

The nature of process-produced data: towards a social-scientific source criticism

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The Nature of Process-Produced Data – Towards a Social-Scientific Source Criticism

1. Introduction¹

Everyday life is increasingly reflected in administrative bookkeeping systems. This situation is the consequence of the enlargement of municipal functions and the creation of urban and regional information systems within the overall development of the welfare state. The scope of administrative functions is becoming more and more diverse². At the same time more people have become clients of a broad range of formal organizations. The penetration of society through a network of formal organizations has increased considerably³.

For the bureaucratic handling of these administrative functions, problems that might be regarded as diffuse in everyday life, must be translated into functionally specific terms. As a result of functional specialization within urban bureaucracies this translation almost always implies the reduction of private contingencies into

¹ The research reported here was supported by funds granted to the Institute for Applied Social Research, University of Cologne, Project: Information Systems and Information Behavior, by the Bundesministerium für Forschung und Technologie/Institut für Dokumentationswesen (IDA 0103). Earlier versions or parts thereof were presented at the QUANTUM-SSHA conference in August 1977 as well as at the 9th World Congress of Sociology, 1978.

Further results of the research are described in: Bick, Wolfgang and Müller, Paul J., *Die Buchführung der Verwaltungen als sozialwissenschaftliche Datenbasis*, in: Müller, Paul J. (ed.), *Die Analyse prozeß-produzierter Daten*, HSF, Vol. 2, Stuttgart 1977, pp. 42–88; Bick, Wolfgang and Müller, Paul J., *Stable Patterns within a Network of Urban Bureaucracies – Domains or Positions?*, paper presented at the 1978 American Sociological Association Meeting, San Francisco. The final report on the project is available as Bick, Wolfgang and Paul J. Müller, *Informationssysteme und Informationsverhalten – Soziologische Grundlagenforschung für eine Informationspolitik*, BMFT FB ID 79–01, Fachinformationszentrum Energie, Mathematik, Physik, Kernforschungszentrum, Eggenstein-Leopoldshafen 1979.

² See e. g. Liebert, Roland J., *Disintegration and Political Action, The Changing Functions of City Governments in America*, New York 1976.

³ See Bick, Wolfgang and Müller, Paul J., *Die Buchführung der Verwaltungen als sozialwissenschaftliche Datenbasis*, in: Müller, Paul J. (ed.), *Die Analyse prozeß-produzierter Daten*, HSF, Vol. 2, Stuttgart 1977, pp. 42–88.

causal models underlying the decision programs of formal organizations. This reduction process leads to a highly selective and biased representation of everyday life. Everyday life is not just neutrally translated but transformed into administrative categories.

The proliferation of formal organizations within industrial societies has led to an increase in the volume of bookkeeping on social behavior. Social bookkeeping data⁴ are often process-produced. These are data which accrue as „by-products“ or traces of the daily routines of formal organizations and which are therefore not collected for the purposes of scientific or statistical evaluation⁵.

As the significance of such process-produced data for sociological research grows, it becomes increasingly important to study the representative nature of administrative bookkeeping, and to delineate the kinds of approaches that seem most promising with the use of these kinds of data. Both issues will be dealt with in this essay.

When data are originally collected for purposes other than those of scientific research, there is an inherent danger of vulnerability that occurs when distortions and the context in which the data were collected are unknown. For many years the technology of the sample survey has been regarded as the main means of social science data collection. This longevity has made it possible to determine – on the basis of the method's intrinsic quality control procedures – the limits of the validity and reliability of the collected material.

In the case of process-produced data, the development of a source criticism analogous to „historical source criticism“⁶ becomes essential, not only for files relating

⁴ See e. g.: Dibble, Vernon K., Four Types of Inference from Documents to Events, in: *History and Theory*, 3 (1963), pp. 203–221.

⁵ Process-produced data were first – although differently – defined by Stein Rokkan, see: Rokkan, Stein, *Data Services in Europe*, in: *American Behavioral Scientist*, Vol. 19, 4 (1976), pp. 443–454. In the meantime various associations developed definitions of process-produced data similar to our definition. *QUANTUM* (Program 1975) stressed to point that process-produced data are not collected within scientific data collection routines, but are the products of administrative record-keeping. Within IASSIST the question whether data produced by statistical bureaus should be included is still an open one.

For the perspective within *QUANTUM* see: Müller, Paul J., *IASSIST Newsletter*, Vol. 1, No. 2, February 1977, pp. 17–21.

For the less methodological and more pragmatic oriented discussion see: *IASSIST Newsletter*, Vol. 1, No. 2, February 1977, pp. 13–15.

⁶ See e. g.: Bernheim, E., *Lehrbuch der historischen Methode und der Geschichtsphilosophie*, Leipzig 1908; Blankenburg, Erhard (ed.), *Empirische Rechtssoziologie*, München 1975; Derlien, Hans Ulrich, *Methodische Probleme der empirischen Verwaltungsforschung*, Bonn 1978; Ivanov, Kristo, *Quality-Control of Information: On the Concept of Accuracy of Information in Data-Banks and in Management Information Systems*, National Technical Information Service, U.S. Department of Commerce 1972; Murphey, Murray G., *Our Knowledge of the Historical Past*, Indianapolis, Ind., 1973; Narroll, Raoull, *Data Quality Control*, New York 1970; Steffen, Wiebke, *Grenzen und Möglichkeiten der Verwendung von Strafakten als Grundlage kriminologischer Forschung*, in: Müller, Paul J. (ed.), *Die Analyse prozeß-produzierter Daten*, HSF, Vol. 2,

to decision-making processes, but for the compilation of comprehensive and uniform files of data on individuals. The first step in the direction of a „social-scientific source criticism“ is an examination of the quality of representation of everyday life provided by administrative bookkeeping systems.

Administrative bookkeeping data are mainly collected in a standardized fashion, that is through application or record forms. In the encounters between clients and administrations using standardized information collection schemes the process of translating everyday life into administrative categories becomes problematic. The clients themselves are involved in this process and the successful translation therefore depends on their willingness and competence to reduce their individual problems into the tight and narrow information needs of urban bureaucracies. Distortions of the representation of everyday life can therefore be assumed.

Administrative bookkeeping data are the results of translating individual problems and private contingencies into the standardized information collection schemes of public administrations. For analysing the quality of process-produced data we used a multi-level and multi-method approach. The population and the network of institutions were the different levels of analysis. The different instruments were *first*, the analysis of application forms; *second*, surveying clients as well as staff members of organizations; and *third*, observing the translation process involved in the encounter between clients and bureaucracies. In the following sections the characteristic features of administrative bookkeeping data and their inherent quality problems are discussed according to the following research questions.

In *section 2*, the application forms for compiling person-related data which are used in the local setting of Cologne are analysed. We compare the information needs of different administrative tasks and show which information is regarded as relevant and which aspects of everyday life are blocked out in administrative bookkeeping. The guiding research questions are then: How selectively, how fragmentarily are the characteristics of the clients entered into the records of formal organizations? To what extent are the social environments (e. g. family, household, friends) of the clients represented?

In *section 3* we analyse whether the selectivity of representation within single offices can be overcome by interlocking bookkeeping systems. Perceiving administrations as a system we identify the holes within administrative bookkeeping that are consequences of blocking out certain aspects of everyday life.

Section 4 deals with the analysis of the interorganizational network of information exchange in an urban setting. We applied network analysis to show how urban bureaucracies exchange information through direct communication or other forms of interorganizational linkages. To what extent does the selectivity of exchange of information between formal organizations entail a vulnerability of the network of institutions, and in what way does this vulnerability affect their records?

Stuttgart 1977, pp. 89–108; Tilly, Charles, *Clio and Minerva*, in: John C. McKinney and Edward Tiryakian (eds.), *Theoretical Sociology: Perspectives and Development*, New York 1970, pp. 434–466; von Brandt, A., *Werkzeug des Historikers*, 7th ed., Stuttgart 1973.

In *section 5* we focus on evaluation of the records made by administrative personnel. How unambiguous, how reliable are the records which are compiled by administrations, for the producers of the records themselves?

Section 6 describes our observation of the interaction between clients and bureaucracies. We consider the extent to which personal connotations are brought into the process of „skeletonizing“ peoples' problems. Thus we attempt to demonstrate the differences between administrative view points implicit in their problem solving processes, on the one hand, and peoples' ways of thinking about their own situation, on the other. Further on we asked the clients how they evaluated the information collection process. To what extent can people accept the skeletonizing process within administrative data collection? The guiding research questions were: to what extent do the collected data only tell something about the data collectors themselves? Are administrative bookkeeping data artifacts which tell little about the represented everyday lives?

2. Representing Everyday Life within Administrative Bookkeeping

2. 1. Administrative Theories of Everyday Life

Policy goals are only broadly defined in laws and thereby transformed into a set of concepts or ways of thinking about reality. For the standardized and routinized execution of these laws a transformation of the concepts into decision programs is necessary. This transformation is heavily characterized by taking over parts of the already existing operationalizations, thus relying on previously defined categories or public statutes. Administrative decision programs are based on implicit causal models about which information is necessary to collect from the client and which not. These implicit causal models define, a priori, contingencies between variables as well as joint thresholds of variables that make people eligible or accessible for administrative action. Information about clients is therefore collected for the purpose of classifying people and not for finding or testing contingencies operating in everyday life. These implicit causal models determine the points of view that organizations have towards their environment. These causal models or points of view are built around substantive focuses that are of interest to the administrative decision programs.

In comparing different models within administrative decision programs one might think of two rather different structures. Decision programs could be grouped according to the administrative domains to which they belong. Causal models aiming at the same broad concept like „improving the health conditions“ would then

be characterized as having an identical set of required information. But we do not expect that the structure of causal models would lead to segmented information bases. Disjoint sets of required information would, in fact, totally exclude the contingencies existing between such concepts as e. g. „health condition“ and „work condition“. In addition to that, such a model would neglect the existent interrelations between the decision programs of different administrations in different domains.

Therefore we perceive the structure of causal models as a system of unique, but interlocked information profiles relevant to each office. The causal model would be focused on a target variable, i. e. the variable measuring the state of affairs the administration is supposed to influence. The causal model then would include all other variables that are regarded as influencing the target variable (see *Figure 1*) leading to an unique profile of relevant information.

The causal models should build up an interlocked structure for two reasons. First, administrations very often regard decisions reached within one decision program (output) as relevant to the operation of another program (input). These interconnections between programs form hierarchical as well as relational structures: eligibility for a service is often dependent on the possession of a certain licence applied for earlier. And, some services are seen as mutually exclusive with the effect that e. g. the amount of money received within one program is taken into account within another program. Second, administrations are confronted with changes in their environment and are dependent on the information given to them by the population. By using information that is produced by other organizations they increase their information input as well as the supposed quality of the information. Therefore, administrative decision programs build up a system of interlocked decision programs.

Implicit causal models are not only characterized by a certain set of variables that is regarded as explanatory for the focus of administrative concern, but are also based on theories about what parts of the applicant's interpersonal network have to be taken into account. It is assumed that the kinds of social environments which can be regarded in administrative bookkeeping would mainly be those that are legally defined. The definitions of relatives or household members meet this requirement: Relatives are defined by the register office, the members of the household are legally defined by the registration office. Although both dimensions, kinship and co-residence, might vary substantively, we do not expect that friendship or acquaintanceship networks – even if they are much more important in everyday life – will be considered as relevant to describing the social relations of the individual applicant. If these relationships were taken into account the administration would be confronted with the fact that there are no other formal organizations which routinely process such categories. Thus, administrations would have to rely solely on the information provided by individual applicants.

Both, the implicit theories about what information about the individual must be collected for processing a case, and those about what social relationship are regarded as influencing the situation of the individual applicant are dimensions of organi-

Figure 1 A
The causal model of the rental assistance program

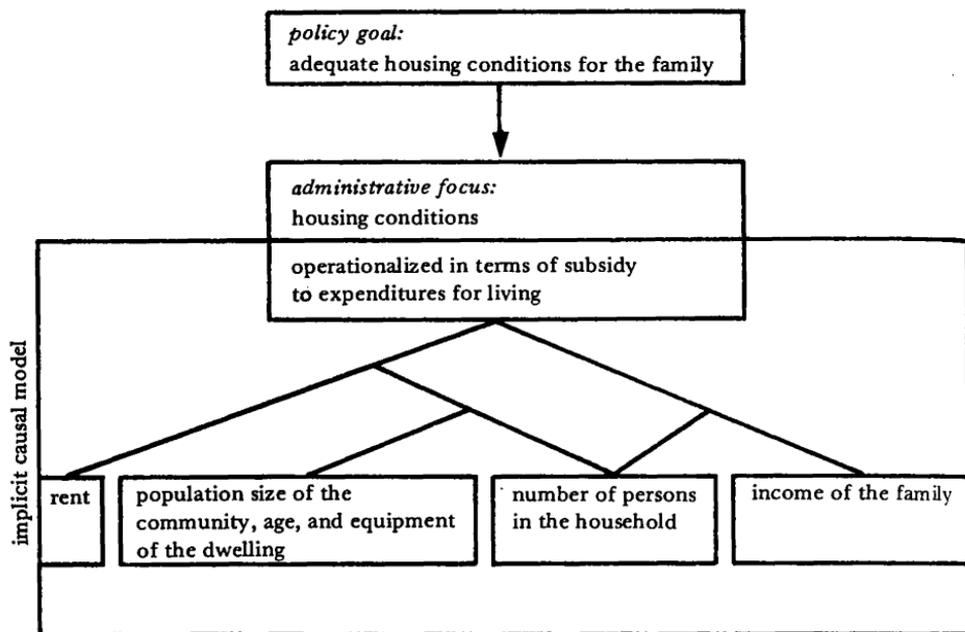
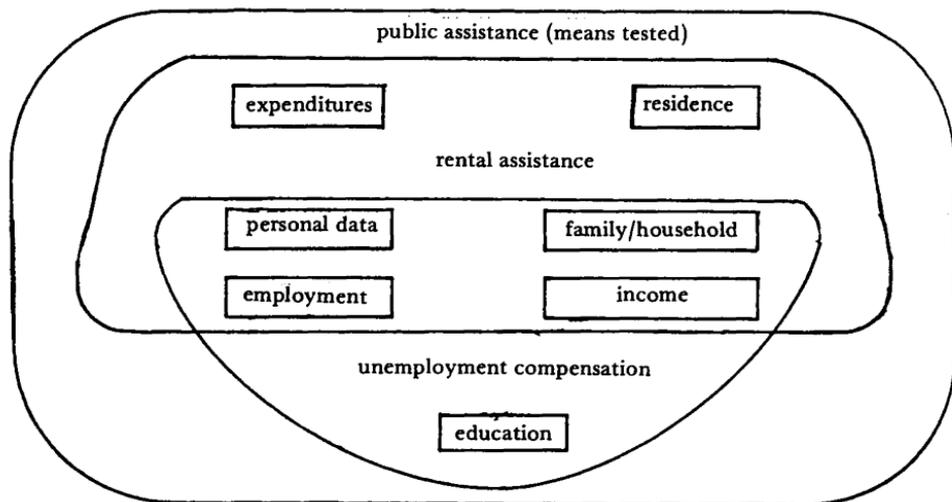


Figure 1 B
The causal models of three different administrative programs



zational orientations toward clients. They describe the interest of the organizations in the clients' „biographical space“ ranging from a focus upon limited aspects of individual actors to a broad interest in clients and their social environments⁷. These client models determine the biases in the representation of everyday life by formal organizations.

2.2. Selectivity and Contingencies within Administrative Causal Models

Application forms are the operationalizations of causal models within administrative decision programs. They purposively neglect information which is regarded as not relevant by not asking for that information. They seek only those contingencies which are regarded as relevant to the case, and they reflect the interlocked decision programs by asking for multiple statuses of the applicants.

We have analysed a total of 92 application and record forms which are used by administrative offices in the Cologne area for gathering information (see *Appendix 1*). The following administrative domains were included in our study: Cologne city administration, the local labour office in Cologne, and the local health insurance administration. Completed files were not used for our study. Instead, we analysed the standardized interview sheets (applications, record forms, questionnaires, etc.) which are used to compile information for client-oriented administrative tasks. This means that the universe of our analyses is the administrative bookkeeping which compiles person-related data in a standardized fashion.

To test the hypothesis that the causal models of administrations build a system of unique, but interlocked information profiles relevant to the offices we coded the questions in the application forms according to a list of 85 variables (see *Appendix 2*) and analysed the resulting matrix using cluster analytical measures. We first measured the similarity between the information-gathering profiles of administra-

⁷ Lefton, Mark and William R. Rosengren, Organizations and Clients: Lateral and Longitudinal Dimensions, in: American Sociological Review, Vol. 31 (1966), pp. 802–910.

In the text the aggregations of single administrative programs or offices to administrations or domains are described in the figures. Only the various groupings of public assistance and work-related public transfers need special definitions: The program „Sozialhilfe“ is translated into „public assistance (means tested)“, the office providing this assistance is termed „welfare office“.

If the programs of public assistance are combined with work-related public transfers (e. g. benefits from unemployment insurance) the aggregate of the offices providing these types of benefits are termed „social welfare administration“. Finally, if we only refer to the aggregation of means tested assistance programs delivered by the offices of the city administration we use the term „welfare administration“.

tive tasks by means of the non-metric coefficient (Canberra-metric)⁸. This asymmetrical and weighted dissimilarity measure ensures recognition of the similarity of those tasks which are distinguished by a high degree of agreement in terms of the causal models applied. The grouping procedure used, „complete linkage“, was chosen to detect the most homogeneous clusters possible⁹. Figure 2 presents the results of this analysis. It was not possible to distinguish groups of administrative tasks by distinct patterns of information representation. There were no groups found which could be characterized as „natural“ classes in terms of internal homogeneity and external isolation¹⁰. This means that the representations of the 92 administrative tasks analysed are nearly unique in terms of the respective compilations of certain combinations of attributes. In other words, the administrative causal models cannot be grouped according to administrative domains but instead reflect individual points of view which overlap only partially¹¹.

If causal models within administrative decision programs can be characterized as highly selective in regard to the contingencies with which they are concerned, it is still to be expected that certain variables will almost always be collected together with other variables, i. e. that dominant points of view exist. To identify these dominant points of view we aggregated the 85 variables into 15 life sectors and analysed their contingencies. The contingencies between the life sectors „family/household“, „residence“, „employment“, „education/qualifications“, „income“, „expen-

⁸ This and the following cluster analyses were done with the program package CLUSTAN 1 C from David Wishart. (Wishart, David, CLUSTAN 1 C User Manual, London 1975.) The „non-metric coefficient“ D (subroutine CORREL, coefficient 37) is defined as

$$D = \frac{b + c}{2a + b + c}$$

(b resp. c are the number of 0/1 resp. 1/0-dismatches, a resp. d the number of 0/0 resp. 1/1-matches).

This coefficient is equivalent to the Canberra-metric for dichotomous variables belonging to the group „Manhattan metric“. See: Lance, T. N., and Williams, N. T., Mixed-Data Classificatory Programs I: Agglomerative Systems, in: Australian Computer Journal, 1 (1967), pp. 15–20.

The non-metric coefficient weights the joint occurrence of attributes (1/1-matches).

⁹ The used fusion procedure „complete linkage“ (subroutine HIERARCHY, coefficient 2) defines the distance between two groups as the distance between the furthest elements of the two groups, that is: for a given dissimilarity measure S the distance between X and Y is defined as

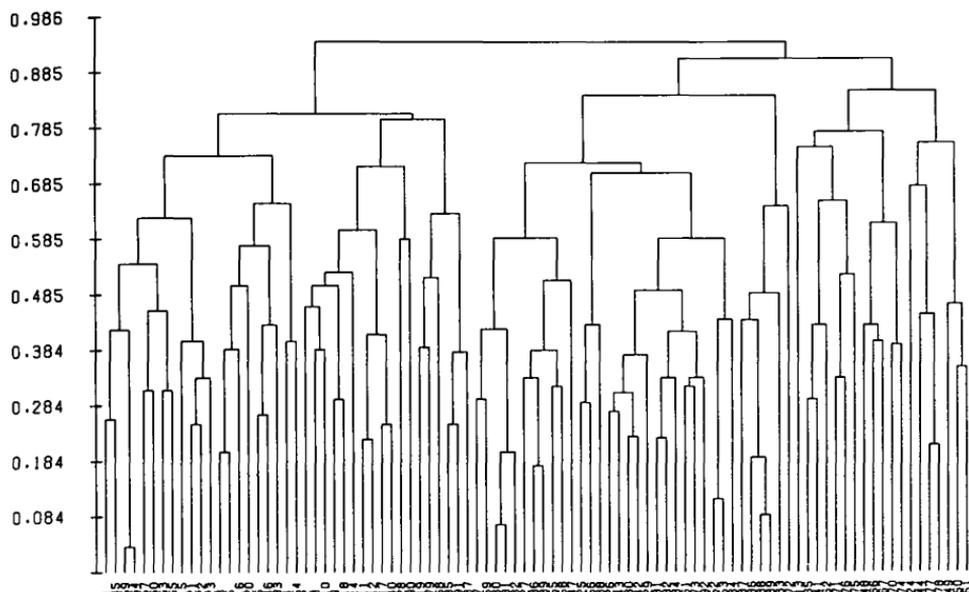
$$S_{X, Y} = \max_{x \in X, y \in Y} S_{x, y}$$

In the hierarchical fusion process those groups/elements are combined which have the highest similarity. As to the advantages of the complete linkage process see: Vogel, Friedrich, Probleme und Verfahren der numerischen Klassifikation, Göttingen 1975, pp. 300 passim.

¹⁰ For the term „natural classes“ see: Sodeur, Wolfgang, Empirische Verfahren zur Klassifikation, Stuttgart 1974, pp. 119 passim.

¹¹ This result was confirmed by analyses using single and average linkage procedures.

Figure 2



THE REPRESENTATION OF CLIENTS FOR 92 ADMINISTRATIVE TASKS

ditures“ and „health“ within the causal models of 92 administrative tasks were measured by means of the coefficient of association¹². Because it was to be expected that certain life sectors would be represented in varying combinations, approaches which break down these contingencies into disjoint combinations were considered as not being adequate. For this reason we made use of a clustering procedure to ascertain overlapping combinations of interdependent life sectors¹³.

¹² ϕ was computed using the SPSS-routine PEARSON CORR and was then transformed to a similarity measure with a range of 0 to 1.

¹³ For this analysis the subroutine KDEND within CLUSTAN 1 C was used. KDEND computes according to the approach developed by Jardine and Sibson, for any given similarity threshold S and number of maximally allowed overlap M, those groups which consist of elements having a similarity equal or higher than S and which have no more than M elements in common. For the approach see: Jardine, N., and Sibson, R., *The Construction Journal*, 11 (1968), pp. 48–50.

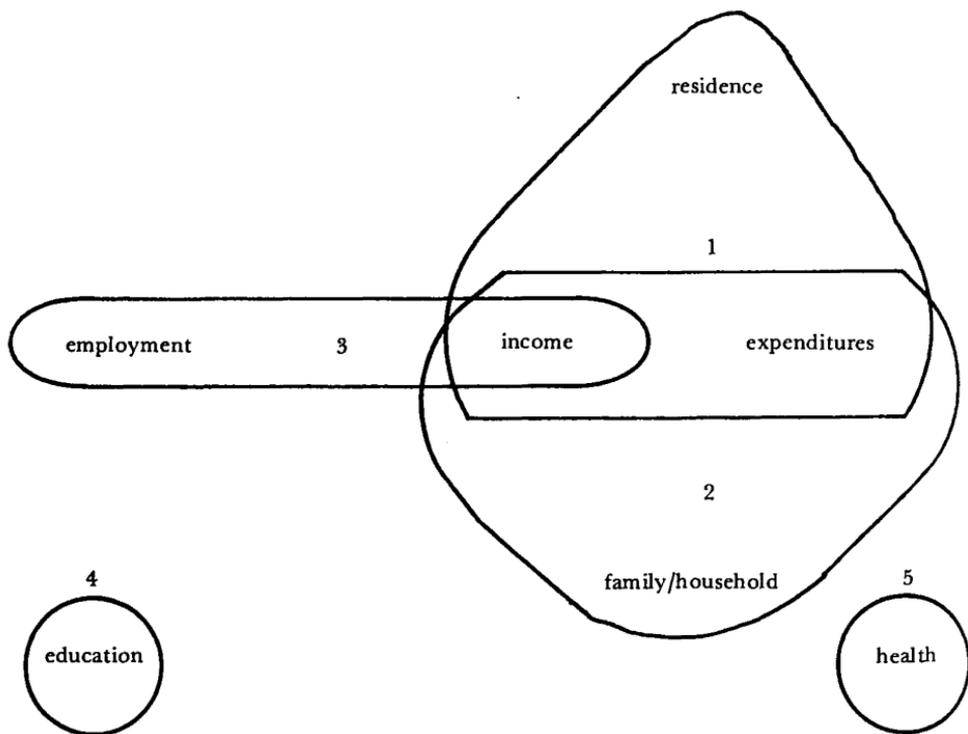
Cole, A. J., and Wishart, D., *An Improved Algorithm for the Jardine-Sibson Method of Generating Overlapping Clusters*, in: *The Computer Journal*, 13 (1970), pp. 156–163.

Figure 3 shows the overlapping contingencies¹⁴. They can be regarded as paradigms indicating the predominant points of view which exist within the causal models of administrative decision programs. Five paradigms can be distinguished as being the perceived contingencies between

1. economic circumstances and residential situations
 2. economic circumstances and family or household composition
 3. employment and income
- or the focus on:
4. education or
 5. health circumstances

without simultaneous consideration of other issues, as, for example, social circumstances.

Figure 3



¹⁴ The similarity threshold chosen is 0.64 (this is equivalent to a ϕ -value of 0.28). On this niveau the clusters maximally have two elements in common so that the solution is independent of additional allowed overlaps.

These distinct points of view in the representation of everyday life can be characterized as the quasi-reality of formal organizations: what is represented is not reality itself, but only a certain perspective of reality. This constructed reality is based upon concepts of that which „belongs together“ and involves masking certain other contingencies that are effectively treated as irrelevant to the purposes of the particular organization¹⁵.

2.3. *The Optics of the Representation of Primary Environments*

Causal models within administrative decision programs can be described as a set of partially overlapping contingencies between variables measuring life sectors of their target populations as shown in Figure 1 B above. So far we have not taken into account the representation of social environments, i. e. what relationships are regarded to be relevant to the execution of administrative decision programs. For this purpose we analysed the 92 forms in terms of the different categories of persons involved. As expected, relations with colleagues or friends were almost never regarded as relevant to administrative decision programs. Only legally defined relations – as kin, household or official representatives – were found, kin and household being the most important. Accordingly we coded the 92 administrative forms in terms of 29 different legal categories of persons (see *Appendix 3*).

Both kinship and household membership are statuses that are defined legally by the administrative system. They represent two general and different philosophies toward the social atoms of concern for administrative purposes. There is, first, a genealogical perspective for identifying the descent of a person and the legally defined obligation to support relatives if necessary („Unterhaltsverpflichtung“). This orientation is important for those administrative decision programs which deal with the legal rights and duties of parents to their children. This philosophy is mainly associated with the public order administration. The second general philosophy in regard to social networks that is relevant to administrative programs is the household orientation. Households are often seen as the smallest economic unit. This concept is often independent of kinship patterns and should be expected as relevant to the housing administration. The welfare administration combines both.

Proceeding from the hypothesis that representation of egocentric networks is based on two independent dimensions – kinship and co-residence – we have carried out a multidimensional scaling analysis¹⁶. For this, a measure of similarity between

¹⁵ The analysis of three population surveys showed that selectivity – as it arose in the analysis of the administrative records – is not perceived by the population. There is an almost stereotyped reduction of the diversity of the representational behaviour of formal organizations. See: Bick, Wolfgang, Müller, Paul J., *Die Buchführung der Verwaltungen als sozialwissenschaftliche Datenbasis*, in: Müller, Prozeß-produzierte Daten.

¹⁶ For the literature on multidimensional scaling see the bibliography: Bick, W., et al., *Multidimensional Scaling – Theory and Applications in the Social Sciences*, Cologne 1977.

the 92 administrative tasks for all 29 categories of persons was defined: The similarity between any two tasks was measured by means of the matching coefficient¹⁷. The dissimilarity matrix was scaled using Smallest Space Analysis¹⁸. In this non-metric procedure, all 92 administrative tasks are depicted in a space of lowest dimensionality, so that the most similar tasks are distinguished by spatial proximity.

The two-dimensional solution is suitable for the data; the solution has a stress of only 0.06¹⁹. This two-dimensional solution is presented in *Figure 4*. The full exploitation of two dimensions is immediately evident.

To verify that the underlying dimensions are those of kinship and co-residence we have fitted external property vectors in the two-dimensional space in such a way as to maximize the correlation between the projections of the 92 points onto the fitted vector and the original property scale²⁰. The following were defined as external property vectors: (1) the absolute number of represented categories of persons for one task (G), (2) the absolute number of persons in the household (GH), and (3) the absolute number of persons outside the household (GNH).

These three vectors — which could be fitted into this space very satisfactorily²¹ — are depicted in *Figure 4*. The GH and GNH axes are almost orthogonal, and can thus be interpreted as the underlying dimensions²². The GH axis indicates the dimension „Living-together“, the GNH axis indicates the dimension „Genealogy“.

¹⁷ The „matching coefficient“ D is defined as

$$D = \frac{a + d}{a + b + c + d}$$

(for the notation cf. footnote 4, for the coefficient see: Sokal, R. R., Michener, C. D., *A Statistical Method for Evaluation Systematic Relationships*. The University of Kansas Science Bulletin, Vol. 38 (1958), pp. 1409–1438).

¹⁸ The program MINISSA-I of Guttman and Lingoës was used (see: Lingoës, James C., *The Guttman-Lingoës Nonmetric Program Series*, Ann Arbor 1973, pp. 39–79).

This nonmetric multidimensional scaling procedure spaces the points into a n-dimensional space of lowest dimensionality with the constraint that the similarities within the raw matrix are monotonically related to the distances in the final configuration of the solution, i. e. the rank order of the similarities is only minimally distorted.

¹⁹ The Kruskal's stress value is the one under condition of weak-monotonicity (Guttman-Lingoës' coefficient of alienation = 0.07). If one further reduces the dimensionality of the solution to an one-dimensional configuration the Kruskal's stress value (weak-monotonicity) is unacceptably high — 0.54 (Guttman-Lingoës' coefficient of alienation = 0.70).

²⁰ For this we used the program PROFIT from J. D. Carroll and J.-J. Chang out of the Edinburgh-Cardiff-MDS-Program Package.

For the procedure see: Carroll, J. Douglas, *Models and Algorithms for Multidimensional Scaling, Conjoint Measurement, and Related Techniques*, in: Green, Paul E. and Wind, Yoram (eds.) *Multiattribute Decisions in Marketing: A Measurement Approach*, New York 1973, pp. 299–371, see pp. 360–363.

²¹ The product-moment-correlations between the projections onto the fitted vectors and the different property scales have the following values: for G: 0.99, GH: 0.99, GNH: 0.95. The

3: Extensive representation of the household community and low representation of the genealogical relationships

4: Extensive representation of the dimensions „Living-together“ and „Genealogy“. The G axis, which indicates the number of persons represented runs through the quadrants 1 and 4. It runs from administrative tasks, which present the clients only as isolated persons, to tasks which represent the inclusion of the client in the social contexts of the household, the family and kinship.

The multidimensional scaling shows that the representation of categories of persons is based on the dimensions „Living-together“ and „Genealogy“, but it does not yet support the conclusion that different and distinct „optics“ exist for the representation of categories of persons.

As stated above the concepts of kinship as well as of household are legally defined social networks which try to reflect different aspects of reality. We assume that there are only limited possibilities of combining these two legal concepts without giving up their meaning. For administrative purpose the household cannot be divided into subsets whereas kinship patterns can only be divided into a few generations. Thus we expected that administrations use only a limited set of pre-defined optics this hypothesis cluster analytical procedures were applied.

We analysed the 92 x 29 (administrative tasks x categories of persons) matrix by means of entropy analysis²³. This minimum variance procedure, based on the information measure, ensures detection of those groups of tasks which are inherently homogeneous, and which constitute different optics of the representation of primary environments.

Figure 5 presents the dendrogram of the entropy analysis, and the existence of natural classes, that is, optics which differ greatly for the individual groups of tasks²⁴. The analysis of the administrative tasks included in these different clusters

²³ Following Vogel the entropy analysis is one of the best procedures for analysing binary data (Vogel, F., Probleme und Verfahren, pp. 109 passim, pp. 350).

The entropy analysis is based on information measures and calculates the entropy of a given group K as follows:

$$H_T(K) = m n_K \text{ld } n_K - \sum_{i=1}^m (n_{i1} \text{ld } n_{i1} + n_{i2} \text{ld } n_{i2})$$

(n_K : number of elements of group K, m: number of attributes, n_{i1} resp. n_{i2} number of 0-resp. 1-values of attribute i). The procedure then fuses the two groups K and L provided that the marginal increase of the total entropy

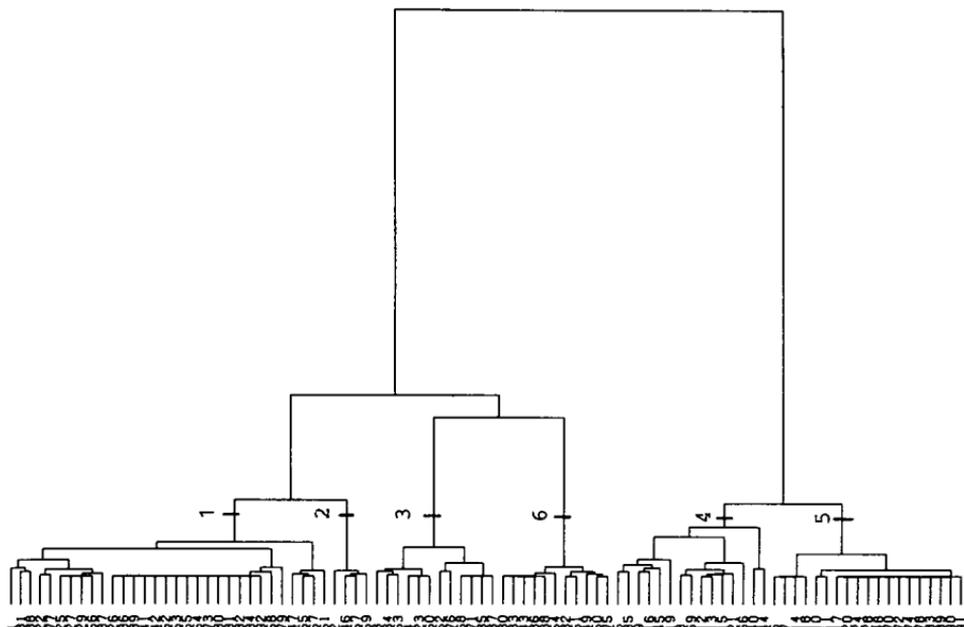
$$\Delta H_T(KUL) = H_T(KUL) - H_T(K) - H_T(L)$$

is smallest.

²⁴ These results were confirmed by applying other cluster procedures, e. g. the CONCOR-algorithm, which tries to find the so-called zero-blocks (blockmodelling). The used program was ABBW written by Clyde Mitchell.

For a description of the algorithm see: Breiger, Ronald L., et al., An Algorithm for Clustering

Figure 5



REPRESENTATION OF PRIMARY ENVIRONMENTS IN ADMINISTRATIVE BOOKKEEPING (COLOGNE)

showed that only six different optics for representation of the social environment of clients were in use²⁵ :

- | | |
|-------------------------------------|----------------------|
| 1 Household and family | 4 Client and parents |
| 2 Household and relatives | 5 Client |
| 3 Stem family (client and children) | 6 Household |

In *Figure 6* we have entered these optics in the final configuration of the multidimensional scaling analysis. The lines which have been drawn in define the administrative tasks with like optics.

The various optics in the representation of egocentric networks dominate — as expected — in different administrative domains: the public order administration

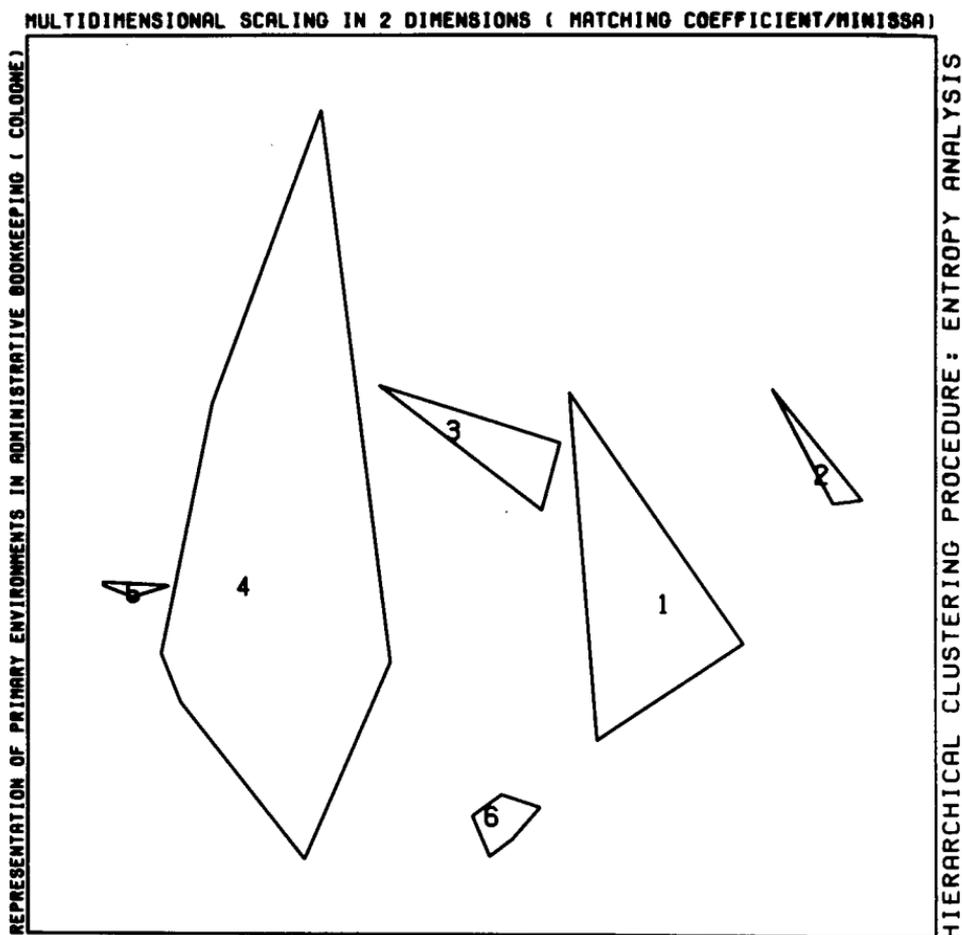
Relational Data with Applications to Social Network Analysis and Comparison with Multidimensional Scaling, in: *Journal of Mathematical Psychology*, 12 (1975), pp. 328–383.

When applying blockmodelling to rectangular data matrices, that is distinguishing between objects and stimuli, the concept of structural equivalence has to be modified as one of similar positions of objects vis-a-vis a set of stimuli.

²⁵ For the interpretation of these clusters the procedure RESULT was used. This procedure calculates the distributions of the variables for each cluster.

Cluster 1 includes 31 administrative tasks, Cluster 2: 4, 3: 12, 4: 15, 5: 19, 6: 11.

Figure 6



represents almost exclusively the client and his genealogy; the representation of the household and of the family typifies the welfare administration, with simultaneous use of other optics. The health insurance and the labour office are not characterized by any dominant perspectives: in these administrations, all six optics are used.

The different optics constitute concepts of the client's social environment which it is necessary to represent. They clearly do not form a continuum; their distinctiveness makes it obvious that social contexts are depicted only by means of a small set of „inter-changeable lenses“.

Our analyses have shown that there are only a few schemes used for representing primary environments of an individual in a legally meaningful way. The points of view administrations have towards these environments are therefore restrictive as

far as alternative ways of perceiving the structure of interpersonal networks are concerned. In contrast to the very small set of optics available to perceive egocentric networks, administrative causal models comprise a wide range of unique combinations of life sectors.

Although many decision programs draw upon a wide range of life sectors, they seldom share causal models totally. However, some overlap between life sectors could be found. The administrative system cannot be described as consisting of groups with the same implicit theories which are the result of belonging to the same administrative division. The system is instead a conglomerate of administrations having many individual points of view.

When administrative bookkeeping is considered in terms of the possibility of using it for sociological inquiry, the researcher is confronted with a high degree of heterogeneity in the variables represented, but also with a great opportunity of finding similar coding of primary environments in the administrative bookkeeping systems of different offices.

2.4. Representing Everyday Life by Asking for Pre-Processed Information

Because of the unique causal models within their decision programs, administrations are highly dependent on their environment for getting necessary information. Furthermore, administrative decision programs are nested in such a way that multiple client statuses must be taken into account. This leads to the necessity of linking administrative decision programs through direct communication or other forms of interorganizational linkages. But we expected that direct interorganizational exchange of information is not a sufficient way to meet the demand for information as well as for verification of information. Because of the uniqueness of the information needed, too many other organizations would have to be approached. On the other hand the risk of an unsuccessful query is high if organizations do not know all the client statuses individuals can occupy in a system of functionally specialized public administrations.

Therefore bureaucracies must ask their clients about these matters. Bureaucracies ask their clients mainly for information which has been processed in interactions between other bureaucracies and the population. The clients are not witnesses of their situation, but the organizations are. As was demonstrated in the analysis of the optics used for representing everyday life by administrative bookkeeping systems, the same reliance on pre-defined concepts can be expected as a characteristic of bureaucratic information processing²⁶. Facts that cannot easily be trans-

²⁶ See e. g. Zimmerman, Don H., *Record Keeping and the Intake Process in a Public Welfare Agency*, in: Wheeler, S. (ed.), *On Record: Files and Dossiers in American Life*, New York 1969, pp. 319-354.

formed into facts of bureaucracies, increase uncertainty regarding the environment. Within application forms many questions therefore ask for information in pre-processed categories.

Table 1:

	the public order administration	the social welfare administration	other organizations	any of these
percentage of application forms that ask for links to . . .	57 %	57 %	59 %	96 %

Total: 92

As shown in *Table 1*, almost all of the 92 application forms ask for relationships to other offices. But the figures given in *Table 1* are very conservative estimates of administrative cross-validation. The 92 application forms analysed require additional documentary evidence to be provided by clients through presentation of personal documents of one kind or another. Application for rental assistance, for example, requires submission of a maximum of 14 different kinds of documentary evidence. This enormous number of appendices is not typical of this application alone, but is also characteristic of almost all application forms in the sample. Operationalizing causal models of administrations is done by using the categories of other administrations. The collection of new information or the validation of information are often done by interchanging information among organizations utilizing the individual applicants as the carriers of personal documents. This procedure implies, of course, that the administration is dependent on the cooperation of its environment to carry out this coordinating task as well as on the ability of the applicants to effectively handle such a system of symbiotic relations between clients and public bureaucracies. Unique causal models in a system of interlocked decision programs, which are operationalized by asking clients about the public statuses conferred on them by other administrations, lead to a representation of everyday life that mainly mirrors pre-processed reality. The representation of everyday life very seldom transcends those areas of reality which are not already conceived of in administrative terms. Therefore this system can be regarded as being highly introverted.

3. The Selective Penetration of the Population Subsystem by Urban Bureaucracies

So far, our analyses have been comparative regarding the optics as well as the causal models used to represent everyday life in the bookkeeping systems of urban bureaucracies. We now wish to demonstrate the extent to which public bureaucracies represent everyday life selectively and to what extent the selectivities of various bureaucracies cannot be overcome by interlocking bookkeeping systems. We shall identify the „holes“ in the representation of everyday life within bookkeeping systems which lead to a partial blindness of the administrations when perceived as a system.

Application forms ask for those life sectors which are relevant to the administrative concern. To find out the holes within administrative bookkeeping — that is, those life sectors and egocentric networks that are blocked out by the administrative system — we again used the standardized application forms as data sources.

In *Figure 7* we have drawn the selective screens used in representing everyday life of a client during his life course. A sample of 15 administrative forms, which can be regarded as the set of forms almost everyone has to fill out during his life, were coded according to 15 life sectors. This figure shows the effects of the unique causal models which are implicit in administrative decision programs. Those life sectors which are not covered by administrative forms will be termed the holes in the administrative bookkeeping systems. But the selectivities inherent in the single administrative programs could well disappear when the cumulative effects of these representations over time are considered.

As shown in *Figure 8*, this is only partially true. *Figure 8* shows the representation of life sectors as well as of the most important legally defined egocentric networks over time. *Figure 8-A* depicts the representation of everyday life in the normal case, whereas *Figure 8-B* presents the results for an individual who applies for a variety of services within the social welfare administration, that is, for an individual who additionally applies for subsidy to occupational training, young people's welfare, unemployment compensation, public assistance, and rental assistance.

It is evident that the population subsystem is penetrated differentially, dependent on the need of individuals to rely on governmental services and that, as a consequence, representation of everyday life of people in lower strata or in bad economic situations is much more complete. But as only a small proportion of the population comes into contact with a wide range of administrative services, the representation of the normal cases shows the deficiencies of administrative bookkeeping much clearer. Administrative bookkeeping very often does not reflect the housing conditions or the economic and health conditions of those people who are members of the applicant's household. Administrations within urban bureaucracies are normally innocent of information about these life sectors or states of affairs of primary

environments. Due to their partial blindness, changes within these holes can hardly be recognized, although they may heavily influence the target variables of some administrations.

Figure 7

Attributes	Applications	notification of birth registration	school-health card	military registration	wedding notice	passport	issuing a social security number	health insurance registration	issuing a state wage tax card	application for reimbursement of taxes	driving license	car registration	subsidy to children	application for old-age pension	notification of death	
personal data																
family and household																
residence																
employment																
education/qualification																
economic situation: income																
economic situation: expenditures																
health																
memberships																
military																
special population groups																
links to the public order administration																
links to the social welfare administration																
links to other organizations																

Figure 8

	(A) Normal Client								(B) Multi-Problem Client							
	living in the household				living outside the household				living in the household				living outside the household			
	applicant	spouse	children > 18 years	children < 18 years	parents	children > 18 years	children < 18 years	parents	applicant	spouse	children > 18 years	children < 18 years	parents	children > 18 years	children < 18 years	parents
personal data																
family and household																
residence																
employment																
education/qualification																
economic situation: income																
economic situation: expenditures																
health																
memberships																
military																
special populations																
links to the public order administration																
links to the social welfare administration																
links to other organizations																

4. The Selective Use of the Network of Institutions for Administrative Bookkeeping

It was assumed that the selectivity found to be characteristic of information-gathering would also distinguish the use of the network of institutions for exchange of information, e. g. for the enrichment and reciprocal confirmation of information or files. It was possible to confirm this hypothesis by means of a survey of administrative clerks which we carried out in the Cologne area²⁷: primarily only that information is exchanged between administrative units which already played a role in the gathering of information from clients. There is little in the way of exchange for the sake of enrichment of information.

It follows that vulnerability to error in the bookkeeping of a network of institutions exists when the circle of parties who engage in interaction constitutes only a selective segment of the total number possible and when in the network of institutions there are sectors or zones of dense interaction which are characterized by a high degree of internal communication and low inter-sectoral communication. Given such structural constraints, errors which arise in the gathering of information by one unit can be passed on to the others; that is, these errors are not perceived, and thus are reproduced.

In order to check this preliminary hypothesis we carried out a secondary analysis of a study which included all written communication of 64 city administration offices in Nuremberg²⁸. In 1970 about 5000 employees of the Nuremberg city administration enumerated all their contacts with one another. This study was carried out by the organization office of Nuremberg with the objective of providing assistance in efforts to economize. In our secondary analysis, this study is consulted for the analysis of interorganizational information behavior. The communication matrix which resulted from the above mentioned study was analysed using multidimensional scaling. The flow of information structures the administrative offices into a network with sectoral differentiation.

²⁷ In the standardized survey within administrative units of the City of Cologne 96 clerks were interviewed for those administrative tasks which – similar to the selection of the 92 administrative tasks – are client-oriented and in which standardized forms are used. The survey was started in autumn 1976 and was finished in spring 1977. For the conception see: Bick, W., and Müller, P. J., *Die informationelle Abbildung der Klienten in formalen Organisationen – Konzeption für eine empirische Untersuchung*, mimeo, Köln 1976.

²⁸ The communication frequencies were collected in 1970 by the organization office of the City of Nuremberg: For a fortnight about 5000 administrative officers of the City of Nuremberg counted their communication distinguishing written, telephone, and face-to-face contacts in and outside of the department. See: *Kommunikationsanalyse 1970, Stadt Nürnberg – Organisationsamt, Untersuchungsbericht und Beilage 1: Tabellensammlung und Beilage 2: Graphische Darstellungen*, Dezember 1970.

Figure 9 presents the results of the Smallest Space Analysis²⁹. Sectoral differentiation was roughly sketched in: grouped around the Administration of Resources are the sectors labelled Building, Public Order, Social Welfare and Health, Schools and Culture. These sectors are not identical with the formal organization of the Nuremberg city administration, however. This is one indication that the principles of „integrative centrality“ and of „sector differentiation“³⁰ cannot be derived from the formal structure of city administration.

Multidimensional scaling confirmed the principles of „integrative centrality“ and „sector differentiation“. But the validity of these principles is limited by the fact that communication densities were defined only bilaterally, and the final configuration can be interpreted only globally in the sense of its „Gestalt“. The hypothesis of existence of zones of dense interactions which can be distinguished from one another according to principles of external isolation can be approached only by analysing the structure using network analysis. For this we used the concept of cliques and constructed fields of dense interactions³¹. Two domains of interacting offices on the community level could be identified: people processing and object processing organizations. People processing organizations are defined as those which classify, confer public statuses and dispose clients³². Object processing organizations are mainly concerned with handling buildings and land. Within these two domains administrations exchange information and often solve their problems in coordinated efforts. Both domains are sketched into *Figure 9*. It becomes evident that sectors do not correspond to domains of interacting offices. The people processing domain cross-cuts sector boundaries; the Schools and Culture sector does not build up a domain.

²⁹ The program MINICPA by Roskam was used (ISF = 1, METHOD = -1, i. e. hard squeeze 1, monotone regression). See Roskam, Edward E., *Nonmetric Data Analysis, General Methodology and Technique with Brief Descriptions of Mini-Programs*, Report 75-MA-13, University of Nijmegen, Department of Psychology.

This non-metric multidimensional scaling program works as follows: For each unit *i* the other units are placed in a space of lowest dimensionality so that those administrative units receiving most information from *i* (row solution) resp. sending most information to *j* (column solution) are close to unit *i*.

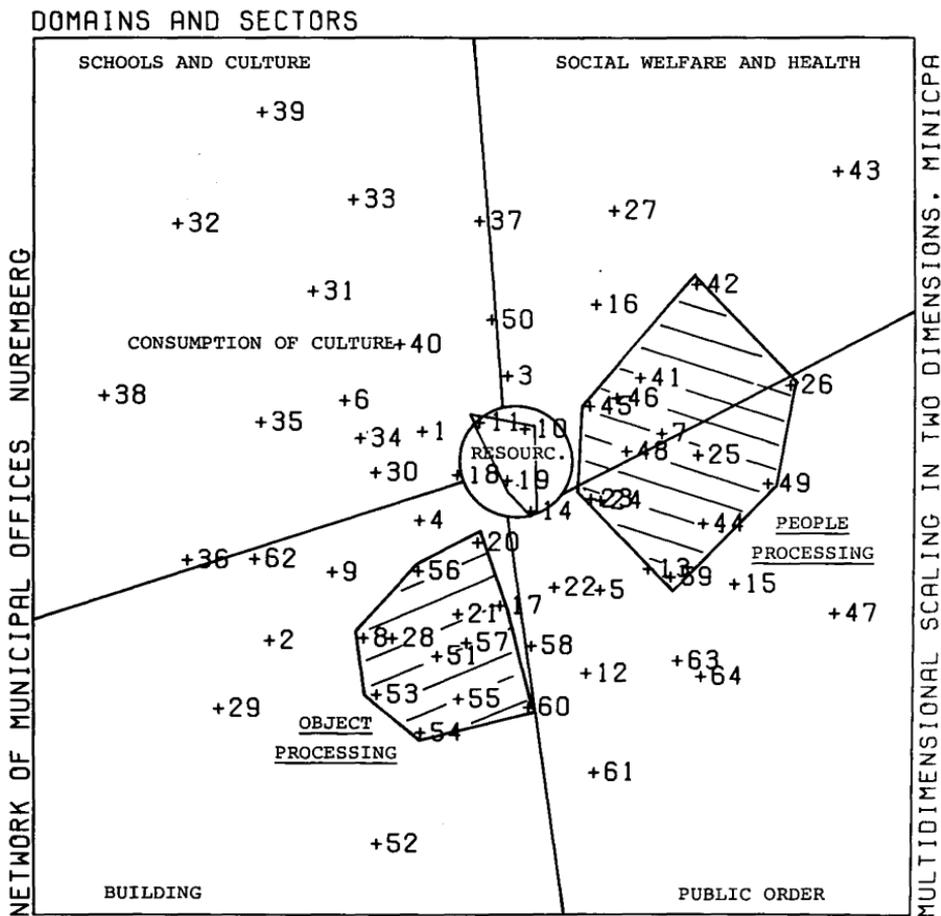
The solution given is based on a row solution. Its coefficient of alienation of 0.198 is acceptable taking into account the large number (64) of units. The column solution leads to a similar result.

³⁰ Laumann and Pappi obtain similar results when analysing the differentiation of a network of elites in a local community. See: Laumann, Edward O., and Pappi, Franz U., *Networks of Collective Action, A Perspective on Community Influence Systems*, New York 1976.

³¹ We applied the clique detecting program NCLIQUE. See: Felling, A. J. A., *A Graph-Theoretical Approach to the Structure of Local Elites*, in: *Zeitschrift für Soziologie*, Vol. 4, No. 4, pp. 221–233. For the procedure applied to construct the domains see: Bick, Wolfgang, and Müller, Paul J., *Stable Patterns within a Network of Urban Bureaucracies – Domains or Positions?*, paper presented at the 1978 American Sociological Association Meeting, San Francisco 1978.

³² See: Hasenfeld, Yeheskel, *People Processing Organizations: An Exchange Approach*, in: *American Sociological Review*, Vol. 37 (1972), pp. 256–263.

Figure 9

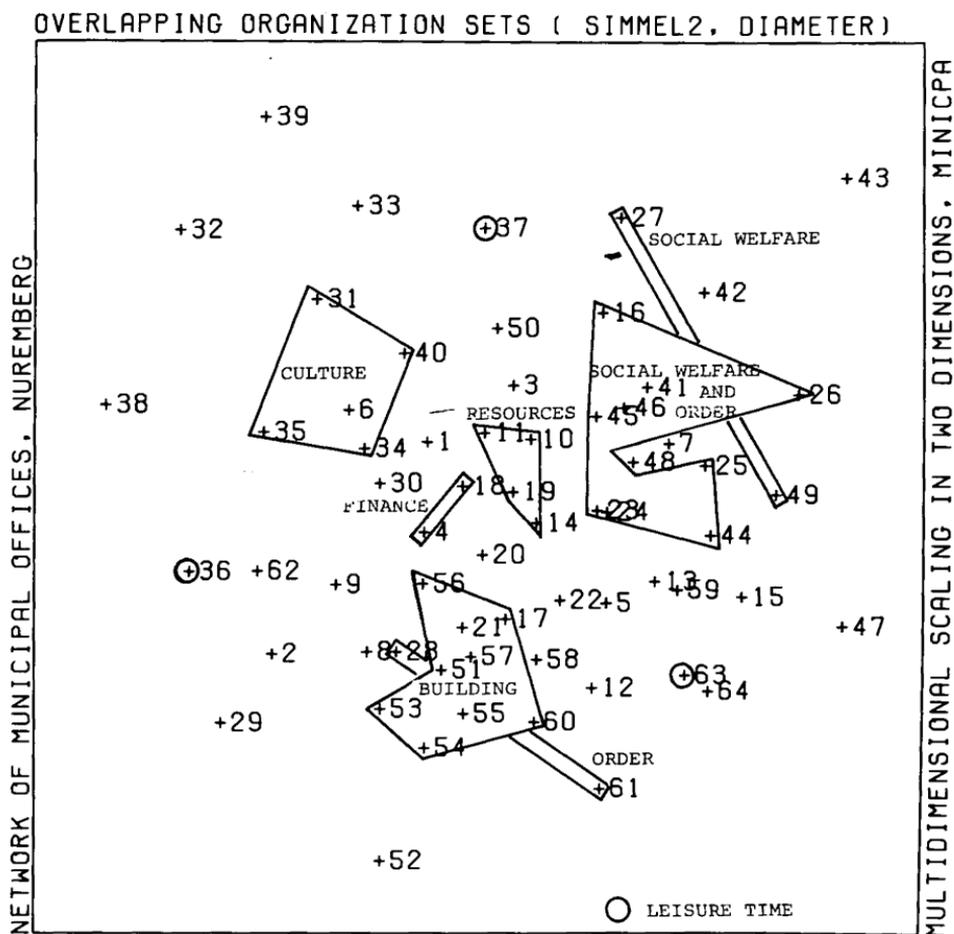


Stress $d_{hat} = 0.189$

See appendix 4 for the identification of the 64 offices.

Vulnerability of a network of information exchange not only depends on direct communication between offices. Offices may interact with similar sets of other offices without necessarily interacting with one another. The set of organizations approached by one organization is the organizational environment of an office. This environment determines the kind of information that can be acquired from other offices thus leading to structural constraints on learning of those aspects of reality that are processed within organizations not belonging to one's own organization set.

Figure 10



Therefore we established another operational concept of vulnerability, dispensing with the determination of zones of dense interactions. Proceeding from the „organization set“³³ – that is, the circle of organizational contacts of each individual office – we defined selectivity as the degree of intersection of any two organization sets, a concept analogous to Georg Simmel’s concept of the „intersection of social

³³ The conception of the „organization set“ was developed by Evan as an analogon to Merton’s role set. See: Evan, William M., *The Organization Set: Toward a Theory of Interorganizational Relations*, in: Thompson, J. D. (ed.), *Approaches to Organizational Design*, Pittsburgh 1966.

circles"³⁴. This approach made it possible for us to ascertain the cohesive groups of institutions with high degrees of overlapping interaction partners. To do so we used Johnson's hierarchical clustering procedure³⁵. The following groups could then be identified: Culture, Leisure Time, Social, Social/Order, Order, Building, Finance, Resources.

In *Figure 10* we have entered these groups into the two-dimensional solution of the Smallest Space Analysis which was presented in *Figure 9*. These local groupings constitute those groups of offices which are characterized by almost the same organization set. They have the same selectivity pattern in the use of institutions for the enrichment or confirmation of information within their systems of bookkeeping.

The vulnerability of the bookkeeping of the network of institutions on the community level can be traced to the fact that, on the one hand, administrative tasks are solved within limited sets of interacting offices, and that, on the other, elements of the networks are supported by the same „correspondents' network“. These factual information barriers set the limits to information which can be found in the files of the respective offices. The barriers constitute institutional limits to administrative bookkeeping. They exist as additional limitations, besides the informational limitations which could be seen through the analysis of the information-gathering behavior reported above. The possibilities of institutions exchanging information are not only limited in terms of selectivity in representing individual attributes or social contexts, but also in terms of selectivity in the use of the administrative environment³⁶.

³⁴ See: Simmel, Georg, *Soziologie. Untersuchungen über die Formen der Vergesellschaftung* (1908), 5th ed., Berlin 1968, pp. 305–344. For the calculation of the similarities the following formula was used:

$$P_{ij} = \frac{(\binom{n}{i} \cap \binom{n}{j}) - 1}{(\binom{n}{i} \cup \binom{n}{j}) - 1}$$

($\binom{n}{i}$ consists of all elements j with a path length of n or less between i and j). For our analyses we have used the subroutine SIMMEL 2 in SOCK ($n = 1$).

For the similarity measure see: Alba, Richard D., and Kadushin, Charles, *The Intersection of Social Circles, A New Measure of Social Proximity in Networks*, in: *Sociological Methods and Research*, 5 (1976), pp. 77–102.

³⁵ For the application of Johnson's hierarchical clustering procedure we have used the subprogram DIAMETER in SOCK. This procedure is similar to the complete linkage approach described in footnote 9.

The labels used again have no resemblance to the definitions of divisions within the city administration.

³⁶ Concerning the interdependence of informational and institutional constraints Jensen obtains similar results: „Most sender and receiver components in the administrative system are related to a certain division . . . with which it communicates in particular, but . . . this kind of specialization is not followed by a similar specialization with respect to the kind of information sent or received by these components“. (Jensen, Mogens Brabrand, *Informatics and the Cen-*

5. The Quality of Administrative Bookkeeping from the Point of View of Administrative Personnel

In the survey of administrative officers in Cologne, we wanted to know how the filing personnel themselves assessed the reliability of their records. In order to relate the answers obtained in this survey to the structural properties of the representations, we combined the interview data with the data from the analysis of the 92 administrative tasks³⁷.

This record-linkage made it possible to develop an external definition of the problems of representation which are faced by the different administrative tasks; that is, a definition independent of the subjective assessments of the clerks interviewed. For this purpose we calculated for each of the 92 administrative tasks, the absolute number of the attribute groups represented for nine categories of persons³⁸. These profiles – in the following termed „representation screens“ – indicate the intensities of administrative interest in information about the applicants and their primary environments. We analysed the resulting data matrix using Ward's procedure and by means of iterative relocation of the resulting clusters³⁹.

tralization Issue. A Danish Case, Institute of Public Administration, University of Copenhagen, Denmark, Report to the 16th Congress of the International Institute of Administrative Sciences, Mexico, July 1974, p. 77).

³⁷ Because of the differentiation of administrative tasks in intake and processing more than one interview was made for certain tasks. Those interviews with personnel that is exclusively concerned with client processing were not included in the following analyses. This leads to a reduction from 96 to 84 interviews. Furtheron for some administrative tasks we did not administer an interview. The assignment of screens of representation to individual interviews was done on the basis of all 92 administrative tasks.

³⁸ The following categories of persons were distinguished: client, spouse, children, parents, grandparents, grandchildren, siblings, other relatives, strangers.

³⁹ The Ward procedure first calculates the error sum of squares for a given partitioning:

$$E_K = \sum_{k=1}^{n_K} \sum_{i=1}^m (x_{ikK} - \bar{x}_{iK})^2$$

(n_K : number of elements of group K, m: number of attributes)

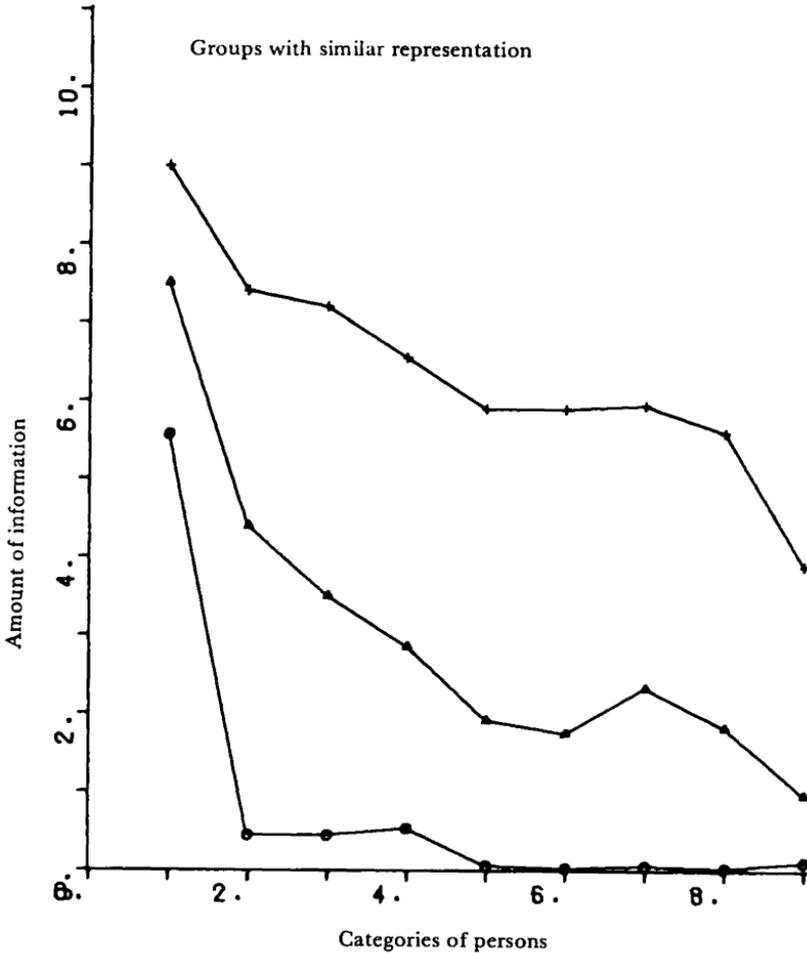
The procedure then proceeds to a fusion of the groups K and L which leads to the minimum increase of the total error sum of squares

$$\Delta E_{KUL} = E_{KUL} - E_K - E_L$$

This was computed by using subroutine HIERARCHY, coefficient 6. For improvement of the found clusters we used the iterative relocation procedure RELOCATE in CLUSTAN 1 C. In this procedure all elements of cluster X are assigned to a different cluster Y if the distance to the centroid of Y is less than the distance to the centroid of X.

The administrative tasks with similar representation screens were assigned to three classes. *Figure 11* illustrates the differing intensity, in regard to the representational range: Screen 1 with the least, Screen 2 with medium and Screen 3 with the greatest representational intensity.

Figure 11



- Screen 1: 36 administrative tasks
- ▲ Screen 2: 36 administrative tasks
- ✦ Screen 3: 20 administrative tasks

We have established various indicators for the assessments of representational quality by the filing personnel:

1. The clerk's assessment of the client's full exploitation of all self-portrayal possibilities (competence)⁴⁰ ;
2. The clerk's assessment of the extent of the client's difficulty in assigning himself to the categories prescribed by the administration (particularism)⁴¹ ;
3. Assessment of whether files compiled by other clerks are on their own sufficiently expressive to give a correct picture of a client not personally known to the file reader (file image)⁴² ;
4. The clerk's assessment of whether or not there is any possibility of checking the veracity of the data given by the client (helplessness)⁴³ .

In addition, two dimensions of administrative information behavior were measured:

1. The distrust of given information, expressed in the clerk's attempt to verify clearly plausible data⁴⁴ ;
2. The frequency with which the clerk calls attention to possibly relevant data which has not been given⁴⁵ .

⁴⁰ This indicator was measured by means of the following question: Now a question about the initial applications which you receive completely filled in by the applicant. Do you have the impression that the applicant has included everything which could be of use to him?

Yes: 61 % No: 18 % N/A: 19 % No answer: 2 %.

⁴¹ Have you noticed that the applicants call attention to facts which play no role in the processing of their application? We are referring especially to statements like „You have also helped my relatives“, or, for example, „I still have to pay for my car“ or something similar, which is included in the conversation.

Yes: 73 % No: 27 %.

⁴² Thinking back to situations in which you have processed files which were compiled by other clerks, are the applicant's circumstances always clear in such files? Can you always get a correct picture of the applicant or, do you most often prefer to refer back to the applicant? Please give your answer using the card. Which answer is most applicable to you?

File always provides sufficient information Yes: 39 % No: 61 %

File usually provides sufficient information Yes: 43 % No: 57 %

Usually refer back to applicant Yes: 16 % No: 84 %

Other Yes: 7 % No: 93 %

⁴³ In the application for . . . there are questions to which the citizen answers no, and thus needs not present any certification. If, for example, someone says that he is not receiving a service from an office, he won't present any certification from that particular office. What can you do in such cases: do you always have to believe the citizen, or are there also possibilities of verifying such answers elsewhere?

Believe: 37 % Verify elsewhere: 47 % Other: 16 %

⁴⁴ In the applications there is a lot of data which at first glance appears to be quite clear. Do you usually check once more whether or not erroneous data might have been given?

Yes: 45 % No: 55 %

⁴⁵ It is not always clear to the applicant just what all can be included in an application. In such

The more comprehensive the representation screen, the less adequate is the information provided by the file (screen/ file image, $\gamma = -0.40$)⁴⁶ – The more the clerks „ask“, the less they feel they „learn“.

The filing clerks thus feel that wide-mesh representation screens result in less reliable and adequate representations. This apparently paradoxical finding is resolved by considering that with increasingly comprehensive representations, the assumed competence of self-portrayal declines (screen/competence, $\gamma = -0.37$), and the difficulty of assignment to the administrative categories increases (screen/particularism, $\gamma = 0.46$).

These difficulties of assignment are one indication of tensions which occur in the representation of everyday life because of the selective screens of formal organizations. Correspondingly, the clerks feel less confident with wide-mesh representation screens than with other information-gathering screens. This phenomenon of „asking more but learning less“ will be referred to hereafter as „decreasing marginal use of additional information“.

However, the greater uncertainty involved in administrative tasks with wide-mesh representation screens parallels the assessment of decreasing helplessness in regard to ability to alter this situation (screen/helplessness, $\gamma = -0.43$): exactly those clerks who sort clients into relatively wide-mesh representation screens claim to have possibilities for verifying the validity of data at other administrative offices.

The different degrees to which clerks distrust the information given them by their clients do not vary with the representation screens ($\gamma = 0.04$); on the contrary, the assistance provided by the clerks increases proportionately to the complexity of representation ($\gamma = 0.49$), independent of the perceived competence of the client⁴⁷.

We hypothesized that one of the distinguishing features of formal organizations would be that formally complete applications are defined as unproblematic. A consequence of this labelling as „unproblematic“ would be that the clerks would not undertake any further verification of formally complete applications. Paradoxically, only an incompletely filled-in application or questionnaire would then stimulate the clerk to gather additional facts and in this way establish the possibility of a representation of the client which would tend to be more in keeping with actual facts.

cases do you often ask the applicant about certain circumstances which he has not included in his application, but which could be important in the processing of his case?

Yes: 58 % No: 27 % N/A: 15 %

⁴⁶ This definition of the intensity of representation combines both – the depth and range of representation. Besides this definition we have chosen other operationalizations which only included one of the two dimensions (number of compiled categories of persons, number of compiled attributes of the client, average number of compiled attributes for all categories of persons). All results presented remained stable for these variables dichotomized at the mean.

⁴⁷ In general there was a correlation between the willingness to help and the perceived competence: the lower the perceived competence the higher the willingness to help ($\phi = 0.37$).

And our survey did indeed discover that the clerks equate formal completeness with adequacy of representation: 77 % of all those interviewed have the impression that in the case of fully completed applications, the applicant has included all information of use to him.

However, the equation of formal completeness with adequacy of representation occurs more often in the medium- or fine-mesh representation screens ($\gamma = 0.37$). Thus, the uncertainties involved in wide-mesh representation screens, as stated above, must be supplemented. Besides the phenomenon of decreasing marginal use of additional information in wide-mesh representation screens, there is the problem that errors in formally complete data in fine-mesh representation screens are not detected.

If we look at the distribution of representation screens in the administrative domains we perceive the diversity of representational deficiencies with which these fields are confronted: the public order administration — executing classical state functions —, the health insurance and the majority of the tasks of the labor office use predominantly the finest-mesh representation screens, while the welfare administration — as a representative of modern welfare and welfare planning systems — uses the most comprehensive representation screens.

In its administrative bookkeeping, the former group is confronted with the representational deficiency resulting from the failure to detect errors, and the latter with the problem of the inadequacy of its representations. This same deficiency will plague the administration of new societal problems, because increasingly comprehensive screens are demanded for the representation of clients.

6. Public and Private Contingencies of Everyday Life

Causal models within administrative decision programs are specific to the focus of administrative concern although nested with other causal models through interconnections to other offices. The causal models can therefore be regarded as being unique but as having overlapping points of view. In contrast, the points of view individuals have towards their social situation should be described as a web of contingencies. They are diffuse as the contingencies are not focused on a specific point of view. Confronted with the questions asked by bureaucracies, people transform their contingencies into explanations. These explanations are to some extent dependent on the variable to be explained, which leads to a variety of different causal models. Being asked for working conditions, people might not mention their housing conditions, but instead talk about their health. Asked for the ability to move as a prerequisite to taking a new job, people might also think about their current housing situation, but not about their health conditions. As bureaucracies ask for different

information they activate the web of private contingencies and are then confronted with a whole set of different private causal models, showing the difference between bureaucratic and private contingencies.

In a survey of the clients of various local bureaucracies done in Cologne in 1978, we investigated the extent to which administrative causal models and private contingencies overlap. As reported in *Table 2*, the public assistance program is confronted with a high degree of non-overlap concerning the definition of what is and what should be regarded as relevant to determining appropriate actions. The percentages given indicate that administrative decision programs are differentially evaluated in regard to the degree to which the philosophies of administrations coincide with private contingencies.

Table 2

	Has everything been discussed which was of interest to you?		N
	% Yes	% No	
Public assistance	51	49	147
Rental assistance	77	23	135
Unemployment compensation	65	35	159
Medical rehabilitation	65	35	48

This result however does not indicate in which ways the differences in perceptions operate. Differences between private and public contingencies could emerge in two forms:

1. The categories used in the administrative decision programs are not the categories used in everyday life. Whereas the administrative categories are very specific and only legally defined, we expect the citizens to have a much broader understanding.
2. Questions asked by bureaucracies are often regarded as being too narrowly posed. They can therefore often not be adequately answered without an explanation. Questions asked by bureaucracies concerning a specific life sector are then answered by referring to private contingencies. These private contingencies may transcend those contingencies implied by the causal models of administrations.

In an observation study of the encounter between clients and bureaucracies done in 1978, we measured the differences between private and public models of everyday life contingencies. The answers given by the clients to questions concerning a life sector were coded according to the life sectors mentioned by the client. Answers of clients were coded if they encompassed much more information than required by the civil servant or even transcended the life sectors asked for. In this way we

measured the perceived necessity for clients to give individual explanations in their answers.

In *Figure 12* we have drawn the correlations of everyday life as evoked by asking questions concerning the three most important life sectors within the public assistance program: work conditions, income and expenditures. Based on a total number of 122 screening interviews observed, work conditions were asked for in 52 %, income and expenditures in 75 % and 57 % respectively. The answers to the questions are portrayed in the middle of the figure. In 20 % of all questions concerning employment the client did not share the administrative definition. The corresponding values for income and expenditures are 23 % and 19 %, thus indicating that administrative categories are often seen as too specific from the individual point of view.

Finally, we have drawn in those contingencies which — although lying in the range of administratively acceptable contingencies — describe what necessarily belongs together according to the private causal models. The clients cannot discriminate so well between the three life sectors, but this is dependent on the focus asked for. Employment is seen in connection with its income-generating function, whereas expenditures are seen in connection with income, therefore being a net concept. Income is perceived in connection with both other dimensions.

As the function of the screening interview is to determine the eligibility to become a client of an office, the results do not necessarily indicate the degree of concordance between bureaucratic and private definitions, but instead the different weights within sets of relevant dimensions as seen by bureaucracies and their publics. One should expect that administrations are confronted with a low degree of congruence between their definitions and the clients' definitions if they use very specific and selective definitions of life sectors which are much more diffusely and inclusively conceived of in everyday life. That is, the selectivity of administrative categories is not accepted by the client population.

To determine the amount of missing congruence between administrative categories and private connotations we have analysed the observed process of jointly filling out a standardized questionnaire within the offices of welfare and youth, the local labour office, the public housing administration, and the local health insurance. We measured the frequencies with which clients were not able to answer the questions as concisely as required by the application form. The results of our analyses are reported in *Table 3*. The percentages given indicate the extent to which the civil servants in various offices are confronted with different definitions held by individual applicants regarding administrative categories. The lower the percentages given, the more people agree with or accept the administrative definitions.

Income is the most controversial concept used within the offices analysed. The local labour office is not confronted with a major lack of congruence between administrative categories and private connotations concerning unemployment compensation, whereas the public housing administration uses only a few categories within the application for rental assistance which have different meanings for the client population.

Figure 12

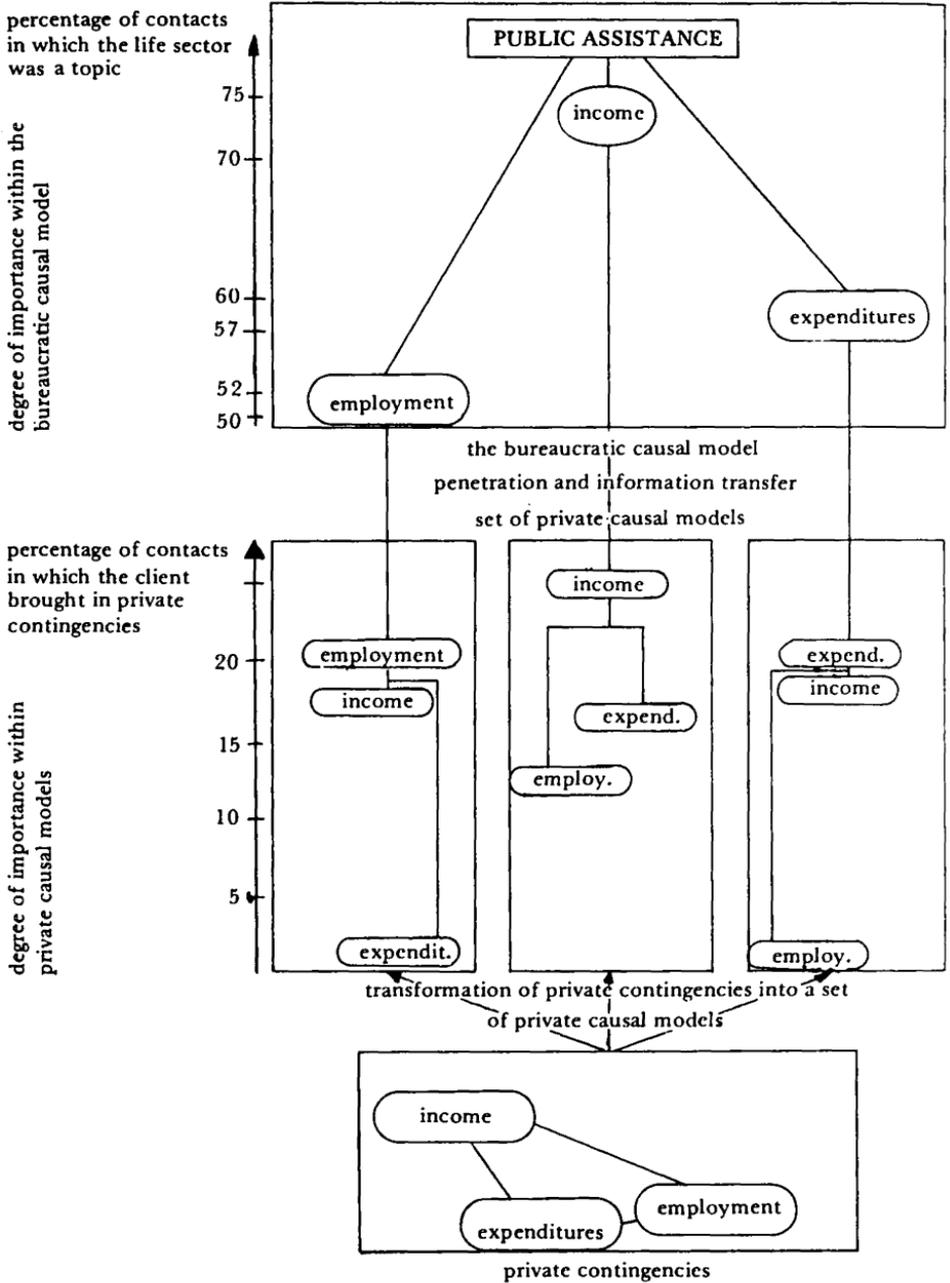


Table 3

	unemployment compensation	rental assistance	subsidy to educational training	medical rehabili- tation	low rental housing license	public assistance
education	—	—	38	—	—	—
employment	38	—	—	—	—	44
income	16	55	61	—	73	42
expenditures	—	36	—	—	—	42
health	—	—	—	63	—	—

— indicates that these life sectors were not asked for (less than 50 %).

The license for eligibility to live in low rental housing, the application for medical rehabilitation, and the application for a subsidy to educational training are all characterized by specific categories which have different meaning for the client populations.

The administrative definition of the concept of income is not shared by those applying for a low rental housing license, whereas the office granting a subsidy to educational training is additionally confronted with a problematic concept of education. Being asked for their health, clients refer to the cause as well as to consequences of their health condition. Health is mainly regarded as an intertemporal concept, which means that questions concerning health cannot be answered without explanations. In addition to that, there exists no common measurement scale to determine the degree of sickness. Therefore, local health insurance is confronted with a high degree of divergent perceptions of health within its client population.

In fact, administrations in varying degrees are confronted with divergent perspectives within their client populations. With the exception of the labour office the very specific categories used within public offices are not fully shared by the clients. This result can be seen as the consequence of bringing private connotations into the process of „skeletonizing“ people's problems.

However, the percentages given for the public assistance program indicate a seemingly paradoxical result. The office that has the broadest understanding of the concepts used is still heavily confronted with the problem of different connotations and definitions within all life sectors. This paradox can be explained as a consequence of the perception of the administrative „client model“ by clients. Clients offered an opportunity to express a wide variety of contingencies activate their own private causal models in the encounter situation and express their own connotations of administrative concepts. The less administrations are restrictive in their client models — that is, the more they are oriented to the whole biographical space of the client —, the more they are confronted with the complex web of contingencies operating in everyday life. Being still a bureaucratic organization interested in classifi-

cation of clients means that the office cannot accept all the contingencies it invites. Even if administrations are less selective, clients still disagree with the ways they are informationally processed. If administrations try to reduce the distance between private and public problem definitions by decreasing the selectivity of representation, the distance between bureaucratic models and everyday life is still apparent.

If administrations are frequently confronted with private contingencies and private connotations of administrative concepts, the classification of clients can only be done by a funnelling process. This process must translate the information given by individual applicants into administratively usable definitions. This translation may lead to a much better representation of everyday life within administrative bookkeeping when done within the encounter. In those cases, in which the „skeletonizing“ of individual contingencies into the reduced set of administrative categories is done by the clients themselves, administrations cannot even learn how biased their bookkeeping may be.

7. Potential Use of Process-Produced Administrative Data

We have demonstrated how the process of categorical reduction influences the perception of reality by the administrative system and the way in which bureaucracies attempt to put together their fragmented points of views. Functional specialization within urban bureaucracies, and the corresponding differentiation of causal models that are used to perceive the environment of organizations, lead to neglecting aspects of everyday life which are not regarded as being of administrative concern as well as certain interdependencies. Although urban bureaucracies form a network and exchange information about various aspects of their environment, the system of urban bureaucracies cannot internally identify its partial blindness or its misperceptions of contingencies operating in everyday life.

Up to this point we have described the structural deficiencies of administrative bookkeeping data. These conditions have not yet been investigated sufficiently to meet the need for social-scientific source criticism for a given data base. It would appear to be possible to meet such demands only within the framework of research projects which analyse concrete and specific data files.

On the other hand, the special advantages of process-produced data for sociological research⁴⁸ must be pointed out. Process-produced data have their own

⁴⁸ As to the problems of documentation, archiving, and access with the use of administrative bookkeeping data see: Müller, Paul J., *Administrative Bookkeeping as a Social Science Data Base*, paper delivered at the August 1976 IASSIST-meetings, mimeo.

merits. As they are reflections of the activities of formal organizations in a society they indicate influences on individual actors within society rather than the opinions of those actors.

The traces of everyday life which are provided by the bookkeeping of institutions are especially useful for the analysis of processes. The special nature of many administrative bookkeeping systems as records of change – not states but changes are reflected – corresponds to the analysis of life histories at their „turning points“. Other bookkeeping systems are distinguished by their almost continuous representation of clients. For that matter, the latter systems are suitable for the analysis of both, constancy and change in life histories.

Both of these approaches could be used as substitutes for attempts to collect data through individual recall of processes – like the passing of various positions in the life cycle – through such devices as individual interviews or diaries as used in time budget studies⁴⁹. Instead, both approaches would read the changes in the mirrors provided by the bookkeeping institutions. Independent of the methodological problems involved in the ascertainment of processes by means of interviews or self-observation, there is a distinguishing characteristic of the representation of interactions or interaction sequences by administrative bookkeeping systems. The client learns only of the direct contacts to bookkeeping authorities, and is often not aware of the cross-connections⁵⁰ with other institutions that result from communication within the network of institutions. Given this situation, the records of the administrative system concerning the persons represented become more important than the statements of the persons about their environments.

If we are interested in the ways in which individuals are tied into a social system characterized by record-keeping institutions, the representation of individual networks within the administrative bookkeeping becomes increasingly important both for contextual analyses, and for the analysis of processes over time, using individual networks as units of analysis. For many administrative tasks the representation of just the isolated individual is inadequate. It is precisely this point which makes it possible to fall back on representation of social networks – either directly or by combining several different data bases.

The combination of administrative data makes it possible to link observations to various points in time. It also gives rise to a linking of files with egocentric networks as units, or of persons who are represented as clients in various administrative bookkeeping systems.

⁴⁹ See: Szalai, Alexander (ed.), *The Use of Time, Daily Activities of Urban and Suburban Populations in Twelve Countries*, The Hague 1972.

⁵⁰ For the problem of informational autarky see: Müller, Paul J., *Informationsflüsse und Informationshaushalte*, in: Steinmüller, Wilhelm (ed.), *Informationsrecht und Informationspolitik*, München 1976, pp. 95–109, Jensen, Mogens B., *The Use of Data Banks in Public Administration – Organisational Consequences and Political Responsibility*, in: *The First International Oslo Symposium on Data Banks and Society*, Oslo 1972, pp. 27–48.

In both of these procedures, the evolving data bases can take the form of „complex data files“. This creates data management and analyses problems which cannot be solved within the data analyses packages which up to now have concentrated on rectangular $n \times m$ matrices.

From previous applications of process-produced data, it is obvious that there has been hardly any attempt to deal with the kind of research questions which we have described. Instead, there has been a preoccupation with analyses of process-produced data which proceeded as if the data had been gathered by isolated surveys, and not by a system of interlocking bookkeeping⁵¹. Characteristic of this orientation is the dominance of studies of selected attributes of the clientele of one or more organizations, for example the „social structure“ or social situation of the clients of welfare organizations. But such analyses of process-produced data are more seriously confronted with the problem of administratively preconceived reality in such representations than approaches which perceive administrative bookkeeping data as indications of ongoing processes. Previous analyses of process-produced data usually treated them in terms of the administrative purposes for which they were collected and rarely reinterpreted them as indicators of other events and processes. Basically however, nothing stands in the way of such an analysis of process-produced data. The prerequisite however, is further development of a new, social-scientific source criticism, which can adequately evaluate process-produced data in terms of the context in which they were originally collected.

⁵¹ See: Bick, Wolfgang, Müller, Paul J. and Reinke, Herbert, QUANTUM Dokumentation 1978, Historische Sozialforschung, Historical Social Research, HSF, Vol. 5, Stuttgart 1978, p. XXIV, Bick Wolfgang, et al., Quantitative History in Transition, in: Social Science Information Vol. 16 (6), pp. 697–714.

Appendix 1: Administrative Tasks

1	Einbürgerung	34	Eingliederungshilfe f. junge Zuwanderer
2	Namensänderung	35	einmalige Beihilfe aus dem Härte- fonds des Landes
3	Staatsangehörigkeitsfeststellung	36	Sozialhilfe
4	Aufenthaltsurlaubnis	37	Leistungen nach Unterhalts- sicherungsgesetz
5	Anmeldung d. Wohnsitzes	38	Armenrecht
6	Einzelhandelserlaubnis	39	Pflegehilfe als offene Sozial- hilfe
7	Versichertenrente	40	Reisenkostenbeihilfe für DDR- Besucher
8	Reisegewerbekarte	41	Beihilfe aus Anlaß von DDR- Besuch
9	Reisepaß	42	Hilfe für Sehschwache
10	Fahrerlaubnis	43	Winterfeuerungs-/Weihnachtsbeihilfe
11	Kfz-Zulassung	44	Zusatzreisen f. Besucher aus DDR
12	Bußgeldbescheid	45	Ausweis f. Vertriebene u. Flüchtlinge
13	Leichenpaß	46	Leistungen nach Häftlingshilfe- gesetz
14	Erlaubnis Gaststättengewerbe	47	Erholungsmaßnahme f. Kriegs- opfer
15	Erwerb d. dt. Staatsangehörigkeit	48	Minderung der Erwerbsfähigkeit
16	Ausstellung e. Lohnsteuerkarte	49	Aufwendungsdarlehen
17	Anzeige über den Beginn eines Gewerbes	50	öffentl. Mittel f. Bau von Miet- wohnungen
18	Personalausweis	51	öffentl. Mittel für Bau von Eigen- heim
19	Unfallversicherung	52	Wohngeld: Lastenzuschuß
20	Wehrerfassung	53	Wohngeld: Mietzuschuß
21	Geburtsanzeige	54	Wohnungsvermittlung
22	Todesanzeige	55	Ausbildungsförderung
23	Aufgebot	56	Kranken-/vorbeugende Gesund- heitshilfe für Kinder
24	Bauantrag	57	Adoptionseinwilligung der Eltern
25	Kriegsopferfürsorge (erg. Hilfe z. Lebensunterhalt)	58	freiwillige Erziehungshilfe
26	Tbc-Hilfe	59	Erziehungshilfe – Heimunter- bringung
27	Übernahme von Krankenhaus- kosten		
28	Blindengeld		
29	Erholungs-/Badekur		
30	Kriegsopferfürsorge (einmalige Leistung)		
31	Erziehungsbeihilfe nach BVG		
32	Wohngeldarlehen für Behinderte		
33	Übernahme von Rückführungs- kosten f. Deutsche		

60	Amtspflegschaft. -vormundschaft		Schwerbeschädigte
61	Übernahme des Kindergartenbeitrags	78	Krankenschein für Verfolgte
62	Mahlzeitendienst f. alte Bürger	79	Kindergeld
63	Adoption eines Pflegekindes	80	Arbeitslosenhilfe
64	Pflegegeldzahlungen	81	Arbeitslosengeld
65	Aufnahme eines Pflegekindes	82	Fortbildung/Umschulung — Unterhaltsgeld
66	Schulgesundheitskarte	83	Konkursausfallgeld
67	Untersuchungs-, Fürsorgebogen Tbc-Hilfe	84	Berufsausbildungsbeihilfe
68	Anmeldung AOK	85	Arbeitsberatung/ -vermittlung
69	Medizinische Leistungen/ Rehabilitation	86	Förderung d. Arbeitsaufnahme: Reisekosten, Umzug
70	Schadensbericht	87	Berufliche Rehabilitation
71	freiwilliger Beitritt AOK	88	Förderung d. Arbeitsaufnahme: Überbrückungsbeihilfe
72	Prüfung des Versicherungspflicht	89	Förd. d. Arbaufn.: Arbeitsaus- rüstung
73	Fragebogen d. Vollstreckungs- behörde AOK	90	Förd. d. Arbaufn.: Bewerbungs- kosten
74	Krankengeld	91	Jobvermittlung
75	Haushaltshilfe	92	Lohnsteuerjahresausgleich
76	Kassenkur		
77	Bundesbehandlungsschein f.		

Appendix 2: Personal Characteristics/Attributes

I Personal data

- 1 name
- 2 address
- 3 place of birth
- 4 date of birth
- 5 nationality
- 6 sex
- 7 telephone
- 8 distinguishing marks
- 9 other names, change of names
- 10 marital status
- 11 residential history
- 12 dates of marriages
- 13 dates of deaths

- II Family and household*
- 14 relatives: in general
 - 15 obligation to support
 - 16 relatives within household/flat/dwelling
 - 17 child status
- III Residence*
- 18 size of flat/dwelling, number of rooms
 - 19 equipment/state of flat/dwelling
 - 20 kind of utilization of flat
 - 21 landlord, hirer
 - 22 subsidized/non subsidized flat/dwelling
- IV Employment*
- 23 practiced occupation (current or last)
 - 24 occupational status
 - 25 employer (current or last)
 - 26 employments: dates
 - 27 employments: other
 - 28 additional occupation
 - 29 occupational history
 - 30 end of employment
 - 31 periods of unemployment
 - 32 periods of being unfit for work
- V Education/qualifications*
- 33 education
 - 34 professional training
 - 35 other qualifications
- VI Economic situation: income*
- 36 income from self-employment
 - 37 income from employment
 - 38 income from subsistence payments
 - 39 annuity, pension
 - 40 income from subletting
 - 41 other income
 - 42 income (global)
 - 43 property/unearned income
 - 44 estimated constancy of income
- VII Economic situation: expenditures*
- 45 business expenditures
 - 46 personal allowances

- 47 deductions for exceptional circumstances
- 48 flat/dwelling, real estate
- 49 debts, mortgages, loan, outstanding taxes
- 50 expenditures (global)

VIII Health

- 51 health data
- 52 medical history
- 53 links to hospital/doctor

IX Memberships

- 54 religion
- 55 voluntary associations

X Military

- 56 military

XI Special population groups

- 57 social problems: limited characteristics
- 58 social problems: economic aspects
- 59 social problems: social aspects
- 60 exiles, evacuees, refugees, „Lastenausgleich“, etc.
- 61 orphan/widow(er) of war, disabled/missed persons, „Spätheimkehrer“, etc.
- 62 physically disabled persons
- 63 tuberculosis
- 64 others: foreigners, political persecutees

XII Links to the public order administration

- 65 office for public order, register office
- 66 court of justice, bankruptcy, criminal procedure
- 67 divorce
- 68 guardianship
- 69 labour court

XIII Links to the social welfare administration

- 70 office for welfare/for the youth
- 71 labour office
- 72 social insurance for old-aged, survivors, etc.
- 73 social insurance for disabled, handicapped persons, etc.
- 74 juvenile detention centre, house for the aged, etc.

XIV Links to other organizations

- 75 building administration
- 76 revenue office

- 77 health insurance
- 78 banks/saving banks
- 79 global

XV Other information

- 80 data on motor vehicles
- 81 references, witnesses
- 82 wishes, intentions
- 83 arguments for private decisions
- 84 arguments for applying
- 85 opinions of other offices

Appendix 3: Categories of Persons

- | | |
|--------------------------------------|---|
| 1 applicant | 15 children under 18 years |
| <i>persons within the household</i> | 16 children above 18 years |
| 2 spouse | 17 stepchildren under 18 years |
| 3 children under 18 years | 18 stepchildren above 18 years |
| 4 children above 18 years | 19 parents |
| 5 stepchildren under 18 years | 20 stepparents |
| 6 stepchildren above 18 years | 21 grandparents |
| 7 parents | 22 grandchild |
| 8 stepparents | 23 brothers and sisters |
| 9 grandparents | 24 other relatives |
| 10 grandchild | 25 other persons |
| 11 brothers and sisters | <i>special categories of persons</i> |
| 12 other relatives | 26 children above 18 still in education |
| 13 non-relatives | 27 foster child |
| <i>persons outside the household</i> | 28 proxy |
| 14 spouse | 29 foster-parents, guardian |

Appendix 4: List of Municipal Authorities in the City of Nuremberg, 1970

- 1 Office of the first mayor (political head of the city government)
- 2 Office of the second mayor (deputy and administrative head of city government)

Divisions

- 3 Division of Administration
- 4 Division of Finance
- 5 Division of Public Order
- 6 Division of Schools and Culture
- 7 Division of Social Welfare and Health
- 8 Building Division
- 9 Division of Public Utilities, Transportation and Industrial Development

Offices

- 10 General administration office
- 11 Procurement office
- 12 Organization office
- 13 Office for central data processing
- 14 Personnel office
- 15 Disciplinary rules office
- 16 Office for urban research and statistics
- 17 Auditing office
- 18 Office for the budget
- 19 Treasurer's office
- 20 Tax office
- 21 Office for landed property
- 22 Office for legal affairs
- 23 City police
- 24 Office for public order
- 25 Registration office
- 26 Register office
- 27 Office for social security
- 28 Fire department
- 29 Office for civil defense
- 30 School board
- 31 Office of public culture
- 32 Art gallery
- 33 City archive
- 34 Central library
- 35 Theatre

- 36 Zoo
- 37 Public libraries
- 38 Education center
- 39 Museum
- 40 Schools
- 41 Welfare office
- 42 Dependency benefits office
- 43 Nursing office
- 44 Care for the elderly office
- 45 Office for the youth
- 46 Health office
- 47 Office for chemical analyses
- 48 Office for hospitals
- 49 Office for compensation (refugees, victims)
- 50 Office for sport
- 51 Board of works
- 52 Office for commissioning of public works
- 53 Office for urban planning
- 54 Surveying and mapping
- 55 Building laws
- 56 Office for surface building
- 57 Office for underground building
- 58 Office for public parks
- 59 Office for housing and settlement
- 60 Sanitation department (street cleaning, sewage disposal etc.)
- 61 Office for veterinary services
- 62 Office for market regulations
- 63 Office for public baths
- 64 Office for funerals