the activity is labelled 'classifying'in order to distinguish it from activities of family (c), which are labelled 'classing' (Riggs 1979, 180).
From a semantic point of view, intensional cl. may be seen as a process of conceptual elaboration (Glaser 1978; Turner 1981). The concept whose intension is articulated in one of its aspects is "explicated" or "unpacked", hence enriched and clarified (Sartori 1970). Concepts corresponding to individual classes are either formed or clarified by the definition of their boundaries with contiguous concepts. Different terms or expressions are univocally allocated to each class concept, and the concept-term ties are fastened — as for all linguistic phenomena: Saussure (1916) — by the implicitly oppositive nature of any systematic allocation. By this we mean the following: if to a vector of concept A, B, C, D... is assigned a vector of terms *a, b, c, d*..., the one-to-one relationship between A and *a* is strengthened by the

particular form of allocation, which automatically excludes that term *a* be also allocated to concepts B, C, D..., and that terms *b, c, d*... be also allocated to concept A.
In this sense Hempel is perfectly right in stating that cl. is "a special kind of scientific concept formation" (1961/1965, 139; also see Sandri 1969, 85-6). From the logical point of view, once the intension of each class concept has been defined clearly (also by opposition with the intensions of each other class concept), it specifies the "necessary and sufficient conditions of membership" in the class, "by stating certain characteristics which all and only the members of the class possess". Each class is therefore "defined... as the extension of" the correspondent class concept (Hempel 1961/1965, 137).

1.1.1. The particular property, among the many comprising the intension of a concept, which is being articulated in its various states in order to create the class concepts is still largely known under its Latin label: *fundamentum divisionis* (literally: the basis of division), although sometimes is given an English label (e.g. 'classificatory principle': Lazarsfeld and Barton 1955, 84).
Take for example the concept of political system. One of its properties is the principle legitimizing rulers. If that property is taken as *fundamentum divisionis*, the classes might be: theocratic, autocratic, plutocratic, democratic, etc. However, if the degree of autonomy of a State's territorial components is taken as the *fundamentum divisionis*, then the classes will probably be: unitary, federal, confederal, etc. As the essays in the present volume testify, there is no dearth of *fundamenta divisionis* for classifications of States and political systems.
The resort to a *fundamentum divisionis* distinguishes classification from other forms of partition of a set. However, many of the classifications actually proposed in the social sciences suffer from a faulty definition of the *fundamentum* Among the best known, Spencer's classification of social institutions in domestic, ceremonial, political, ecclesiastical, professional, industrial (1892, vols. II and III) and Malinowski's classification of organized groups on the basis of the needs they serve (l944, chap. 6).
While the *fundamentum divisionis* is a property of any classification in its entirety, the level of generality of classes is a property of each single class concept, as of any concept. Two concepts (X and Y) are at the same level of generality when (a) the extension of X (total number of concrete instances classed under X) is not part of the extension of Y, and vice versa; and (b) the extension of X is not part of the extension of a concept Z which is at the same level of generality of Y, and the symmetric can be said for Y.
While the violation of requisite (a) brings about a grossly incorrect classification, requisite (b) is violated for practical purposes in several actual classifications (it must be strictly respected only in taxonomies — see sect. 2.3). That violation will have no negative consequences if a correct reduction of a taxonomy has been operated (see par. 2.1.3).
Mutual exclusinevess is a property of *any* couples of classes of a well-formed cl.: classes A and B are mutually exclusive if no object/event is member of the extensions of both A and B. Obviously, violation of requisite (a) for sameness-of-the-level also entails lack of mutual exclusiveness. Such a negative consequence does not obtain, however, if only requisite (b) is violated.
On the other hand, many violations of mutual exclusiness are due to the adoption of more than one *fundamentum divisionis* for the same cl. (see for instance Spencer's above mentioned cl. of institutions). Problems may also arise when it comes to the actual assignment of concrete instances, i.e. to operations of type (c) (see sect. 1.3).
Exhaustiveness is a property of the complex of classes. Given the particular property which has been taken as *fundamentum divisionis*, a cl. is exhaustive if each possible state on that

property has been allocated to one of the classes. In extensional terms, if we have classified forms of political systems, any actual political system must be member of one of the classes — and this whatever *fundamentum* has been chosen.
Exhaustiveness is absolutely warranted only if one of the classes is so defined as to necessarily include all the instances not included in the other classes. This device is more or less of an artifact depending on situations in which it is resorted to (see par. 2.1.2).
Taken together, the two conditions of exhaustiveness and mutual exclusiveness provide that every concrete instance is assigned to *one and only one* class.

1.1.2. The intellectual operation that we are calling 'intensional cl.'may be performed by taking more than one *fundamentum divisionis* simultaneously into account. Rather than a one-dimensional set of classes, a n-dimensional set of types is then created, where n is the number of *fundamenta* A type (from the Greek term τυπος: cast, model) is therefore a concept whose intension is the intersection (in set-theoretical sense) of the n classes which are combined to form it. This on logical grounds; empirically it will often be discovered that the fact of being the combination of n classes, each belonging to a different dimension, will endow the type with features not implied by the intension of each of the n classes (see par 2.2.3).
The complete set of types, i. e. the product of this form of intensional cl., is indifferently labelled 'typology'or 'classification'. We strongly prefer the former label, as we consider semantically unwise to use the same term for an operation and its product.
The semantic space as structured by those intellectual operations (logical products) has been conceptualized by Hempel and Oppenheim (1936) and labelled 'property space'by Lazarsfeld (1937).
The characteristics of a typology will be explored in greater depth in sect. 2.2.

1.1.3. Intensional cl. can be performed, so to say, in chain. After dividing the extension of a concept in classes by applying a *fundamentum divisionis*, one, several, or all the classes can further be divided by applying other *fundamenta.* This splitting of classes can be repeated over and over again. This procedure was conceptualized by Plato as διαιρεσισ (literally, dichotomos choice: each concept was divided into the two concepts of immediately lesser generality). Aristotle introduced the analytical opposition between ghÈne (the concept whose extension is being divided) and hÈide (each of the classes resulting from that division). The distinction has survived in Western culture under the Latin labels genus and species.
By 'analytical opposition' we mean the following. Let us take a concept A and articulate a certain aspect of its intension (the fundamentum divisionis), forming three less general concepts: AA, AB, AC. In this passage, A is the genus, while AA, AB, AC are species. Suppose then an aspect of AA's intension is articulated, and four still less general concepts are formed: AAA, AAB, AAC, AAD. In this passage, AA is the genus, while AAA, AAB, AAC, and AAD are species. And so on.
Usually, if concept AA is being articulated, AB and AC also are. Aristotle's cl. of animals used a different fundamentum for each level of generality, and the same for all classes at the same level; the same did Albertus Magnus in classifying plants (1250), and DufrÈnoy (1845) for minerals. On the other hand, the rigour and elegance of similar solutions may impose an unbearable burden upon actual operations, and transform intensional cl. into a formal exercise, hardly fitting empirical referents. In actual scientific practice, the fundamenta used for articulating classes at the same level are often different.
While the analytical opposition between genus and species is very useful, a general term for

any subdivision at any level of generality (i.e., AA, AAB, AABC, etc.) is also useful: natural scientists use the Greek term taxon (plur. taxa), meaning order, class, which is very appropriate for its genetic link with ‘taxonomy’(literally, the law of orders, or classes), the name which is frequently given to the complex of ‘taxa', i.e. to the product of this form of cl. Other expressions are used, such as “articulated cl.”, or “multi-level cl.” (Lazarsfeld and Barton 1951), “Linnean cl.” (Granger 1960), “hierarchical cl.” (Sartori 1984), “hierarchical classificatory system” (Sandri 1969); however, we think that the Greek term is more appropriate, not only to honour the Greek origin of the concept and operation, but also because the alternative Latin term (cl.) is - as we said — better preserved for the operation and not used for the product too.

1.2. *Extensional classification*

In sect. 1.0 we identified a second family of operations that usually go under the name ‘cl.’. An operation of this family would group the objects or events of a set into subsets according to some criterion related to the perceived similarities of their states on one or (usually) several properties. Accordingly, extensional cl. will usually form types rather than classes. The predominant criterion is to maximize homogeneity within classes and heterogeneity between classes.

1.2.1. One remote intellectual origin of the procedure might be found in Aristotle's criticism of Platonic di{iresis as based on one character only (Parts of Animals, 642b, 21 - 644a, 10). However, an extensional view of cl. waited for at last twenty centuries before acquiring intellectual dignity. This might be surprising, considering that children seem to learn the concept of cl. through a series of experiences and operations which are unquestionably extensional (i.e. centered on grouping objects) rather than intensional, i. e. centered on articulating concepts (Piaget and Inhelder 1959).
In our opinion, this belated development depends on the fact that, in order to be somehow formalized from a spontaneous activity into a respectable intellectual operation within a scientific discipline, extensional cl. had to wait for the development of another intellectual tool, viz. the idea of orderly recording the states of a vector of objects on a vector of properties — in other words, for the intellectual forefather of what is presently known as the data matrix.
An extensional cl. can in fact be performed with guarantees of intersubjectivity only if the following are exactly established: (a) the membership, in terms of objects/events, of the set to be subdivided; (b) the array of properties in terms of which the internal homogeneity and mutual heterogeneity of classes are to be maximized; (c) the procedures by which states on properties sub (b) are to be identified and coded; (d) the criteria by which differences in states on each property are to be evaluated: are all differences to be equally evaluated, or may they be ordered in terms of magnitude, or even measured? (e) a logical and/or mathematical formula combining the differences on all properties considered into a single difference score for each pair of objects/events (this formula has come to be called a ‘distance function': Sokal 1958); (f) a set of decision rules as to how classes are to be formed.
The higher the number of objects/events to be grouped and/or properties to be considered in grouping, the higher the need for something like a matrix organization of information, favoring electronic computation. It may, then, be considered more than a coincidence that approximately in the same period proto-statisticians Conring and Achenwall adopted

rudimentary matrix presentations of their data on the military and economic resources of rival German states, and botanist Michel Adanson stated that “all parts and qualities, or properties and faculties of plants... barring not even one” ought to be considered before attempting a classification (1763, clvi). Along with this idea, Adanson operated extensional cl. and produced taxonomies based on the rate of equal states on the total of properties considered between any two plants (1763, vol. I).
Present specialists of extensional cl., who use thousands of computer iterations to produce the best cl. possible of the objects in a given data matrix, correctly recognize Adanson's priority in imagining a distance function based on the rates of equal/different states, and even label ‘adansonian’the form of cl. they operate (Sneath 1957; Sokal 1958).
Other labels have been proposed for the operation, over and above the old ones — ‘classification’and ‘taxonomy’. Among them ‘numerical taxonomy’(Sokal and Sneath 1963), ‘class formation’(Capecchi and Mo_"ller 1968), ‘cluster analysis', etc. In our opinion, ‘numerical taxonomy’should be reserved for the product, or rather, for a particular form of product; ‘cluster analysis’for a particular technical procedure. ‘Class formation’has the required generality, and is correctly referred to an operation having intellectual components. However, it might very well be used for the kind of operations we dealt with in section 1.1, which on the contrary are duly distinguished if the label ‘intensional cl.’is assigned to them, while the label ‘extensional cl.’is assigned to the operations dealt with in the present section, as we proposed.

1.2.2. A controversial question is how many properties are to be considered. Parsimony and elegance would advice to keep that number down; on the other hand, it may be remarked that “increasing the number of variables increases the probability of correct classification” (May 1982, 43). Since the concept of ‘correct cl.’is rather questionable (see sect. 3.3), a better argument might be that, with a formalized approach, there is no way to consider the information on the objects'/events’properties unless those properties are included in the matrix. Therefore, leaving properties out of the matrix entails a loss of information of unknown amount.
Both maximal information and parsimony can be achieved if many potential fundamenta divisionis are explored, but only a few are actually retained... in order to build the typology which is the product of extensional cl. Criteria must in that case be settled (in the formula sub (e), see par. 1.2.1) excluding from consideration properties which are not discriminating enough, or otherwise fail to meet any other requirements. Further, some properties may be differentially weighted, due to their superior discriminating power, or theoretical importance, or any other reason (e.g., if they are considered “phyletic”, i.e. more stable in the course of evolution — a weighting criterion suggested by Darwin itself: see Ko_"rner 1974, 693; also see Cain 1974, 688).
Among the decision rules sub (f), it may be stated that classes are to be formed only in terms of the general distance function, or by also taking into account any of the following criteria: maximum allowed infra-class and/or minimum allowed inter-class differences on individual properties; minimum and/or maximum limits on the absolute and/or the proportional membership in a class; how “chains” are to be treated (where each object/event is sufficiently similar to other objects/events adiacent along the chain, but not similar enough to (some) more remote members); etc.
The rules sub (f) may also include criteria for linking already formed classes with other classes or isolated objects. If this re-grouping is performed in a level-wise fashion (i.e., second-order classes are allowed only after all possible first-order classes have been formed,

and the same for all higher-order classes, if any), the product will appear identical to a taxonomy produced by intensional cl. (but see par. 2.3.1 for further specifications).
If, on the other hand, higher-order classes are allowed to form while lower-order classes are still being formed, the product will show a closer resemblance to the actual branching of a tree; the term 'dendrogram'(from Greek dendron, tree) is currently used for the graphical presentation of that structure.

1.3. *Classing*

The third and last family of classificatory operations identified in sect. 1 is the assignment of objects/events to classes, types or taxa which have been previousy defined. This kind of operation is often simply called a 'classification'. Other labels proposed or used are: categorical assignment (Scheffler 1967/1983, 49), diagnosis (Hempel 1961/1965, 138; Capecchi 1964b, 294), diagnostics (Capecchi 1964a, 292), determination (Radford et al. 1974, 3), class identification (Capecchi and Mo_"ller 1968, 63), or simply identification (Capecchi 1964b, 294; Radford et al., 1974, 3).

1.3.1. The kind of category (class, type, or taxon) to which assignment is made does not make in itself for important differences in the classing operation. Only a fundamentum divisionis need be considered in the assignment to classes; two or more in the assignment to types; a series of fundamenta in the assignment to taxa. Increasing complexity might be expected as one passes from the former to the latter, but in practice this is not necessarily true. Far more important are the consequences on the assignment procedure of the kind of cl. through which the categories have been formed.
As we said above, extensional cl. requires the preliminary definition of a set of objects/events on which the operation is to be performed; performing the cl. entails the automatic assignment of those objects/events to the resulting types. If the objects/events that one wants to class do not belong to the set on which the extensional cl. was performed, their states on the properties of the matrix have to be ascertained and coded. However, this preliminary step already involves a problem: should one consider all the properties of the original matrix, or just those which have been retained in the distance function (see section 1.2.1)? This may be considered a trivial problem in itself; but its solution depends on a harder problem: viz., should one use for the new objects/events the same distance function which has been established through an elaboration of entirely different objects/events?
The answer given may depend on a several factors, including the belief that the cl. already arrived at is the "natural" one (see sect. 3.1), and therefore will be retrieved on any set of objects/events of the same domain. On the other hand, more empirically oriented researchers might be tempted — since the data matrix has been filled anyhow and the computer is there to do the job — to try and see whether the distance function for the new objects comes out to be the same or different.
The next question is, of course: what if it comes out significantly different? Apparently, the conclusion can hardly be avoided that different typologies are good for the two sets of objects/events, even though the properties considered are the same. But then, a real chain of questions ensues: how the assignment of objects/events to the first or the second set has been determined? May the sets be considered random samples from the same universe? Was any form of randomization performed? Or are there significant differences, known a priori, between the two sets? And how those differences are related to the differences between the

two distance functions?
Most of the above questions have a familiar ring. We believe extensional cl. is bound to face all of them, and probably a few others, unless it is performed as a one-shot affair — i.e., never attempting replications on different sets of objects/events. Indeed, the paucity of replications reported in the specialized literature makes one suspect that that this is exactly the way extensional cl. has been conceived and performed so far.

1.3.2. Assignment of individual instances to categories formed by intensional cl. stages a quite different situation.
The problem of classing objects/events differently in two different occasions takes on an entirely different form. As in intensional cl. it is states on one property (or combination of states on few properties) that are classed, rather than whole objects/events, it is perfectly normal that objects/events are grouped differently if different fundamenta divisionis, or combinations thereof, are considered.
On the other hand, the same objects/events may be classed differently (by different classers, or the same classer in different occasions) into the same classes, types, or taxa. This cannot happen after an extensional cl., as classing is automatically performed once the distance function and the other rules have been settled. It can happen, however, in classing after an intensional cl., both because of the natural variability in the classers'judgments and of the extreme difficulty in providing assignment rules able to deal effectively with all actual situations. Fitting an abstract scheme to the concrete instances is non-problematic only with such objects as logical and mathematical abstractions. But things are otherwise with empirical objects/events. "In scientific research, however, the objects under study are often found to resist a tidy pigeon-holing of this kind" (Hempel 1961/1965, 151). Mutual exclusiveness "is a property of the (cl.) systems, and it is seldom also a characteristic of the objects to be classified" (Sandri 1969, 84). "A given member of the population may manifest traits belonging to different sets, so that classifying (it) as an instance of only one type... takes on an arbitrary aspect" (Tiryakian 1968, 179).
In this connection, the role of careful operational definition of the properties adopted as fundamenta divisionis cannot be overrated. Such a definition should progressively incorporate and assimilate the decisions made in classing single borderline cases. Following judicial wisdom, borderline cases met earliest during the classing operation should be allocated "on the narrowest possible grounds", and early precedents should be construed narrowly, in order not to preempt subsequent decisions by rules of too large a scope. On the other hand, after a sizeable portion of the objects/events have been processed, the micro-rules already established in solving individual instances will have to be generalized, coordinated, and systematized.
In principle, it is advisable to allow for feed-backs from the classing operation to the (intensional) cl. stage. In other words, if some of the classes, or their complex, exhibit a poor fit with the empirical domain under study, the outcome of the previous intensional cl. should be revised in order to improve the fit with the help of the information gathered.
Some ways in which lack of empirical fit may emerge are dealt with in the next section.

2. CLASSIFICATIONS AS PRODUCTS

In this section we analyze the products of the operations described in section 1.

2.1. *Classification schemes*

The structurally simplest product obtains when only a fundamentum divisionis has been considered in an intensional (or, exceptionally, an extensional) cl. This kind of instrument (a list of classes) is almost universally called a 'classification'; a generalized exception are linguists, who tend to use 'typology'even when there is only one fundamentum (see Greenberg 1957). On the other hand, in order not to use the same term for an operation and its product, it rather seems advisable to adopt the phrase 'classification scheme'(here: 'cl. scheme'), following Berger and Zelditch (1968, 448), Fox (1982, 127), and a few others, at least whenever the context does not make clear enough one is speaking about the product.

2.1.1. The basic structural properties of all products of classificatory operations have been listed and cursorily reviewed in par. 1.1.1. Here we shall add a few remarks concerning cl. schemes in particular.

In most empirical situations, establishing a really exhaustive cl. scheme would be a formidable task in the intensional cl. stage, and having to deal with non-exhaustive cl. schemes in the classing stage would force classers to consciously operate incorrect assignments in order not to leave instances un-classed. Such serious problems are usually avoided by inserting one or more "residual categories" in the cl. scheme. Resort to residual categories is at least as ancient as Platonic di{iresis (see par. 1.2.1), whereby a genus was dichotomized into two species, one characterized by the presence of a certain trait, and the other characterized by its absence. When such absence was the only common trait of the latter species within the genus, that species was evidently just a residual category (the habit, rather common in natural sciences, of creating species only characterized by the common absence of a trait has later been criticized as paraphyletic, i. e. as an improper application of taxonomic procedures: see Hennig 1979).

Totally uninterpretable residual categories should be avoided whenever possible. In reporting election results, for instance, votes for minor parties are often lumped together under the category "other parties", spoiling those data for any further analysis. This could be avoided if several residual categories were supplied, viz. "other conservative parties", "other progressive parties", "other confessional parties", and so on. The advantage would be the availability of a precious addend whenever one analyst wants to correlate, e. g., the total leftist vote with any other territorially distributed variables.

If one cannot make the residual category somehow meaningful, one shoud at least avoid its swelling with cases.

In a book presenting "a foreign-events data set" (Heyman et al. 1973), one fifth of the variables in the file had from 94% to 99,9% of the cases in residual categories.

While one cannot expect the political position of a party to be so bruskly assessed by official publications, one may ask such an assessment from a political scientist building and circulating a file with election data. When open-ended survey material is field coded, the "undecidable" or similar residual categories are used by interviewers as dustbins for the answers whenever they cannot decide in which of two classes to fit them. It is wise to encourage them to choose either of the two eligible classes, because at any rate a possible slight distortion of the intended meaning is preferable to a total loss of information.

2.1.2. As it has been remarked above, the classes of a cl. schemes need not be at the same level of generality. A good reason for setting classes at different levels of generality may be the widely different extension (in terms of number of assignable instances) that can obtain between classes at the same level. Take for instance a taxonomy of religious denominations. The first division should be between A: believers, and B: non-believers. Then A could be

split into AA: believers in divinities, and AB: believers in spirits (animists). AA could be split into AAA: believers in monotheistic religions, and AAB: believers in polytheistic religions. AAA could then be split into AAAA: Buddhists, AAAB: Christians, AAAC: Moslems, etc.; AAB into AABA: Hinduists , AABB: Jainists, AABC: Shintoists, etc. We would then probably have AAAAA for Theravada Buddhists, AAABA for Catholics, AAACA for Sunnites, etc. The fewer letters in the identification tag, the higher the level of generality.
In order to somehow balance the extension of classes while retaining exhaustiveness, a cl. scheme of denominations should probably include several taxa of the fifth level (such as Catholics, Sunnites, etc.), several of the fourth (such as Shintoists, Israelites, etc.), probably two residual categories at third level (other monotheistic and other polytheistic), one taxon at the second (animists) and one at the first (non-believers).
In general terms, a cl. scheme may have classes at different levels of generality whenever it comes (as is made evident in the example above) from a correctly reduced taxonomy, i.e. whenever a genus and one or more of its species or subspecies do not show up as classes in the same cl. scheme. The grouping of several species at the same level of generality into a single class is a question of opportunity.

2.1.3. Mutual exclusiveness and level of generality are the most basic kinds of relationships obtaining between the classes of the same cl. scheme. Two other possible kinds are an order relationship and a ratio relationship; both those kinds are associated with particular kinds of fundamenta divisionis and operational definitions thereof.
If we perceive the states on a property as ordered, we probably want that order reproduced between the classes of the corresponding cl. scheme. While that puts a constraint on the way classes are to be formed in the intensional cl. stage, it makes no difference either for the classing procedure or for the characteristics of the resulting cl. scheme: classes must be based on one fundamentum divisionis only, be mutually exclusive and jointly exhaustive.
Ordered classes, as well as non-ordered ones, need not be at the same level of generality. Suppose that an educational system provides for three levels: primary, secondary, and advanced, and that there are three different degrees (A, B, C) at the advanced level. One may order, in terms of some criterion, the classes as follows: primary, secondary, advanced type B, type C, type A: the former two classes will be lower in order but higher in generality than the latter three, and they all will legitimately be part of the same cl. scheme.
Also, we may perceive the states on a property as lined along a continuum, i.e. isomorphic to real numbers. However, since only numbers with a finite number of figures can be recorded, the continuum will have to be broken down by a unit of measurement, or (if such unit is lacking) by a scaling procedure — as it is often done in the social sciences.
Finally, we may perceive the states on a property as countable, and decide to count them. By the latter decision, as well as by adoption of either a unit of measurement (plus a rounding rule), or a given scaling procedure, we automatically form a cl. scheme. Its classes may look like “1 foot, 2 feet, 3 feet...” or like “fully agree, agree, uncertain...” or like “no son, 1 son, 2 sons..."; they still have — if the scheme is well-formed — the basic properties of any other cl. scheme.
Order or ratio relationships between classes may be established in connection with certain assumptions on the nature of the property and certain characteristics of the operational definition; however, they do not replace mutual exclusiveness nor joint exhaustiveness. The list of permissible classes of an ordered scale or a ratio scale is, by all standards, a cl. scheme.

2.2. *Typologies*

Typologies are typically produced by an extensional cl., or by an intensional cl. when more than one fundamentum divisionis is simultaneously taken into account. Typologies produced by the two types of operations can be compared, with intellectual gratification proportional to the rate of overlap in the list of fundamenta used (see e. g. Hudson 1982).
Types are the logical product of n classes (one per each fundamentum), and as logical products they enjoy the commutative property of all products (Cohen and Nagel 1934, 123). This means that the order in which fundamenta are considered is irrelevant: the type of theocratic regimes which also are authoritarian is the same as the type of authoritarian regimes which also are theocratic. This differentiates typologies from taxonomies, which obtain when fundamenta are considered in succession.
Types must be mutually exclusive and jointly exhaustive like classes. Mutual exclusiveness is violated as a consequence of any change in the list of fundamenta in passing from one type to another. If type X is ‘secularized and receptive political systems’and type Y is ‘centralized and aggressive political systems', type X and type Y cannot belong to the same typology, because an actual political system might be classed in both types.
Residual categories can be used, and are in fact used, on any of the fundamenta. A type is conceivable which is the logical product of n residual categories; while it may be required to make the typology exhaustive, it will hardly be interpretable in substantive terms. Since few if any actual instances will be assigned to it, it will be wise to merge it with other types in the reduction stage (see next par.).

2.2.1. A third way to produce a typology has been conceptualized by Lazarsfeld (1937) who called it “substruction of a property space”. Substruction is an useful intellectual tool because many students propose lists of types without explicating the fundamenta divisionis; such fundamenta have to be inferred by other students who, so to say, extract them from the intensions of the types as described.
Lazarsfeld (1937) performed the first substruction on Fromm's four types of authority relationships. Lazarsfeld and Barton (1951) “substrued” the property space underlying Durkheim's types of suicide and Kingsley Davis’types of social norms. Capecchi (1966) “substrued” the property space underlying Merton's five types of anomie, showing the logical possibility of four additional types, all of which having a meaningful counterpart in actual behaviours.
The role of substruction is entirely dependent on the intellectual sloppiness of most scholars, who propose list of types without caring to explicate their fundamenta divisionis and to build a full-fledged typology. Another intellectual operation, however, plays a more general role, that would remain crucial for typology building even in an ideal world of widespread methodological awareness. It has been first conceptualized by Hempel and Oppenheim (1936) and is labelled “reduction of a property space”.
The crucial role of reduction stems from the fact that the number of types in a typology (sometimes referred to as its “power") is a multiplicative function of the number of classes in each of the fundamenta considered. This property of all products, including logical products, has three negative consequences for typologies:
(a) the mere number of types is bound to be unmanageable unless two or three dichotomous fundamenta only are being considered;
(b) some types are likely to be a mere logical possibility, devoid of conceptual interest;
(c) some types will be empirically empty, i. e. no or few instances will turn out to be assignable to them in the classing stage. The set of empirically empty types will usually have

a large overlap with the set of un-interesting types, but will probably be larger.
Those drawbacks are or might be alleged as an excuse for sloppy type building; but reduction of a logically well-formed typology, rather than sloppiness, is the proper remedy for the drawbacks. As the term suggests, reduction consists in lowering the number of types, and therefore the intellectual complexity of the typology. This is properly done not by eliminating some types — which would also take exhaustiveness away — but by combyning two or more types into a type of wider extension and less articulated intension.
Lazarsfeld and Barton (1951) distinguish between a functional reduction (based on the relationships between fundamenta divisionis), a pragmatic reduction (based on researcher's goals, and also aiming at a balanced extension), and an arbitrary numeric reduction (which squeezes a typology down to a cl. scheme by assigning numeral to types and performing mathematical operations on such codes). Capecchi (1966, 17) proposes a typology of reductions by combining two dichotomous fundamenta: whether or not mathematical instruments are used, and whether or not empirical evidence on the extension of types is considered. In our opinion, the researcher's goals are — or should be — the foremost consideration; they frame the evaluation of the degree of semantic proximity between fundamenta and between classes thereof, which in turn controls the process of aggregation of types. Semantic considerations, however, find a limit in the desirability to balance the extension of types. Whenever a genus is articulated into k species, the ideal extension of each species is of course 1/k of the extension of the genus. Types already exceeding that proportion are better not merged, whatever their semantic proximity. In reduction, as in establishing the number of classes in a cl. scheme, semantic proximity and balanced extension should be weighed comparatively.

2.2.2. The recognized intension of a type may grow richer than it would be implied by its being the logical product of the intension of n classes. “When the psychologist describes the extrovert type, he hopes that subsequent research will find more and more attributes which enter into this particular combination” (Lazarsfeld 1937, 122).
Let us examine that process through an example. The intension of the concept of ‘regime’is made up by a number of aspects, only a part of which are captured by explicit definitions. In operating an intensional cl. of regimes, we pick one of those aspects up as fundamentum divisionis and allocate each of its various facets to one of the classes we are forming. Let us suppose the fundamentum is the principle legitimizing rulers, and the classes are four: theocratic, autocratic, plutocratic, democratic. In principle, each of the class concepts formed retains all other aspects of the intension of the concept of regime except those prohibited by the mutual exclusiveness of classes (i. e., a democratic regime can have every trait a regime has, except a theocratic, or an autocratic, or a plutocratic legitimization). Suppose now we want to produce a typology combining form of legitimization with form of exercise of authority (our second fundamentum, with four classes: authoritarian, paternalistic, legal-rational, and consensual). The typology will comprise 16 types, each of which will in principle retain all the aspects of the intension of the concept of regime except those prohibited by the mutual exclusiveness of types. However, examination of the characteristics of concrete instances of one type (e. g., theocratic-and-authoritarian regimes) may show that certain aspects (e.g., general elections) which are not prohibited (neither by definition, nor de facto) by the intension of the composing classes seem to be de facto prohibited by their combination. It may as well show that certain features (e. g., education based on wealth) tend to characterize all the instances (or a proportion far superior than in the theocratic-non-authoritarian and in the authoritarian-non-theocratic types).

Of course, confidence in those empirical findings will be enhanced if a theoretical justification is found for it.
The observed regular occurrence, or non-occurrence, of a certain aspect enrich the intension of a type concept; insofar as such enrichments are assimilated, they will tend to stimulate conjectures as to other possible developments, and that particular type concept will tend to acquire a degree of semantic autonomy from its constituent classes.

2.3. *Taxonomies*

A taxonomy obtains when several fundamenta divisionis are considered in succession, rather than simultaneously, by an intensional cl. The order in which fundamenta are considered is highly relevant: the taxonomy obtained by using property X to classify a genus and then property Y to classify its species is by no means the same as that obtained by considering property Y first and property X afterwards.
Since fundamenta are considered in succession, each single passage from a genus to its own species, at every step down the taxonomic hierarchy, is structurally similar to the building of a cl. scheme. The species of the same genus must be mutually exclusive and jointly exhaustive, and residual categories may be employed to ensure exhaustiveness and to reduce the number of species. Whatever differences there are, they are due to the fact that every step is not an isolated operation, as it must be inserted in a hierarchical framework. As an obvious consequence, all species of the same genus must be at the same level of generality. This condition might entail both a proliferation of species and a great difficulty in achieving exhaustiveness; however, it can be relaxed by a wise use of residual categories, supplemented by the consideration that genera at the same level may be articulated each by a different fundamentum, that can be a finer-grained replica of a fundamentum used for a taxon at a higher level (see par. 1.1.3). In practical terms, this means that if the articulation of a given fundamentum produces too many species, some of them may be grouped into a residual category, which will then be articulated at the next step, possibly retrieving the distinctions that were considered too finely grained at the higher level.
The concept 'same level of generality'is of questionable application across different branches of a taxonomy, when no relationship of inclusion, and not even an overlap, obtains between the extension of different taxa. Using the notation introduced in par. 1.1.3, we can say that taxon AB is at the same level of generality as taxon AC (as both are species of genus A) and that it is more general than taxa ABC and ABAC (which are one species and one subspecies of AB). But we cannot compare the generality of taxa ABC and ACAB, since they are not species of the same genus, and consequently there is no overlap between their extensions.
Concerning taxonomies, therefore, the concept of 'rank'is more correctly used, meaning just the number of steps down any branch of the taxonomy, starting from the summum genus (the concept on top of the hierarchy). We may say that taxon ABC is higher in rank than taxon ACAB — and this can be done, in our notation, by just counting the number of letters in the tag.
Another term being widely used by taxonomists in biology is 'clade'(from Greek klados, the branch), by which it is meant a hierarchical succession of taxa, one per rank, each being a species of the immediately higher-ranked genus; e. g.: A, AB, ABA, ABAC, ABACA, and so on. 'Cladogram'is the diagram portraying a clade (Radford et al. 1974, 473). A contemporary school of biologists, particularly careful in identifying clades, have been identified as "cladists" (see sect. 3.2).

2.3.1. Ordinary extensional cl. produces typologies; however, it may produce structures having various degrees of similarity to taxonomies, if certain criteria are followed in grouping objects/events.
If already formed groups are allowed to merge with other groups and/or be joined by objects/events not yet grouped, and higher-level groups are thus formed, the product will be a dendrogram (see par. 1.2.2). Dendrograms look consideraby different from taxonomies, because while in the latter all taxa of the same rank appear to split simultaneously, in the former only one group splits at a time (in other words, there is a complete ordering between splits: no two splits are at the same rank). As a consequence, the display of a taxonomy grows very rapidly in width as ranks of taxa are added, while a dendrogram develops mainly in height.
If, on the other hand, second-order groups are allowed to form only after all possible first-order groups have been formed, and the same for every higher order, then the product will look the same as a taxonomy produced by intensional cl.
However, it must be remembered that in extensional cl. several fundamenta are usually considered simultaneously in order to group (and, in case, re-group) objects/events; as a consequence, while the set of species of the same genus is a cl. scheme, the set of groups which are merged into a higher-order group are a typology, in that they are differentiated along several dimensions simultaneously.
Only if, quite unusually for extensional cl., groups are formed and merged by considering only one property at a time, then the product of an extensional cl. will be a taxonomy from a structural point of view too. In principle, nothing would forbid that in intensional cl. too a genus were divided into species by simultaneously considering a combination of fundamenta divisionis. It can by no means be excluded that this has in fact been done by several builders of taxonomies in zoology or botany, in order to solve particular difficulties and to obain a better fit of their taxa to phenomena. On the other hand, in view of the complexities introduced by mingling the principles governing typology and taxonomy, it is not surprising that such an hybridation has never been conceptualized — as far as we know — in the methodological literature.

3.1. *The essentialist fallacy*

Building taxonomies seems to be a natural intellectual activity for mankind — which might be surprising given their structural complexity. “Primitive classifications are not singular or exceptional... on the contrary, they seem to be connected, with no break in continuity, to the first scientific classifications... First of all, like all sophisticated classifications, they are systems of hierarchized notions... Moreover, these systems, like those of science, have a purely speculative purpose. Their object is not to facilitate action, but to advance understanding” (Durkheim and Mauss 1902/1963, 81). The “primitive mind” builds taxonomies because they are believed to represent the hierarchical structure of reality (Levy-Bruhl 1910). The organization of society is the model which teaches to think in taxonomic terms, and is projected in taxonomies (Durkheim and Mauss 1902).
In classical Greece, intensional cl. is practiced as an intellectual drill, but cl. schemes and taxonomies, once produced, are believed to faithfully portray the inner structure of reality. Plato thinks that each being has an ideal form, to which a type corresponds in men's minds. His five mÈgista t|n gen|n (the largest of all genera) are seen as an attribute of being as well as

of thinking. The same with Pythagoreans'ten categories. For Aristotle, the observation of various specimens helps one to get rid of accidental traits, singling out what is essential and invariable. On the contrary, his pupil Theophrastos, director of Athens'Lyceon with its botanical gardens, is convinced that species are instable and rapidly evolving. However, that typically alexandrine point of view is twenty centuries ahead of time: During the Christian middle ages, Aristotle's detailed taxonomies of animals are believed to reproduce the order of Creation. In the same spirit are conceived and received post-Renaissance taxonomies which supersede Aristotle's: Matthioli's, Cesalpino's, Bauhin's, Aldrovandi's, John Ray's, etc. Linnaeus's motto is (1735): "tot numeramus species quot ab initio creavit supremum Ens" (we enumerate as many species as were created by God).

While the ontological and the epistemological dimensions are regularly mingled, the axiological one is often added: Linnaeus'taxonomy is also a hierarchy of degrees of perfection, topped by Man; Schlegel (1808) considers Indo-European inflectional languages as inherently superior to affix languages.

The possibility of a "natural classification" is disputed by Buffon, Louis XVI's Chief Gardener at the eve of the French Revolution. But his scepticism is countered by Cuvier's reorganization of evidence in favour of morphological stability of species, with typically Aristotelian teleologic overtones. Cuvier's contemporary, Augustin Pyrame de Candolle, claims that "classification... is truly natural" (1813, 91).

The opposition between "natural" and "artificial" classification is a recurring theme in the last two centuries. Cohen and Nagel have cogently argued that "any division... according to some actual trait arbitrarily chosen is perfectly natural... <but it> may also be said to be artificial, in the sense that we select the trait" (1934, 223). Yet, many scholars have continued stressing "naturality" as a desirable property, by gradually re-interpreting it in terms of significant relationships with other classifications (Hempel 1961/1965, 146-7; Kaplan 1964, 50), utility "for a wider range of inductive generalizations" (Gilmour 1940, 466), "systematic import" (Huxley 1940; Hempel 1952b; Sandri 1969), links with theory (Hempel 1952b; Bunge 1967, 83), "projectibility of discriminating concepts" (Sandri 1969, 99 ff.). In short, the concept of "natural classification" has been transferred from the ontological to the epistemological domain. However, as Tiryakian (1968, 177) has remarked, "the reification of typologies is a frequent temptation and pitfall". In a typical manual of the neopositivist period one can still read a statement as plain as "A natural class is based on the fundamental character of things" (Lenzel 1938, 32). And one may suspect that, if the epistemological coat of paint were scraped off, quite substantial traces of rusty essentialism would loom through the still widespread concern for "natural" classifications.

3.2. *The scientistic fallacy*

Evolutionism buried the belief that genera and species of plants and animals had been handed down unchanged from the Creation to the classifier's days. Phylogenesis replaced morphology as the governing criterion, and taxonomies were re-interpreted as genealogies. That development can be seen either as an epochal revolution or as an episode in the long-term pendulum swing between emphasis on structure and emphasis on genesis. Anyhow, evolutionists can hardly be denied the merit of having forced consideration for the diachronic dimension upon a scientific community crippled by a static ontology.

On the other hand, they did not manage either to avoid mingling the ontological and the epistemological planes. Being found guilty of a wrong ontology, classification, typology and taxonomy were discredited as intellectual tools, and came to regarded as dull and stuffy.

Julian Huxley, the leading third-generation evolutionist, stated it was high time to cease being “bogged down in semantics and definitions”. Evaluative overtones were not missing either: the upholding of taxonomy and classification came to be regarded as conservative, while a liberal attitude implied their rejection (Tiryakian 1968, 182).
According to some contemporary critics of shout-and-sway evolutionism in zoology, who identify themselves as “cladists” (see par. 2.3), disparagement of intellectual rigour did not fail to bring its fruits, as several species identified by evolutionist zoologists or botanists on scant fossil evidence suffered from the paraphyletic fallacy (see par. 2.1.1) or from the “plesiomorphic” fallacy (i. e. were identified through characters which also could be found among other species or even the whole genus).

3.2.1. A further attack on the role of classificatory operations came from logical empiricists and their followers, claiming that every science should tread in the same steps as the paradigm science (19th-century physics). In physics — they maintained — classification has long been superseded by measurement; If other sciences want to achieve the same status as physics, they have to abandon classificatory activities and turn to measurement. Logical empiricists just suggest the idea: “The concept of type has played a significant role in various phases of the development of empirical science. Many of its uses are now of historical interest only; but some branches of research, especially psychology and the social sciences, have continued up to the present to employ typological concepts...” (Hempel 1952a, 66). “In many sciences the classificatory stage has not been got over yet” (Kemeny 1959/1972, 196. Italics ours).
In less cautious and subtle hands, the myth of measurement, and its origins, would come into the open. See e. g. a statement by the standard bearer of operationism in sociology: “If such measurement <of social phenomena> is possible, then the path of the social science leads across the same difficult but not insurmountable terrain over which physics and other sciences have travelled to their present conspicuous triumphs... The ways of science attract us so strongly both because of the results that can be achieved with science and because of its academic and public prestige” (Lundberg 1938, 197 and 200. Italics ours).
The syllogism implied by Hempel and Lundberg may be criticized both for what it states and for what it assumes.
a) granted that social sciences wish to achieve the same scientific status as physics (or, more cynically, that social scientists wish to achieve the same status as physicists), it has to be proved that they must, or even can, achieve it through the same means as physics’(Hayek 1952/1967, 12 ff.; Schu_"tz 1954, 266-7; Radnitzky 1968, 70 ff.; Phillips 1977, 10 ff.; Mokrzycki 1983, 7 ff.);
b) it is questionable that the achievements of physics are ascribable to measurement any more than to several other instruments, and many other factors (Hayek 1952/1967, 23; Zetterberg 1954, 126; Kuhn 1962/1969, 49-60; Sartori 1970, 1038; Berka 1983, 9);
c) it can be disputed that measurement supersedes classification, since the choice of a unit of measurement automatically breaks down a continuum into classes with the same characteristics as the classes of any cl. scheme, plus ratio relationships among them (see par. 2.1.3). “Any level of measurement... includes, as a minimal requisite, a procedure of classification” (Blalock 1960/1970, 28; also see Coombs 1953, 473);
d) Physicists measure properties they conceive as continuous, and only after establishing a unit of measurement. But what if a property cannot be so conceived or if a proper unit of measurement cannot be established?
The latter situations happen to be quite common in the social sciences; but that fact did not

discourage operationists, behaviorists and other followers of the neo-positivist creed. While procedures were contrived which imitated, with various degrees of success, the characteristics of measurement (and which are at any rate a valuable legacy of the behaviorist period to the social sciences), the residual gap was filled by terminological tricks: any sorts of code-assigning procedure (counting, scaling, classing) and their preliminary intellectual operations (intensional cl., scale building, even the choice of indicators, etc.) were labelled 'measurement'; any set of codes was labelled 'scale'.

"Measurement is the assignment of numerals to objects or events according to rules — any rule" (Stevens 1951, 22). "Measurement in its simplest form consists in substituting symbols or names for real objects" (Coombs 1953, 473). "A language of measurement defines classes of phenomena by providing specific criteria for deciding whether an observation can be assigned to a particular class" (Przeworski and Teune 1970, 93). In definitions like these, the term 'measurement'is stretched out to occupy the semantic spaces of intensional cl., classing, even of naming.

The semantic space of classification scheme has also been occupied. "The nominal scale represents the most unrestricted assignment of numerals. The numerals are used only as labels or type numbers, and words or letters would serve as well" (Stevens 1951, 25). "Nominal scales... are merely scales for the measurement of identity and difference" (Ellis 1968, 42). "A nominal scale obtains if equality and diversity among the numbers can be interpreted as equivalence and non-equivalence among the units" (Galtung 1967, 73).

By such a move, the semantic stretching of the term 'scale'reaches the point of a contradictio in adjectu, as the adjective 'nominal'(meaning that differences in kind, not in degree, obtain between classes) contradicts the noun (scale), which implies a difference in degree between steps (you have no scale if the steps are different in form, but all placed at the same level).

3.2.2. The generalized substitution of the self-contradictory expression 'nominal scale'for classification (scheme) by the social scientists working with data would be astonishing could it not be explained by their lack of terminological sensitivity and by the prestige of "scientific" terms vis a vis "philosophical" ones. To the best of our knowledge, the expression has been criticized strongly and directly by Sartori (1970) and Berka (who speaks of 'conceptual contamination': 1983, 103) only ; indirectly by Torgerson (1958, 17).

Due to its wider and less technical scope, the stretching of the term 'measurement'has met with a larger range of reactions. Neo-positivists Carnap (1950, 9) and Hempel (1952b, 58) have remarked that no measurement is possible without a proper unit. Kaplan has exposed the stretching as a sham: "It often happens that a quantitative idiom is used, not only without any actual measurements having been performed, but without any being projected, and even without any apparent awareness of what must be done before such measurements can be carried out" (1964, 213). Hayek has denounced "the blind pretension to systematically extend measurement to a field where specific conditions are not met" as responsible for "the worst aberrations and absurdities" in scientistically oriented social sciences (1952/1967, 57-8). Lazarsfeld and Barton have criticized the assumption that rigour and scientific status depend on the use of a specific instrument, the measuring scale (1951/1967, 231). Even a historian of psychology rather sympathetic to behaviorism has conceded that the cult of measurement was "favoured by the desire of investigators to claim the prestige of science for their research. Especially has this motivation operated among the psychologists, insecure because of their unscientific heritage from philosophy" (Boring 1961, 124).

Insecurity of scientific status because of too recent separation from philosophy was even higher among political scientists and sociologists, who accordingly took good care not to use terms of philosophical lineage, among which 'classification'was prominent. Already in the Encyclopedia of the Social Sciences of 1930 there are no entries for Classification, Typology, Taxonomy. In the International Encyclopedia of the Social Sciences of 1968 there is only the entry for Typology (other terms of philosophical lineage, such as 'theory', were also absent from both works).

The downgrading of classification vis a vis measurement may loose momentum when all due consequences are drawn from the incipient decline of the behavioristic orientation in the social sciences. The growing emphasis on theory — a term that positivists had practically banished in favour of 'law', which they considered more "objective" and observational — in the last two decades is one of the signs of that decline.

However, once again a balanced assessment of the role of classification and related activities seems hard to attain. A statement by one of the leading sociologists of anti-behavioristic orientation is highly significant on that account: "the search for beautifully comprehensive sets of categories is hardly the essence of explanatory science. The past half-century of typological sociologies should be enough to convince us of where it stands on the pole of scientific priorities" (Collins 1975, 114). And already in 1968 Tiryakian stated: "the very success and acceptance of a typological classification may... freeze the level of explanation. Since typologies have much more de facto status in social sciences... than in the physical sciences, typological classification may share some of the responsibility for the retardation of more powerful theoretical explanation" (1968, 179).

We believe that the idea of a superiority of theories and explanations (i. e., knowledge in propositional form) on concepts, classifications and other forms of non-propositional knowledge stems from hidden survivals of both a realist and a "decidablist" epistemologies. By "decidablist" epistemology we mean the conviction that the truth or falsity of statements about the world may be ascertained (hence, the associated propositions are "decidable"). That conviction naturally focusses attention onto the dichotomy true/false, and therefore onto statements (whose logical attribute is being decidable — or at least thinkable — as true or false) and away from concepts (which are neither true nor false). By realist epistemology we mean the conviction that our concepts faithfully portray referents (objects, events, "states of the world" — as Wittgenstein put it in his early realist phase).

If our concepts (including classes, types, taxa, etc.) do reflect objects/events, then of course we may take them for granted as non-problematic and focus on statements or systems of statements (hypotheses, theories, laws, models, explanations, etc.) which will tell us how objects behave, how events cause other events, how "states of the world" evolve.

3.3. *Conclusion*

Probably some of our points of view concerning the proper role of classification already are known to the reader after the previous discussion. This section, however, presents them in orderly and synthetic fashion.

1) Classification should be freed from any ontological tasks and implications. As such implications are not easily kept out of a debate on "natural" classification, it is wiser to abandon that debate, or at least the loaded term, altogether, as the conventionalists suggested (Giedymin 1982, 19).

2) Cl. schemes, typologies, taxonomies do not make assertions and therefore can not be judged true or false (Scheffler 1967/1983, 52; Swanson 1972, 193). It is misleading to consider them "a particular kind of hypothetical constructs or hypotheses" (Sandri 1969, 104), or to consider "some of them... as real rather than nominal definitions" (Berger and Zelditch

1968, 447). As concepts, they are tools for conferring organization and stability on our thoughts about reality. Like tools, they may be judged or found more or less useful for a particular purpose (Kemeny 1959/1972, 195).
As they do not entail any forecasts of empirical "states of the world", they are compatible with every distribution of data (Scheffler,ibidem; Swanson,ibidem). In the presence of a particular distribution they may be judged more or less appropriate, but it is improper to claim they have been falsified. The latter claim is unwarranted even when "there exists some method of identifying the types independent of the cl. scheme" (Berger and Zelditch 1968, 448), because no method of identifying types can be bestowed upon ontological validity, and therefore falsifying power.
3) Classing is guided by cl. schemes, typologies, and taxonomies, plus the associated operational definitions (see par. 1.3.2); however, it is not determined by them (Scheffler 1967/1983, 49). A particular act of classing may be judged to be a correct or a (more or less) mistaken application of some rules of the operational definitions; it cannot be judged as true or false.
4) The anxious question whether classification has to be considered as knowledge or as a preliminary to knowledge (see e. g. Gil 1981, 1024) can probably be answered with no drama according to what each person would say about familiarity with the vocabulary of a language: is that familiarity knowledge, or just a preliminary to knowledge of the statements that can be made in that language?
5) To claim that classification is not as germane as measurement to the scientific enterprise, and therefore must be replaced by measurement, might sound as ridiculous as claiming that French, being an "adjectival" language, should be spoken by always substituting adjectives for nouns, or disguising nouns as adjectives. What is germane to the scientific enterprise is using the appropriate tool(s) to tackle each problem, rather than the same tool whatever the problem. No tools are scientific or unscientific in themselves, and any general hierarchy of tools in terms of scientific dignity, independent of problem and purpose, is nonsense.
6) To claim that the attention given to classification has blocked the road toward "expanatory" science, or any other kind of science, might sound as ridiculous as claiming that one cannot say anything in French yet because one has spent all of one's time learning French words.

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