

Multilevel Research of Human Systems: Flowers, Bouquets and Gardens¹

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Two past research projects are presented as case studies how shifts to a different level of analysis produced remarkable results. In the first project a jump from the individual to the country level related psychological data to a range of other disciplines, with consequences for psychology as well. In the second a shift from the organizational to the individual level linked a sociological study to current concerns in individual psychology.

These cases are used as illustrations for a discussion about levels of analysis in the social sciences. A major part of social science research is based on information collected from or about individuals. Different social science disciplines analyse such data each at their own level of aggregation: the individual, the group, the organization, the tribe, the country. This division of labor has developed into overspecialization: students of one discipline largely ignore developments in neighboring disciplines. As all social sciences study aspects of the same social reality, this parochialism defeats the purpose of the social sciences themselves. Jumping to a different level can shed an entirely new light on existing issues, even within a discipline.

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1. Levels Issues in the Social Sciences

All scientific activity is based on comparison. In the social sciences there is a choice of the level at which human systems will be compared: individuals to individuals, groups to groups, organizations to organizations, tribes to tribes, countries to countries. To students of a particular social science the level of analysis tends to be taken for granted. From time to time methodologists warn that the choice of the proper level of analysis may not be as obvious as it looks [22,35,37,38].

Multilevel research, that is, research that analyses the same data at more than one level, is relatively rare. By its very nature it crosses disciplinary boundaries. In this article two multilevel research projects in which the author has been involved will be described and used as illustrations for a discussion on levels of analysis in the social sciences. Like flowers, bouquets and gardens represent different levels of attention of the gardener, so individuals, groups, organizations, tribes and countries represent different levels of attention of the social scientist.

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2. Project One: From Individuals to Countries

The first project concerns a database on work-related values, collected in the context of attitude surveys of over 116,000 employees in 72 national subsidiaries of the multinational IBM, in the period 1967–1973 [10,12]. Previously, attitude survey data in IBM had only been collected within countries. Questions had been correlated and factor analysed across individuals, and compared for different occupations and business divisions.

The decision to analyse the new IBM subsidiary data at the country level was only made after several years of trial and error, as it conflicted with the psychological training of the researchers. It represented a shift from a psychological paradigm to a multilevel paradigm in which psychological concepts were related to concepts from political science, sociology, anthropology and economics. Initially forty countries were included in the analysis. Individual answers on survey questions were aggregated into mean scores per country. The number of cases in the analysis reduced itself in one step from 116,000 to 40.

Thirty-two questions were included in the analysis. These had previously been included in individual-level factor analyses and were found to belong to factors with labels like: preferred leadership style, job content, rewards, interpersonal relations, security, comfort, and company [13]. All of these issues were and still are common and legitimate concerns of the psychology of work and organization. The shift to the country level meant that now a matrix of 32 question mean scores \times 40 countries was factor analysed. A statistical analysis of means of clusters of individual scores is commonly called an *ecological analysis*.

One little known implication of the difference between individual and ecological factor analysis is that for the latter the common caution that 'the number of cases should be considerably larger than the numbers of variables' does not apply. The number of cases in ecological factor analysis is the number of clusters; but the stability of the results is determined by the number of individual cases that were aggregated into the clusters [15]. In ecological factor analysis a matrix may even count fewer cases than variables.

The ecological factor analysis of the IBM values questions produced three orthogonal factors, of which one was split into two dimensions for conceptual reasons. In this way four dimensions were created. These describe country cultures, not values of individuals. They were labelled Power Distance, Individualism versus Collectivism, Masculinity versus Femininity, and Uncertainty Avoidance [10,12].

These four dimensions at the time did not correspond to common psychological concerns, but they had been predicted surprisingly well in an extensive cross-disciplinary review article entitled 'National character: the study of modal personality and sociocultural systems' by Inkeles and Levinson [19]. Instead of 'dimensions' Inkeles and Levinson used the term 'standard analytic issues'. The issues they identified in the anthropological, sociological and psychological literature at that time were:

1. Relation to authority;
2. Conception of self, in particular:
 - a. The relationship between the individual and the society;
 - b. The individual's concept of masculinity and femininity;
3. Ways of dealing with conflict, including the control of aggression and the expression versus inhibition of feelings.

The similarity with the dimensions empirically found in the IBM data base is obvious.

Much later a fifth dimension was added on the basis of a research project among students in twenty-three countries, using a questionnaire on values designed by Chinese social scientists. It was labelled 'Long Term versus Short Term Orientation' [12, Chapter 7].

Inkeles and Levinson had written that their standard analytical issues should '...meet at least the following criteria. First, they should be found in adults universally, as a function both of maturational potentials common to man and of sociocultural characteristics common to human societies. Second, the manner in which they are handled should have functional significance for the individual personality as well as for the social system.' The five dimensions are derived from analyses of

individual responses aggregated to the country level and therefore they apply to societies, not to individuals. As such they belong to anthropology, not to psychology. However, they have, as Inkeles and Levinson wrote 'functional significance' at the levels of other disciplines.

The latter can be verified by an analysis of citations of the book 'Culture's Consequences' [10,11] that introduced the first four dimensions. As opposed to a journal article, a book has no predetermined circle of readers (at least not if, like in the present case, the publisher markets to professionals in all the social sciences). The citations of a book indicate what readership in practice has found the message functionally significant.

From the publication of 'Culture's Consequences' in 1980 to the end of 1994, 834 citations (excluding self-citations) of the book in journal articles have been listed in the Social Science Citation Index. There is a surprising variety of journals citing 'Culture's Consequences'. For the five-year period 1989–1993, on a total of 434 citations, 158 different journal titles appeared.

The five journals providing the most citations were in psychology, management, communications and organization sociology: *Journal of Cross-Cultural Psychology* (38 citing articles); *International Journal of Psychology* (19); *Journal of International Business Studies* (29); *International Journal of Intercultural Relations* (23) and *Organization Studies* (16 citations). Together they supplied 29% of all citations.

Fifty journals accounted for 2–9 citations each. Among them were: *Accounting, Organizations and Society*; *Academy of Management Review*; *Communication Education*; *International Journal of Comparative Sociology*; *International Journal of Public Administration*; *Journal of Marketing*; *Journal of Nursing Administration*; *Sex Roles*; *Sociologie du Travail* (France); *Strategic Management Journal*; *Technological Forecasting and Social Change*. Together they accounted for 47% of all citations.

A hundred and three journals carried just one citation: together 24% of all citations. They included: *Annals of Tourism Research*; *Anthropos*; *Behavioral Sciences and the Law*; *Brookings Papers on Economic Activity*; *Business History*; *Jour-*

nal of Peace Research; *Dynamische Psychiatrie* (Germany); *Economic Geography*; *European Journal of Operational Research*; *Health Education Quarterly*; *Historisk Tidsskrift* (Norway); *Journal of Genetic Psychology*; *Journal of Labor Economics*; *Journal of Nervous and Mental Disease*; *Language in Society*; *Public Relations Review*; *Revue Belge de philologie et d'histoire*; *Scientometrics*; *South African Journal of Philosophy and Systems Practice*. The dimensions proposed do show a wide spread in functional significance.

Looking at the content of the citations we find that different disciplines tend to cite different dimensions. Psychologists most often refer to Individualism/Collectivism. Current psychological theories were developed in individualist Western cultures. The assertion that most non-western cultures are collectivist and therefore expect people to behave as ingroup members rather than as individuals appeals especially to psychologists from newly industrializing countries. The introduction of the Individualism/Collectivism dimension has led to a contingency approach to various psychological theories previously assumed to be universal, like Maslow's model of human needs [28]. Besides many articles, two books [21,39] have been devoted to this dimension alone.

Sociologists and management researchers have spread their interest more across all four or five dimensions; if they have a special interest, it is rather in Power Distance and Uncertainty Avoidance. These dimensions explain the different preferences in different countries for centralization and formalization [e.g., 5].

Development economists have been most interested in Individualism/Collectivism and Long/Short Term Orientation [e.g., 36]. The latter dimension was found to be associated with economic growth, the former with wealth [7,12].

The experience of the IBM project – really a series of projects over a period of several years – has shown that the jump from the individual to the country level yielded unexpected and even revolutionary insights. The study of flowers was replaced by the study of gardens; and the view from the garden level provided new understandings of the conditions under which the flowers flourished, and of bouquets and flower-beds.

3. Project Two: From Organizations to Individuals

The second case deals with the database for a study on organizational cultures, containing responses on 118 questions by 1,295 individuals divided over 20 organizational units in Denmark and the Netherlands, and collected in the period 1985–1986 [15].

The questionnaire included the 32 values questions used previously in the cross-national IBM studies (see Project One above); these were extended with 25 other questions about values and with 61 questions about 'practices': perceptions of the work situation. Because the study was about organization cultures, individual answers were aggregated to the organization level. Respondent samples per organization (mean sample size about 60) were composed of equal numbers of managers, non-managerial professionals, and non-managerial non-professional employees.

For the values questions, differences among organizations were found to be smaller than differences among countries had been in the IBM studies. It was the practices questions, not the values questions that showed the largest differences among organizations. A key conclusion from the research project was that organizational cultures differ mainly in their practices, while national cultures differ mainly in their values.

The split between values and practices is based on the 'onion' model of manifestations of culture, in which values are pictured as the invisible core of culture and practices as the visible outer peels. Values are feelings with a positive and a negative pole, like good/evil, clean/dirty, rational/irrational. Practices are symbols, heroes, and rituals [12, pp. 7–9]. Because organizational cultures consist mainly of practices, they are of a more superficial nature.

An ecological factor analysis of the practices questions (61 questions, 20 organizational units) produced six orthogonal dimensions of organizational cultures, based on differences in practices. They were labelled:

1. Process vs. results oriented;
2. Employee vs. job oriented;

3. Parochial vs. professional;
4. Open vs. closed system;
5. Loose vs. tight control;
6. Normative vs. pragmatic.

Dimension 1 contrasts process-oriented organization cultures, dominated by technical and bureaucratic routines, with results-oriented cultures, dominated by a common concern for outcomes. Dimension 2 contrasts employee-oriented cultures assuming a broad responsibility for their members' well-being, to job-oriented cultures assuming responsibility for the employees' job performance only. Dimension 3 opposes parochial cultures in which members derive their identity from the organization for which they work, to professional cultures in which the (usually highly educated) members identify primarily with their profession. Dimension 4 refers to the common style of internal and external communication, and to the ease with which outsiders and newcomers are admitted. Dimension 5 deals with the amount of internal structuring and with the degree of formality and punctuality within the organization. Dimension 6 describes the prevailing way (rigid or flexible) of dealing with the environment, in particular with customers and/or clients.

In contrast with the four or five dimensions of national culture described in Project One that belonged to anthropology, the six dimensions found for organizational culture belong to sociology and to management theory. Related concepts in the literature are: For dimension 1 (process/results): mechanistic versus organic solidarity [4]; for dimension 2 (employee/job): consideration versus initiation of structure [6]; for dimension 3 (parochial/professional): local versus cosmopolitan [31]; for dimension 4 (open/closed): communication climate [34]; for dimension 5 (loose/tight): control theory [a.o., 9]; and for dimension 6 (normative/pragmatic) customer orientation [a.o., 33].

In 1990 the existing database of the 1985–1986 organizational cultures study, which so far had only been analysed at the organizations (ecological) level, was re-analysed at the level of individual respondents, using the individual analysis approach described by Leung and Bond [25]. For this

purpose the ecological variance had to be eliminated. From each individual's score on a question the organization's mean score on that question (which had been the basis for the ecological analysis) was deducted. Thus only the variance of individual responses around the organization's means remained. After this operation the answers of the 1,295 individuals were pooled. Separate factor analyses were performed on the 57 values questions (a $57 \times 1,295$ matrix) and on the 61 practices questions (a $61 \times 1,295$ matrix). The latter at the individual level measure *individual* perceptions of *common* practices in the organization. The two analyses yielded 6 factors each, and these combined the questions in ways very different from the ecological analyses. In the ecological analyses the 'values' factors had proved to be much weaker than the 'practices' factors, so that only the latter had been used for the dimensions of organization cultures. In the individual analysis the reverse was the case: the values factors were stronger than the practices factors, implying that between respondents, differences in values were larger than differences in perceptions of practices [16]. This makes sense, because people's values were largely formed before they joined this organization, while perceptions of practices were obviously based on experiences within the organization that to a large extent were shared with other respondents.

The six factors for individual values were labelled: IV1: personal need for achievement; IV2: need for supportive relationships; IV3: machismo; IV4: workaholism; IV5: alienation; IV6: authoritarianism. The six factors for individual perceptions of practices were labelled: IP1: professionalism; IP2: distance from management; IP3: trust in colleagues; IP4: orderliness; IP5: hostility; IP6: integration (in organization). For a full explanation see [16]. All twelve labels describe individual rather than organizational characteristics.

Values and perceptions of practices were kept separate in the individual analysis but this does not mean that they are independent. A second-order factor analysis of the factor scores for the 1,295 individuals on the six values factors and the six practices factors produced the following six common factors:

Factor 1: Integration (earlier labelled 'positive contribution'), consisting of IP1: professionalism, IP3: trust in colleagues and IP6: integration in organization, but negatively related to IV5: alienation, IP2: distance from management and IP5: hostility.

Factor 2: Active involvement, consisting of IV4: workaholism and IV2: need for supportive relationships.

Factor 3: Orderliness, containing IP4 only.

Factor 4: Need for achievement, containing IV1 only.

Factor 5: Machismo, containing IV3 only.

Factor 6: Authoritarianism, containing IV6 only.

The second-order factor analysis maintains five of the six values factors, while second-order Factor 1 collapses five of the six practices factors together with one values factor: the reverse of alienation. This confirms that the individual variance is largely a matter of values, and that most differences in individual perceptions of practices have one underlying common cause: the degree to which this individual feels integrated into or alienated from this organization (whatever may be the cause).

Why do different individuals within the same organization hold different values? The obvious explanation is that this is a matter of their personalities and as such partly genetic and partly based on life experiences. In the area of personality research there has been a recent move towards simplification. Secondary research across a large number of earlier studies identifying dimensions of personality has led to the identification of the 'big five' universal dimensions of individual personality which turn up in almost any study [17]. These were labelled [29]:

O: Openness (key words: imaginative and original, as opposed to conventional);

E: Extraversion (active and energetic, as opposed to passive);

C: Conscientiousness (organized and efficient, as opposed to messy);

N: Neuroticism (anxious and hostile, as opposed to relaxed);

A: Agreeableness (altruistic and modest, as opposed to cold).

These five show a striking correspondence with five of the six second-order factors in the individual-level analysis of the organizational culture database:

- Factor 1: Integration corresponds with the reverse of neuroticism;
- Factor 2: Active involvement corresponds with extraversion;
- Factor 3: Orderliness corresponds with conscientiousness;
- Factor 4: Need for achievement includes a high loading for 'variety and adventure', so it shows some overlap with openness;
- Factor 5: Machismo (including agreeing with 'when people have failed in life it is their fault') overlaps with the reverse of agreeableness.

Starting from a sociological study of organizations, a jump from the ecological to the individual level of analysis has put us right into the heart of personality psychology. It offers an independent confirmation of the 'big five' metatheory.

This confirmation is the more remarkable because the data analysed were from Danish and Dutch respondents, while most of the studies in the Big Five secondary analysis used US subjects. However, our study yielded an unmistakable sixth dimension: authoritarianism. At hindsight it is surprising that the Big Five research did not reveal a personality factor related to dependence on authority. Ever since Adorno et al. [1], this should be on the personality map. Is it possible that it was not found because the studies analysed either

overlooked the relevant questions or else covered restricted ranges of subjects that did not sufficiently vary on this factor?

In comparison with Project One, Project Two developed in the opposite direction. There was also a level jump, but this time from the aggregate to the individual level. The study of bouquets was extended by a study of flowers; and the available data had been hiding important information about these flowers.

4. Discussion: The Division of Labor among the Social Sciences

Social sciences study social systems. A system is a whole composed of partially interdependent parts, and in a social system some of these parts are individuals or other social systems. The social sciences include anthropology, sociology, political science, individual and social psychology, economics and management (this is not meant to be an exhaustive list). Maybe some parts of individual psychology are not strictly 'social'.

The concept of systems exists in the physical sciences as well. Boulding [3] and Von Bertalanffy [40] have designed a 'General Hierarchy of Systems' (Fig. 1). The hierarchy contains nine levels, and every next higher level adds a dimension of complexity to the previous one.

Thus at level 1 (framework) the parts are fixed within the whole such as in a table (both hardware and software). At level 2 (clockwork), movement is introduced, but only according to a fixed pattern. At level 3 (cybernetic) the system can vary its movement in order to control its output, such as in a thermostat. From level 4 onwards we leave the area of machines and enter the area of living matter. Level 4 (the cell) is homeostatic: it can adjust the settings of its own controls in order for the whole to grow and survive. Level 5 (the plant) is an assembly of cells with an ability to generate new cells, to grow and procreate. Level 6 (the animal) does the same but is controlled by a brain that 'knows': it stores and processes information and it directs the whole according to the information received from the outside. Level 7 (man) is an animal that not only knows, but knows that it

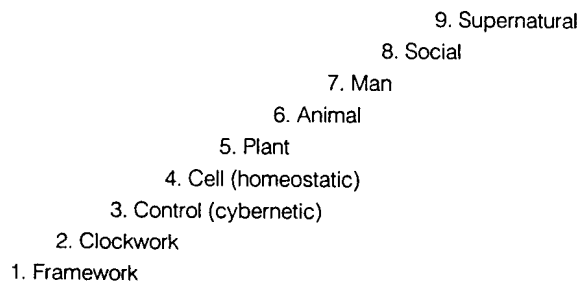


Fig. 1. General hierarchy of systems.

knows: it possesses language and symbolism. Level 8 (social) is any aggregation of interacting humans. Level 9 (supernatural) transcends the observable reality.

Human systems are therefore at levels 7 and 8; social systems are at level 8, medicine is at level 7, biology at levels 4–6, the physical sciences are at levels 1–4. The social sciences are the only ones in which the scientist (herself operating at level 7) is less complex than her object (at level 8). This implies that social knowledge will always be subjective, partial, and tentative. It is an illusion that social sciences will ever reach the level of consensus of most physical sciences: it is as much an illusion as the search for a perpetual motion device. This applies even more for men's attempts to agree about level 9, the supernatural, as anybody can observe.

Kuhn [23] has pointed to the importance of 'paradigms' in science. A paradigm is a set of unquestioned assumptions held by those who at a particular point in time profess a particular science. The scientific consensus in the physical sciences means that at anyone moment there are dominant paradigms; it takes a scientific revolution to upset such a paradigm, like in the 17th century Galileo Galilei's assertion that the earth is moving, which upset the static paradigm supported by the Catholic Church.

The position of social systems at level 8 of the General Hierarchy implies that, and explains why, Kuhn's theory does not fully apply to the social sciences. Any social science has several simultaneous and competing paradigms, and the effects of new paradigms are less revolutionary than in the physical sciences.

The social sciences have established a division of labor pictured in Fig. 2. There are two ways of cutting the social cake: by level or by aspect. Anthropology, sociology, social psychology and psychology look at all aspects of social systems, but only at a given level (at the level of societies, categories of persons, groups, or individuals, respectively). Within the social landscape anthropology studies the gardens, sociology and social psychology study different kinds of bouquets, and (individual) psychology studies the flowers. Management, political science, and economics look at one

particular aspect each (the purposeful organization, the polity, the exchange of goods and services), but they cross levels. The same holds for other application-oriented disciplines. Often a level science and an aspect science need to co-operate in order to resolve a particular problem.

The division of labor among the social sciences has been a practical necessity, but it has had the unfortunate side effect of overspecialization. Adherents of one science communicate with colleagues only; they build a parochial loyalty to their field, even to certain paradigms within their field. The conscience is lost that the social world exceeds the field of any one science.

Unwanted effects of overspecialization are:

- compartmentalization: adherents to a field work in different departments, read and cite different journals, visit different congresses, follow different career paths;
- restriction of inputs: inmates of a discipline reject certain types of information. For example, economists trying to help poor countries develop will not consider anthropological information;
- restriction of methods: methods developed within one field are not used by others even when they would be useful. For example, most anthropologists scorn the use of survey information even where available;
- triviality of outputs: problems are abstracted to such an extent that any practical use of conclusions is excluded. Entire fields survive on resolving only the problems generated by the inmates themselves, without demonstrable transfer of ideas to the larger social reality.

Level	Total systems	Aspect systems			
Society	Anthropology	po	li	ti	o
Category	Sociology	ma	cal	sci	n
Group	Social psychology	ge	me	nt	o
Individual	Psychology	nt			s

Fig. 2. The division of labor among the social sciences.

5. Inputs and Outputs of Social Science Activity

Fig. 3 pictures the types of inputs and outputs we find in all social science activities, regardless of discipline. It is a special case of a more general model applying to all scientific activities.

Social sciences' inputs are empirical data and/or existing theories. Empirical inputs are processed by *induction* (reasoning from the specific to the general), theories by a process of *deduction* (reasoning from the general to the specific). The process of analysis, at the heart of Fig. 3, according to the previous section can never be objective but has to be subjective, partial and tentative. This is even the case where the analysis is quantitative, using mathematical models and/or statistics and is supported by computers. The outputs of the analysis are policy outputs and/or new theories. Policy outputs are conclusions meant to be put to a practical test, by politicians, managers, consultants and similar actors in the social world. New theories may become inputs to new social science activities. The mix of new theories and policy outputs varies between disciplines but also between parts of the world: in general, the North American tradition stresses policy outputs while the continental Euro-

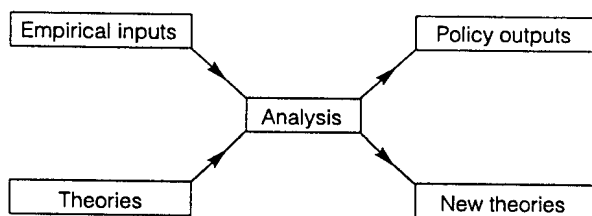


Fig. 3. Inputs and outputs in social science activity.

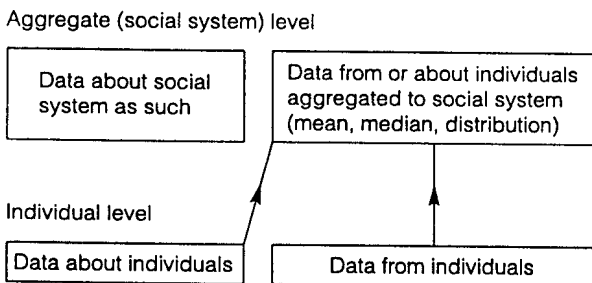


Fig. 4. Origins of empirical data in the social sciences.

pean tradition stresses the generation of new theories.

This article focuses on empirical data as inputs to social science activities. The empirical data handled by the social sciences can be about social systems as wholes (aggregate level), or they can be about and/or from individuals; in the latter case the data have to be aggregated for analysis at the social system level (Fig. 4).

The social systems in Fig. 4 can be countries, tribes, occupational groups, social classes, organizations, peer groups, families, etc. Examples of data about social systems as such are frequencies of events (such as accident rates), indexes, per capita national incomes, and descriptive characteristics (such as trial by jury or by tribunal). Examples of data about individuals are demographics (age, gender, marital status), medical data, census data, observations of behavior. Data from individuals are those that can be collected by interviews, paper-and-pencil questionnaires, or tests.

Data about or from individuals aggregated to social systems (upper right in Fig. 4) form a major part of the material the social sciences use. Opinion polls, population statistics, classroom averages, customer satisfaction indexes, test norms all belong to this category. Simple statistics usually suffice for the aggregation computation: means (rarely medians) and sometimes standard deviations or other measures of distribution.

6. Choosing the Appropriate Level of Analysis

As soon as data have been collected at the individual level that can also be aggregated to the level of particular social systems, one has to determine the appropriate level of analysis for a certain purpose. The study of gardens is not just an extension of the study of bouquets or flowers. It adds a level of complexity: the interaction between the elements and with components of the ecosystem.

Let there be N individuals (flowers) who belong to n different social system-level clusters (bouquets or gardens); assume we have scores on a number of variables for each individual, and we want to detect the relationships between the variables by a

multivariate statistical technique, like correlation analysis, factor analysis, cluster analysis, multi-dimensional scaling, or smallest space analysis. Leung and Bond [25] have described a general approach to analysing multilevel data. In their case, the clusters are called 'cultures'. They distinguish:

1. A *pancultural* analysis, pooling the data from all N individuals together, regardless of the cluster they belong to;
2. Separate *within-culture* analyses in each of the n clusters, each of them limited to the individuals within the cluster;
3. An *ecological* analysis, performed on aggregate measures of the variables for each of the n clusters (usually the means), as well as on any related external variables which exist only at the cluster level;
4. An *individual* analysis, performed on the pooled data for the N individuals after elimination of the cluster-level effects. This can be done by deducting from each individual score the cluster's mean score on the question, so that the new cluster mean becomes 0 and the ecological variance is eliminated (the approach taken in Project Two described earlier). It can also be done by full standardization of the individual scores, which results in standard scores with a mean (for each question, across the individuals within each culture) of 0 and a standard deviation of 1. In both cases, the individual analysis considers precisely that part of the variance in the data which had been eliminated in the ecological analysis. It is a way of pooling the within-cluster analyses across all n clusters.

From these four ways of treating the data, the ecological and individual analysis (3 and 4) are entirely separate and non-overlapping; the correlation coefficients between the same two variables at the ecological and at the individual level usually differ and may even carry opposite signs. The pancultural analysis (1) mixes the variances from the ecological and the individual level.

Choosing the appropriate level of analysis for a given set of data is obviously a crucial step that should precede any data treatment [22]. In mainstream social or behavioral research this step is

often neglected; it receives no attention in popular textbooks like Blalock and Blalock [2] or Kerlinger [20]. Political science methodology knows the 'ecological fallacy' [37] which implies that one should not interpret relationships between variables at the cluster level as if they applied to individuals. Psychologists, however, as a rule are not warned for the 'reverse ecological fallacy': interpreting relationships between variables found at the individual level as if they applied to the cluster level. The prevailing individualism in Western countries increases the temptation to commit this fallacy, to which psychologists fall quite frequently [16]: they cannot see the wood for the trees, in this article's metaphor they cannot see the garden for the flowers.

7. The Case for Multilevel Analysis

Multilevel analysis means using the same data base for analysis at two or more levels simultaneously [38]. Contrasting effects at different levels can provide crucial insights into the working of social systems; ignoring such effects can condemn results to triviality. A classic example of multilevel research was published by Meltzer [30] who, with data from 539 US individuals divided over 79 groups, showed that many attitudes of individuals could be better predicted from their group's mean scores on related issues than from their own individual scores on these issues. Another example is a study by Lincoln and Zeitz [26] among 500 employees divided over 20 US social service agencies; they found that the relationship between professional qualification and supervisory duties was positive across individuals but negative across agencies. The latter was due to the more professional agencies needing less supervision.

Since the late 1970s the mathematics for multilevel analysis has been elaborated, and advanced computer calculation programs have been developed [8,18,24]. Most current applications take place in the field of educational research, for separating school or teacher effects on performance of students, from individual student effects [27,32]. The disadvantage of the new methods is that by the

complexity of its mathematics, multilevel research is becoming another specialty rather than a general paradigm for the social sciences. The crucial step is not the choice of the right computer program but the awareness that a data set can also be analysed at another aggregation level [22]. Often no special mathematics is needed for this purpose: classical methods will do, as in the two projects described.

The basic reason for the scarcity of multilevel research is the distribution of labor among the social sciences. Confronted with the same database, psychologists will correlate individual data, sociologists will compare mean scores, and anthropologists will turn away disgusted; rarely will researchers cross boundaries and extend their own discipline's approach with one common in another discipline. This is unfortunate, because, of course, the social reality involves all levels simultaneously. All social sciences study parts and aspects of the same world, and disciplinary parochialism defeats the purpose of the scientific effort itself.

8. Conclusion

The two research projects described illustrate the rich possibilities of multilevel research. The first project took what were supposed to be psychological data and aggregated them to the country level; and from this level they caused a paradigm shift for cross-cultural psychology and proved relevant to a variety of other social science fields. In the second project data collected for a study in organization sociology were re-analysed across individuals and led right into the heart of psychology, contributing to personality theory.

Disciplinary parochialism and level myopia do not only make the social sciences unproductive; they also make them dull. It is exciting to explore more than one level of the social reality. New generations of social scientists should not be fenced in at one level: they should feel free and be able to transcend levels. Methodology textbooks can contribute to this. They should make the choice of the level of analysis a central theme. In the social science paradise there are flowers, bouquets, and gardens; a complete gardener can deal with all three.

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