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ABSTRACT

This paper represents the initial stage of a project established to describe and understand the rationale and processes of certain educational systems in Israel and other countries, and to spread the acquired knowledge as a useful practical contribution. The problem in the study is to understand the conditions prevailing and the methods to be used in attempting to raise the educational level of those countries. The project faced certain obstacles, firstly, in its theoretical basis, since the general topic of comparative education has not yet acquired a full conceptual and methodological outline, and secondly, in implementation, since the governments of the countries surveyed are the potentially interested parties. Particular attention must therefore be paid to the political dimension of the research and advisory activities. The purpose of this initial stage has been to answer two preliminary questions: (1) What are the criteria which will enable one to locate the countries with the highest rate of success in education? and (2) which are the four countries having the highest educational level to be subsequently investigated. The paper discusses comparative education including definitions and objectives of comparative education and methods and problems in the area. The survey process is described including a multi-dimensional approach, monotonous correlations, geometric data analysis, and multi-dimensional structural analysis. The study found that there is no country with a very low educational level that also has a high economic standard. A 6-page bibliography is included. A section of tables and documents presents the overall details of the similarity analysis and of the educational partial orders. (DK)

JERUSALEM CENTER FOR PUBLIC AFFAIRS / THE FOUNDATIONS OF THE MILKEN FAMILIES

INSTITUTE FOR THE STUDY OF EDUCATIONAL SYSTEMS

EDUCATION AND SOCIO-ECONOMIC ACHIEVEMENTS

TOWARDS AN INTERNATIONAL SURVEY OF EDUCATIONAL SYSTEMS

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Jerusalem

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SUMMARY

INTRODUCTION

The recently established Institute for the Study of Educational Systems, dedicated to the promotion of education as central to the advancement of human life, will set itself two major goals:

a) To describe and understand the rationale and processes of certain educational systems in Israel and other countries.

b) To spead the acquired knowledge as a useful practical contribution.

This project will, then, confront one of the most critical and complex fields of education today.

As Aldo Visalberghi has said: "The international competition among developed countries, moving from the military to the economic field, requires higher and higher general education levels for most people".[1]

The problem is obviously to understand the conditions prevailing and the methods to be used in attempting to raise the educational level of those countries.

However, the project faces certain obstacles, firstly, in its theoretical basis, since the general topic of comparative education has clearly not yet acquired a full conceptual and methodological outline,[2] and secondly, in implementation, since the governments of the countries surveyed are the potentially interested parties. Particular attention must therefore be paid to the political dimension of the research and advisory activities. Indeed, as suggested by J. Oakes, "In the end, interpretations of what indicators mean and decisions about what policies should be implemented will be influenced by values as well as by knowledge. Indicators cannot remove process from the reflection and debate among policy-makers and the public ultimately is responsible for its healthy functioning".[3]

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1 - "Support and Venue of the Bologna Conference", in "Indicators of the Quality of Educational Systems an International Perspective", in *International Journal of Educational Research*, Vol. 14, 1990, p 323.

2 - As Prof. Chaim Adler immediatly pointed out. It should be noted that many scholars agree with him.

3 - in *Educational Indicators: A Guide for Policymakers*. Santa Monica, CA: The Rand Corporation, for the Centre for Policy Research in Education, 1986, p 23. On the characteristics and general problematics of the research as a possible guide for social action, see the excellent study by James S. Coleman, *Policy Research in Social Sciences*, Morristown, N.J., General Learning Press, 1972. Written about twenty years ago, this document remains an essential text for every social scientist who aspires to have some influence upon policy in his field of research.

The project will require a long, sustained effort continuing over a period of several years as well as the joint involvement of numerous experts: national experts, sociologists, educators, economists, politicians, and so on.

The purpose of this initial stage has been to answer two preliminary questions:

What are the criteria which will enable us to locate the countries with the highest rate of success in education?

Which are the four countries having the highest educational level to be subsequently investigated?

Although short in its timeframe, covering only a few weeks of work, this stage seemed extremely important to us since it has enabled us to draw up a preliminary, fairly precise outline of the State of the Art. Moreover, we were also able to consider using new methodological tools now that multi-dimensional analysis has been made possible by the methods of Louis Guttman and his disciples in Jerusalem. These tools are methodological novelties since this is, perhaps, the first time that the need for a multi-dimensional analysis has been recognized and systematically applied.

ACKNOWLEDGMENTS

Professor Daniel Elazar and Mr Zvi Marom of the Institute for the Study of Educational Systems, a joint venture of the Jerusalem Center for Public Affairs and the Foundations of the Milken Families, have been kind enough to entrust us with this complex yet preliminary task. May the following pages be accepted as a token of our appreciation.

Dr. Mordekhai Bar-On, of the Ben-Gurion Research Center, Sde Boker, has given many hours of his time to reflect with us on the problems involved and on their implications.

Dr. Shlomit Levy, of the Guttman Institute for Applied Social Research, Jerusalem, has read our first analytical results, and has offered us constructive criticism on them.

Professor Chaim Adler from the NCJW Research Institute for Innovation in Education, the Hebrew University of Jerusalem, has pointed out some problems inherent in comparative education.

Eynath Cohen, having read this pilot survey and subjected it to meticulous study, provided constructive criticism of its various stages.

Reuven Amar, from the Calculation Center of the Hebrew University of Jerusalem, has again agreed to join forces with me on this study.

Susan Brettshneider helped me to edit the Report in English.

Chaya Herskovic, Project Coordinator at the Institute for the Study of Educational Systems, provided us with technical assistance in preparing this Report.

Last but not least, let me mention the moral support and the technical assistance proffered by the librarians of the School of Education and the Department of Social Sciences at the Hebrew University of Jerusalem, as well as the Sciences Education Division at the Weizman Institute.

The data analysis was conducted at the Calculation Center of the Hebrew University of Jerusalem.

1. COMPARATIVE EDUCATION: PROBLEMATICS

The above two questions are part of the area of so-called "comparative education". This specific area of education, nearly as old as the study of societies, has mainly developed within the last 100 years. In fact, this development is intrinsically linked to the establishment of national school systems throughout the world and to their desire to learn from each other's experiences. Indeed, towards the end of the 19th century, "the comparative education was closely connected with borrowing, transplanting and reform", as suggested correctly by W. Brickman.[4]

Within the framework of this preliminary survey, it seems useful to review certain crucial points of reference in the field.

1.1. DEFINITION AND OBJECTIVES OF COMPARATIVE EDUCATION

"Strictly speaking, to 'compare' means to examine two or more entities by putting them side by side and looking for similarities and differences between and among them. In the field of education, this can apply both to comparisons between and comparisons within systems of education."[5] However, one encounters various characteristics of comparative education when trying to define its different objectives. Postlethwaite describes the four principal objectives:

> a. "Identifying what is happening elsewhere that might help improve our own system of education;
>
> b. Describing similarities and differences in educational phenomena between systems of education and interpreting why these exist;
>
> c. Estimating the relative effects of variables (thought to be determinant) on outcomes (both within and between systems of education);
>
> d. Identifying general principles concerning educational effects."[6]

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[4] - "History of Comparative Education", in The *Encyclopedia of Comparative Education and National Systems of Education*, Edited by T. Neville Postlethwaite, Pergamon Press, p 6.

[5] - *The Encyclopedia of Comparative Education and National Systems of Education*, *op.cit.*, Preface, p XVII.

[6] - *id.*, *op.cit.*, pp XIX-XX.

1.2. METHODS & PROBLEMS: TOWARDS A STATE OF THE ART

It is interesting to note that over the last few years, a number of journals and encyclopedic publications have attempted an analysis of the characteristics of this specific area of the Social Sciences.

Early examples are the special issues of *Comparative Education*, 13 (2), pp 75-105, and the *Comparative Education Review*, 21 (23), pp 151-416, both published in 1977, which aim at a description of the state of the art.

We would also like to refer to the *Encyclopedia of Comparative Education and National Systems of Education*, which includes a reasoned introduction to the problematics of comparative education written by international experts in the field, pp 1- 75.

Finally, let us mention three special issues : *Studies in Educational Evaluation*, 14, 1988, dealing with the question of "Quality of Education Indicators"; and volume 14, pp 321-408, 1990, on the same topic: "Indicators of the Quality of Educational Systems: an International Perspective"; the *International Journal of Educational Research*, volume 13, pp 221-340, on "Meta-Analysis in Education".

These six documents provide us with an essential portion of the problems and development of Comparative Education.

2. THE SURVEY PROCESS

It is a great challenge to set out to measure the success of educational systems, and the following should be regarded as a preliminary attempt. We should therefore recommend convening an international panel of experts in the field, for an-depth, comprehensive debate on the matter.

The determination of the characteristics of a successful educational system in 1991-92 to an extent also involves a determination of the principles and objectives of a successful system in the 21st century. Obviously, at present, this can only be partially undertaken. Nevertheless, we would like to present a number of points of reference which will, of course, have to be developed and studied further.

In order to give concrete answers to the two questions presented earlier, we proceeded by the following stages:

a) We first screened a large number of international statistical yearbooks in order to discover the relevant indicators[7], and based on these, to create an adapted data file for this survey. From the start we chose to concentrate only on international indicators, namely those that clearly depict the situation in a large number of countries. Thus surveys and indicators relating to only about ten countries were not considered for this preliminary survey. This does not mean, however, that they will not be included at a later stage when the survey will have reached its "cruising speed".

b) Some criteria seem absolutely crucial for a complete understanding of the "broad educational process". Let us clarify this with the help of some basic examples. According to Daniel Elazar, every educational system has to deal with four basic sets of demands or tasks: civilizational, social, parental and individual.[8] This approach will theoretically permit us to uncover typologies of educational systems. Correlated with economic success, these typologies may even enable

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7 - Many definitions of the notion of indicator are known. We will indicate one of them as an example: "Indicators are expected to reflect the condition of the system as a whole, or of some significant part or element of the system. (...) They provide an 'at a glance' profile of current conditions." Desmond L. Nuttall, "The functions and limitations of international educational indicators", *International Journal of Educational Research*, Vol 14, 1990, p 328.

8 - "The first task of any educational system is to transmit the heritage of the civilization it serves. (...) The social dimension of education has to do with the perpetuation of the civil society. It involves education for good citizenship, education to develop productive workers for the society with up-to-date skills, and education for social control. (...) The third dimension is the parental demands and expectations for their children...to be able to make a living, to perpetuate their way of life, to help their children in the pursuit of happiness. (...) Finally, there is the individual dimension, what the individual students expect from the educational system. Students seek happiness, self-expression, and education for adjusment or the ability to fit in." Elazar Daniel J., "Israel's Education System: an Introduction to a Study Program", The Jerusalem Center for Public Affairs, 1991.

countries to improve their educational policy as well as their economic development. Here we focus on formal education and socio-economic achievements on the assumption that there is a positive correlation between the two.[9]

These indicators and a great many others are of prime importance. It is impossible to fully understand the complexity of the national education system of various countries without:

- revealing what are the "ideological" approaches of the various decision-making factors in the country (government, educators, parents and children) in terms of politics, culture, religion, technology and economy?

- discovering what type of learning material is being taught and what are the declared and hidden curricula?

- having basic and thorough information about its real functioning, about the way in which the educational system is perceived, internalised and experienced by the various social agents, and about the policies of professional, intellectual, technical and moral training.

Many major questions of the educational systems do not appear in the statistical tables of the international organizations such as the United Nations, the World Bank or the OECD,[10] and where they do appear it is always in a very indirect manner. The reader interested in treatment of the past and the future, that is, the importance attributed to tradition, will not be able to find any conclusive and systematic information on the subject[11]. The same is the case regarding philosophical and strategic guidelines for methods of dealing with relations between the elite and the masses.

Sometimes it is not quantity of information but accuracy that is lacking. Most international surveys use the state or the country as a whole as a unit of measurement and do not carry out research on individual regions or constituent

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9 - For more details, see below, p 14 .

10 - It should be observed that the main objective set by the CERI is to supply the OECD's members with the following working tools, as indicated by Noberto Botttani:
- "In the short term, the main aim is to prepare, analyse and interpret some twenty indicators considered to be fundamental in the member countries on the basis of statistical material furnished by the various national authorities and to test the possibility of comparing them at the international level;
- in the medium term, the intention is to examine the methods and the strategies used to develop and apply educational indicators capable of guiding education policymaking and the management of educational management;
- the long-term aim is to contribute to improving the evaluation methods and programmes by putting forward indicators which are at once more reliable, less open to question and general in scope", in "The Background of the CERI/OECD Project on International Educational Indicators", *International Journal of Educational Research*, Vol 14, 1990, p 341.

11 - The operational translation of which is linked to the transmission / creativity issue.

states of the countries[12]. Italy, industrialised in the north and rural in the south, is an illustration of this, for the overall statistical findings may hide a more complex reality.

Moreover, even when the indicator seems to be valid like the Science Test scores of 14-year-olds, 1970-1971, which predicted "economic growth a decade later",[13] they are only rarely implemented.

Unfortunately, one has to obey the reality principle: most indicators exist today only at a wishful-thinking, intuitive stage. Indeed, up to the present day there is no empirical, international survey (statistical or qualitative) based on these criteria.

This is of utmost importance since it is known that some seemingly valid indicators do not lead to a fulfillment of the researchers' expectations. For example, there exists a negative correlation between the normalised number of the Nobel prizes and five out of the eight indicators used in the survey publicised by *Economist* in 1983[14].

c) A data file, adapted to the needs of this present study and based on basic existing international data, has been constructed. Within the framework of a preliminary survey covering a short period of time, it is only possible to base arguments on existing data while trying to utilize them to their fullest extent.[15]

1. Firstly, educational criteria at their most literal were used. For example, the adolescent school enrollement ratio or the rate of illiteracy within the population.

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12 - We say "most of them" and avoid saying "all of them", due to a methodological concern.

13 - Herbert J. Walberg, "Science, Mathematics, and National Welfare: Retrospective and Prospective Achievements", *International Journal of Educational Research*, vol 14, 1990, p 347. In contrast to this general point of view, it may be worthwhile to mention the much more pessimistic analysis of the South-African social scientist Bernard Steinberg: "Recent research studies and evaluations of the problems of education in plural societies have been strongly influenced by power and conflict theories....The hitherto widespread faith in universal education and in compensatory policies as the means of minimizing social inequalities and divisiveness within modern nation states has been subjected to much analytical criticism. Similarly, the idealistic perception of universal state schooling as the most just avenue of upward social mobility, as well as the ladder to higher status and privilege through personal achievement, as opposed to ascription, has been strongly challenged. The widely prevalent view since the 1970s has been that the actual provision of educational amenities does not necessarily by itself alter the existing correlations between social class, educational attainment, and subsequent status; and that educational systems may be the means (intentional or otherwise) of preserving the status quo, through which the privileged sector of society retains its advantages in such a way to manipulate any social change in its own favour.", in "Education and Integration in Israel: the First Twenty Years", *The Jewish Journal of Sociology*, XXX, 1, June 1988, 17-36, p 31. This analysis is quite similar to that developed by the French sociologist of education, Raymond Boudon, *Education, Opportunity, and Social Inequality*, New-York, 1974.

14 - "Nations by Numbers". *Economist*, December 24, 1983, 289, 7321, pp 53-59. Quoted by Herbert J. Walberg, "Science, Mathematics and National Welfare : Retrospective and Prospective Achievements", *International Journal of Educational Research*, Vol 14, 1990, p 346.

15 - These data may somehow be related to some of the indicators noted above. Most of them belong to the social demands described by Elazar. Almost none are linked to the civilizational or the individual sets of demands.

2. More general cultural criteria have also been used, such as the number of books published (normalised per capita for each country), or the number of scientists and engineers.

3. But in order to specify further the level of well-being in the different countries, one has also to take even more general criteria into consideration, such as those linked to the general state of health of the population (life expectancy) and to the fertility rate of the women in the country.[16]

4. Finally, purely economic criteria have also been taken into account such as the GNP and its annual increase.

[16] - The well-being of a population is the outcome of many different components: educational, economical, cultural and physical. Life expectancy is not only linked to the general progress of medical care, but also to health education. Fertility ratio, as a family planning indicator, is related to cultural, educational and economic conditions. In fact, the fertility ratio is inversely correlated to the other well-being indicators.

There follows here the list of the criteria used to answer the questions as well as data references.

a. Total population (*)
b. GNP per capita (**)
c. Average annual growth rate (1965-1988) (****)
d. Men's life expectancy at birth (*)
e. Women's life expectancy at birth (*)
f. Fertility (*)
g. Infant mortality rate (****)
h. Percentage of urban population (****)
i. Daily calorie supply (****)
j. Educational expenditures as percentage of GNP (***)
k. Male literacy rate (***)
l. Female literacy rate (***)
m. School pupil/teacher ratio (***)
n. Secondary school enrollment ratio (***)
o. Graduate Population (***)
p. Population of Scientists and engineers engaged in research and experimental development (*)
q. Annual total book production (*)
r. Television receivers per 1000 inhabitants (*)

DATA SOURCES

(*) = *1987 United Nations Statistical Yearbook*
(**) = *Statesman's Yearbook, 1989-1990*, ed. J. Paxton
(***) = *World Education Encyclopedia*, ed. G.T. Kurian
(****) = *World Development Report 1990*, World Bank

We must emphasize that the criteria listed above are not univocal. As mentioned correctly, "even the most elementary statistics available in the different countries are not easily comparable, in spite of lasting efforts of international organisations (...). There is a strong need to have reliable indicators at our disposal for both scientific and practical aims, but few agree on their technical nature, and prejudices against large-scale objective testing survive, even if careful analysis has demonstrated that such objective measurements are the only ones capable of predicting economical growth years in advance."[17]

For even the concept of illiteracy, one of the most crucial, is problematic. Let us quote George Kurian's warning: "Literacy has conflicting definitions (...). UNESCO defines literacy as the ability to read and write a simple sentence. In some countries, such as Japan (...), illiteracy is defined as never having attended

[17] - *op. cit.*, p 324.

school. In Tunisia, literacy is defined as the ability to read but not necessarily to write. In developed countries literacy is defined in functional terms as the ability to fill out a simple application form."[18]

2.1. A FIRST SELECTION

Two types of countries were eliminated immediately: those with a population of less than 500,000 inhabitants and those whose the population figure is unknown over the past fifteen years. One hundred and thirty seven countries located in the various continents were chosen following this first selection.

2.2. TOWARDS A MULTI-DIMENSIONAL APPROACH

The data having been gathered and standardized, we could proceed to a multi-dimensional approach analysis.

Twenty years ago, two French educational sociologists had already warned against the uni-dimensional approach of the educational system: "The values guiding its functioning are numerous and irreducible, one would therefore be unable to add its achievements up in order to assess its efficiency".[19]

Taking this state of multi-dimensionality into consideration (both in content and in method) we have undertaken a number of analyses: Monotonous correlations, WSSA1, MSA, POSAC1 with and without missing values. Within the framework of this first document we will concentrate on the important results of the analysis.

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[18] - *World Education Encyclopedia, op. cit.*, p 1659.

[19] - Pierre Bourdieu et Jean-Claude Passeron, "La comparabilité des systèmes d'enseignement", in *Education, développement et démocratie*, sous la direction de Robert Castel et Jean-Claude Passeron, Cahiers du Centre de sociologie européenne, Mouton, Paris, 1967, p 44. This concern of multidimensionality is not specific to these researchers. See for instance, Desmond L. Nuttall: "Given the complexity and the diversity of educational systems, it is obvious that an individual indicator conveys limited information. To compensate the unidimensional nature of each indicator, it is necessary to build a system of indicators, that is a coherent set of indicators that together provide a valid representation of the condition of a particular educational system, not just an ad hoc collection of readily available statistic", in "the Functions and Limitations ...", *art. cit.*, p 329.

2.3. MONOTONOUS CORRELATIONS

Firstly, we wanted to investigate the existing correlations between the significant indicators. In order to do so, we chose to use the MONCO procedure[20] (although not exclusively). This procedure has a correlative coefficient which measures a monotonous link and therefore not necessarily a linear link between two variables.

The following table demonstrates the 136 monotonous correlations characterizing the 17 significant indicators.

[20] - For a mathematical presentation of the MONCO, see Louis Guttman, "Polytonicity and Monotonicity, Coefficients of", in the *Encyclopedia of Statistical Sciences*, vol 7, John Wiley and Sons, 1986, pp 80-87.

MONOTONOUS CORRELATIONS (MONCO) OF THE 17 INTERNATIONAL SOCIO-ECONOMIC AND EDUCATIONAL INDICATORS

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ESPERHOM	1	100	100	94	96	88	41	90	97	96	97	50	99	92	92	92	88
ESPERFEM	2	100	100	95	97	90	42	91	97	98	97	51	99	92	92	95	91
FERT	3	94	95	100	92	85	32	83	96	97	91	55	94	83	82	95	88
SECRATIO	4	96	97	92	100	92	58	86	95	95	98	39	95	93	91	90	90
GRADUATE	5	88	90	85	92	100	65	93	92	91	91	6	90	76	86	44	84
PERGNP	6	41	42	32	58	65	100	53	32	37	54	11	44	49	46	55	74
TELE	7	90	91	83	86	93	53	100	83	97	91	57	95	92	78	90	88
LITHOM	8	97	97	96	95	92	32	83	100	100	95	40	95	87	87	96	96
LITFEM	9	96	98	97	95	91	37	97	100	100	95	48	97	83	85	96	92
SCHRATIO	10	97	97	91	98	91	54	91	95	95	100	56	95	92	92	94	94
GNPRATIO	11	50	51	55	39	6	11	57	40	48	56	100	59	43	17	43	61
MORTINF	12	99	99	94	95	90	44	95	95	97	95	59	100	92	89	97	94
CALORI	13	92	92	83	93	76	49	92	87	83	92	43	92	100	87	90	81
URBAN	14	92	92	82	91	86	46	78	87	85	92	17	89	87	100	78	87
NORMBOOK	15	92	95	95	90	44	55	90	96	96	94	43	97	90	78	100	55
NORMMADA	16	88	91	88	90	84	74	88	96	92	94	61	94	81	87	55	100
GNP	17	97	97	89	95	89	54	96	88	88	98	31	97	93	92	92	87

MONOTONOUS CORRELATIONS (MONCO) OF THE 17 INTERNATIONAL SOCIO-ECONOMIC AND EDUCATIONAL INDICATORS

DESCRIPTION OF THE INDICATORS

1. ESPERHOM	Men's life expectancy at birth
2. ESPERFEM	Women's life expectancy at birth
3. FERT	Fertility
4. SECRATIO	Secondary school enrollment ratio
5. GRADUATE	Graduate population
6. PERGNP	Educational expenditure as percentage of GNP
7. TELE	Television receivers per 1000 inhabitants
8. LITHOM	Male literacy rate
9. LITFEM	Female literacy rate
10. SCHRATIO	School pupil/teacher ratio
11. GNPRATIO	Average annual growth rate
12. MORTINF	Infant mortality rate
13. CALORI	Daily calorie supply
14. URBAN	Percentage of urban population
15. NORMBOOK	Annual total book production (normalized data)
16. NORMMADA	Scientists & engineers engaged in research and experimental development (normalized data)
17. GNP	GNP per capita

Obviously, in this particular framework we do not intend to comment on all 136 correlations. We shall, however, focus on a few. Whereas some indicators are strongly correlated with almost all variables such as the GNP, the number of graduates or men's and women's life expectancy; others such as educational expenditure as a percentage of the GNP or the average annual growth rate are almost totally uncorrelated.

All the correlations, without exception, are positive. This is a clear indication of the fact that we are dealing with a conceptually integrated universe and in this case, the one of well-being. Indeed, as L. Guttman clearly points out, when describing a similar semantic universe: "If any two items are selected (...) and if the population observed is not selected artificially, then the population regressions between these two items will be monotone and with a positive or zero sign."[21]

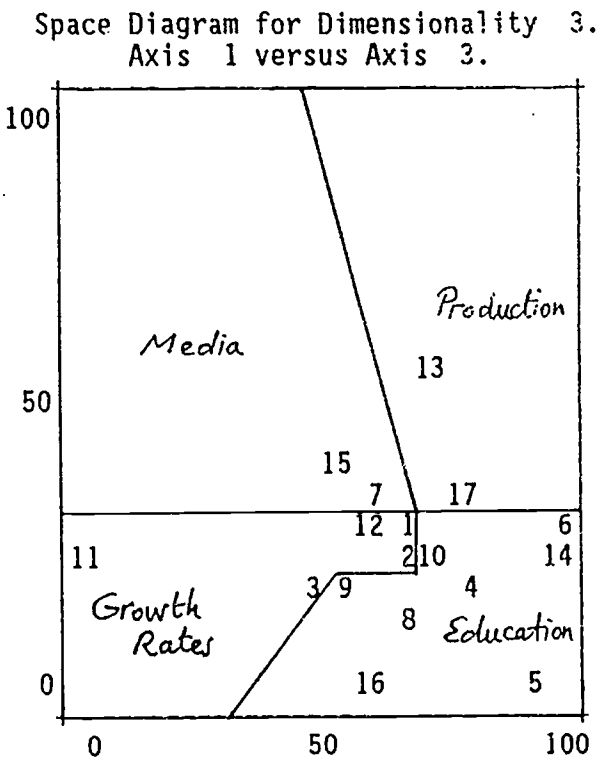
[21] - "What Is Not What in Theory Construction", in R. M. Hauser, D. Mechanic and A. Haller (Eds), *Social Structure and Behavior*, New York, Academic Press, 1982, pp 331-348.

2.4. GEOMETRIC DATA ANALYSIS: THE WSSA1

Due to a particular procedure[21] it is possible to depict the 136 correlations graphically and thereby also simultaneously. This latter, called WSSA1, conveys the variables in a Euclidian space so that the higher the correlation between two variables the closer they are to one another.[22]

In the "Space Diagram" for Dimensionality 3 (axes 1x3), we encounter four spheres of indicators:

a. Education (indicators 4, 5, 6, 8, 9, 10, 14, 16)
b. The growth rate (indicators 1, 2, 3, 11, 12)
c. The media availability (indicators 7, 15)
d. Production and nutrition (indicators 13, 17)



21 - For a general presentation of the theoretical works of L. Guttman and their numerous applications, see among others, Guttman L. et Levy S., Several chapters in I. Borg (Ed), *Multidimensional Data Representations: When and Why*, Ann Arbor, Mathesis Press, 1981, pp 1-192; Canter D. (Ed), *Facet Theory: Approaches to Social Sciences*, New York, Springer-Verlag, 1985; Shye S. (Ed), *Theory Construction and Data Analysis in Behavorial Sciences*, San Francisco, Jossey-Bass, 1978.

22 - For an introduction to the theory which underlies the WSSA1, see in particular, Levy S., "Lawful Roles of Facets in Social Theories", in Canter D (Ed), *op. cit.*, pp 117-125.

2.5. MULTI-DIMENSIONAL STRUCTURAL ANALYSIS: THE MSA1

In the previous section we emphazised the internal structure of the various indicators as well as the fact that they all belong to the same semantic universe. We would now like to concentrate on and to compare the different countries.

By using the first procedure perfected by Guttman and Lingoes,[24] we intend to try to define to what extent different countries depict overall similar behavior.[25] The latter has been derived from the overall indicators excluding two, men's life expectancy at birth and the male literacy rate. Both were perfectly correlated with their corresponding "female" indicator.

Before presenting the "overall" results, we should point out that the national data used in our survey were copied exactly as they appeared in the documents mentioned above. We did this no matter what our opinion as to the data's reliability. Indeed, had this opinion been taken into account, numerous countries, such as the communist countries which inevitably appear as major successes, would have been automatically removed from the list. However, we chose not to test their reliability for the following two reasons: a) We do not know the limit of this kind of elimination process; b) The refusal to dismiss countries presenting unreliable data does not affect the internal order of those with reliable data. Having mentioned this methodological aspect, we are now in a position to introduce the space diagram, in which each country appears under an identity number, and the countries are ranked according to similar overall behavior. Note also that 120 countries appear within the space diagram (see next page) and those with more than 5 missing values among the 15 variables considered, were automatically eliminated.

One can divide the countries roughly into three units, forming the shape of a big V. The socio-economic and educationally poor countries are located on the right-hand side and the rich ones are on the left-hand side. Interestingly enough, Israel is located in a small region together with the following non-communist countries: Japan, New Zealand, Germany Federal Republic, Belgium, France, Switzerland, Finland, Spain, Ireland, Italy, Austria, Kuweit, Hong Kong and South Korea. Spain has the most similar overall behavior to Israel.[26]

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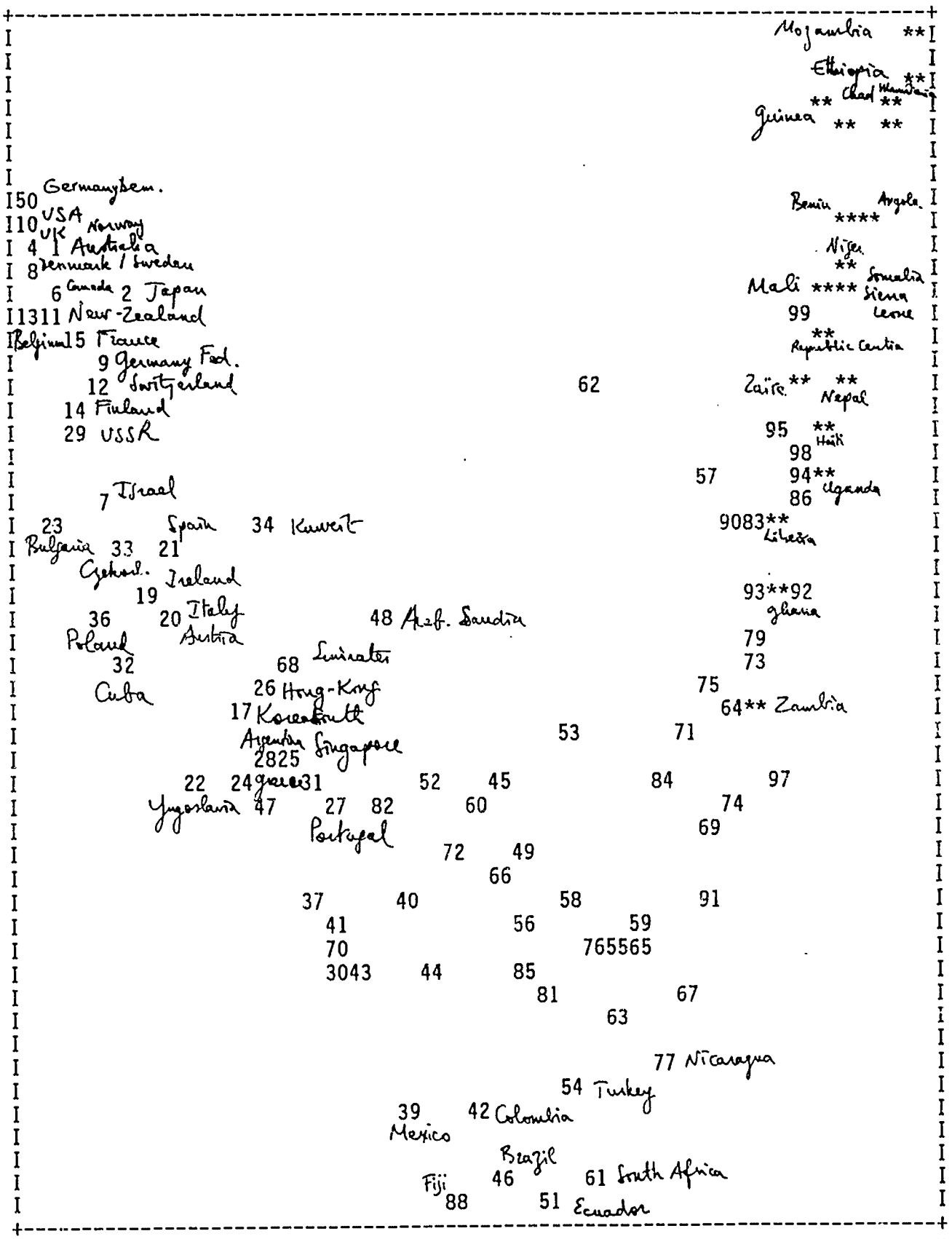
[24] - See in particular the study of Eli Zvulun, "Multidimensional Scalogram Analysis: the Method and Its Application", in Shye S. (Ed), *Theory Construction and Data Analysis ,op.cit.*, pp 237-264.

[25] - We are dealing with countries. Each country is charaterized by 15 different indicators. For our concern, we have recoded the different indicators in order to simplify the data. From now onwards, each country is defined as having a certain profile. The MSA1 will help us to discover the similarity between the profiles, and therefore between the countries. The MSA1 is a geometrical data analysis. It depicts the structure of data by regionalisation: the more identical categories two different profiles share, the closer these profiles will appear in the space diagram.

[26] - In Section 6, we present the overall details of this similarity analysis: the list of profiles and national structures; the coordinate of countries in a two-dimensional space; the analytical space diagram, namely, 15 diagrams conveying each country's characteristic for each indicator.

Space Diagram for Dimensionality 2 . Axis 1 versus Axis 2 .



BEST COPY AVAILABLE

2.6. TOWARDS A PARTIAL EDUCATIONAL ORDER: THE POSAC1

The MSA1 enabled us to emphasize the degree of similarity between the countries. The POSAC1 takes us one step further by attempting to rank the countries according to their educational achievements[27]. For this purpose we take **only strictly educational variables** into consideration, namely indicators 4, 5, 6, 8, 9, 10 and 16 of the list.[28].

We applied two different methods of calculation to rank the countries on a multi-dimensional educational scale. According to the strictest method which takes account only of the countries with no missing data, the top ten non-communist countries are: USA, Canada, Israel, Japan, Norway, Australia, The Netherlands, Belgium and the UK.

According to the second method (which accepts countries with missing values) the top thirteen non-communist countries are: USA, Canada, Sweden, Norway, Japan, New Zealand, Finland, Australia, Israel, Denmark, UK, Belgium and The Netherlands.

It should be noted that with both methods, the USSR was ranked as the top educational country. Although we could, of course, with good reason question the validity of these figures communicated by the Soviet authorities, the data were, nevertheless, considered without change as they appear in the *United Nations Statistical Yearbook* and other international documents.

2.7 A LAST SELECTION

If we combine the results of the MSA1 and the POSAC1, we can make a more accurate selection of the required four countries. In order to do this, we feel it necessary to both briefly review the results of the two procedures and to mention a few additional selecting principles.

Firstly, it is possible to rank the findings according to the two criteria already stated above; namely, the level of educational achievement (results of the POSAC1) and the degree of similarity between the various countries and in particular with Israel.

One can rank for instance Japan, New Zealand, South Korea and Spain according to these two criteria. Moreover, this survey sheds new light on the complex interrelation between educational achievement and the country's overall behavior.

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[27] - For a mathematical presentation of the POSAC1, see the article of S. Shye and R. Amar, "Partial-Order Scalogram Analysis by Base Coordinates and Lattice Mapping of the Items by their Scalogram Roles", in Canter D. (Ed), *Facet Theory..., op.cit*, pp 277-298.

[28] - The POSAC1 we have implemented is methodologically similar to the one S. Levy used in her study, "Partial Order of Israeli Settlements by Adjustive Behaviors", in *Israel Social Science Research*, 1984, 2, pp 44-65.

	Educational Achievement (POSAC1)	Overall Similarity with Israel (MSA1)
Japan	Very good	Similar
New Zealand	Very good	Similar
South Korea	Average	Similar
Spain	Average	Very similar

Even if a direct application of the POSAC1 and the MSA1 seems to point to the fact that a country can reach a very high economic profile without being the best qualified according to its educational indicators (e.g. South Korea), on the other hand, there is no country with a very low educational level which also has a high economic standard.

It therefore seems logical to focus the survey on countries with a high economic level which have at least an average educational level.

Another criteria relates to the geographical location: namely, is it necessary and advisable to have a representative of each continent?

Should the countries selected for the survey be of more or less the same size or might it not be better if they were really different?

Finally, should the countries selected for the survey have approximately the same economic level or might it not be advisable to research various different dynamics?

It is, of course, self evident that the answers to these three questions will have an important influence on the final choice of the countries to be surveyed.

We would, therefore, like to present various possible options. There follows here firstly a list of 22 countries (in Israel the survey has begun already) where the final choices can be made.[29] (The total population calculated to the nearest million appears in parentheses.): Australia (15.6), Austria (7.6), Belgium (9.8), Canada (25.3), Denmark (5.1), Federal Germany (61.0), Finland (4.9), France (54.3), Hong Kong (5.4), Ireland (3.5), Italy (56.6), Japan (121.0), The Netherlands (3.1), New Zealand (3.3), Norway (4.1), Singapore (2.4), South Korea (40.4), Spain (37.7), Sweden (8.4), Switzerland (6.4), UK (55.6), USA (226.5).

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[29] - All these 22 countries and Israel are very good candidates for further and comparative investigation. In 1970-1971, a very fruitful research study was conducted on Science Tests Scores among 14 years old students in selected countries. Such research on skills (mathematics, reading, etc.) and on general attitudes and values of students at ages 12-15, could yield great understanding and insight to educational planners. Inserted in a typological approach such as Elazar's, this information would have its optimal impact.

Option 1: *small-sized countries, in all continents:*

Belgium/Finland/Norway/Sweden/
Hong Kong/Singapore
New Zealand

Option 2: *medium-sized countries, in all continents:*

Australia
Canada
Spain
South Korea

Option 3: *large-sized countries, in all continents:*

Federal Germany/France/Italy
Japan
United States

It is fairly obvious that most countries ranked in the first 3 options belong to a specific high socio-cultural, economic and educational universe. Indeed, Australia has quite a few points in common with Canada. We therefore suggest only selecting one of the two.

As far as the USA is concerned, due to its size, its influence in the world and its intricate internal aspects, it would be advisable not to make it a part of this first research. However, this is not the case for Japan. H.J. Walberg has already noted that "with the highest test scores (science test scores of 14-year-olds, 1970-1971) nearly the highest growth and nearly the lowest unemployment of the nations with complete information, Japan may have set the educational and economic standards for the rest of the world".[30]

Regarding Spain, where recent developments have been very interesting, as noted above, its overall behavior is very similar to Israel. We therefore suggest that it be included in the list of surveyed countries.

Since the USA is momentarily out of the picture, we suggest focusing on its northern neighbor, Canada. This is especially appropriate since having a very high immigration rate it is faced with major educational problems, related to cultural and ethnic conflicts, which endanger its internal cohesion.

The Scandinavian countries are affluent and present many similarities. In the MSA1 Space Diagram, we can discover that Norway, Denmark and Sweden are located in a very well defined sub-region. We therefore will suggest to choose Norway as an example of the Scandinavian experience.

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30 - "Science, Mathematics, and National Welfare: Retrospective and Prospective Achievements", *International Journal of Educational Research*, vol 14, 1990, p 349.

After having designated the four countries, one could also optionally choose France whose history and socio-cultural experience turned it into a European point of reference and maybe even a classical, universal, experience. A comparative study of France might prove very fruitful.

South Korea provides a very interesting field of research: high economic standards and average educational achievement. We would therefore recommend to add this country to France as optional.

Our definite final choice seems to point towards a combination of small to large-sized countries in all continents, namely:

Final Selection : *small to large-sized countries, in all continents:*

Japan
Spain
Norway
Canada
France (optional).
South Korea (optional).

3. TOWARDS A TEMPORARY CONCLUSION

The monotonous correlations, the WSSA1, the MSA1 and the POSAC1 have all been of tremendous help in our quest to understand the international educational and social universe.

We have tried to supply the Institute for the Study of Educational Systems with conceptual and methodological instruments that will allow a reasoned selection of countries to be surveyed. Naturally, the data is not perfect and can be subjected to criticism. However, it does not overlap any analysis so far undertaken.

Moreover, the data used in this complex and intricate international sphere of comparative education, even with all the disadvantages of which we are aware, are of a very high level of reliability compared to only ten years ago. That this is so is due to the tireless efforts of international organisations to provide standardized data.

There is no doubt that the questions raised lead to a very exciting agenda of intellectual and political work. As Ramsey W. Selden says: "Developing indicators is not a trivial task. Many of the measures that we would like to use do not exist. Deciding on indicators and the models that will be used to analyse and interpret them bring political consequences. Preventing politicians and the press from misusing indicators is a formidable, if not impossible task. Just defining indicators and getting everyone in the system, from local school staff to national statisticians to report the figures in a valid and consistent manner, is difficult."[31]

In order to avoid mistakes and with a view to implementing the future major results, it will be necessary, in the very near future, to begin deliberating the conditions and consequences of such complex policy research.

[31] - "Developing Educational Indicators: A State-National Perspective", *International Journal of Educational Research*, Vol 14, 1990, p 383.

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5. TABLES AND DOCUMENTS

In this Section , we will present the overall details of the similarity analysis (MSA1) and of the educational partial orders (POSAC1) : the list of profiles and national structures; the coordinate of countries in a two-dimensional space; the analytical space diagrams, namely, the diagrams conveying each country's characteristic for each indicator.

```
*********************************************
* TWO-DIMENSIONAL PARTIAL ORDER SCALOGRAM *
*      ANALYSIS WITH BASE COORDINATES      *
*                 POSAC1                   *
*********************************************
```

Number of Posac variables 7

ACCORDING 7 EDUCATIONAL INDICATORS

"WITHOUT MISSINGS"

Number of read cases 137
Number of rejected cases 83
Number of retained cases 54

There are 56 different profiles

Id	Profile	Sco	Freq	User Id
	LLSSGNP ITCERDE TTHCARR HFRRDMG OEAAUMN MMTTAAP IITD GOEA			
31	9 931 5 4 334	95	1	ARGENTI
10	101031 8211860	158	1	AUSTRAL
18	9 931 7 2 856	122	1	AUSTRIA
14	9 931 8 71461	139	1	BELGIUM
37	6 629 3 4 236	86	1	BRAZIL
9	9 830 8 55153	164	1	BULGARI
5	9 931 8301477	178	1	CANADA
48	8 828 4 3 019	70	1	COLOMBI
38	8 630 5 1 034	84	1	CYPRUS
34	7 729 4 3 236	88	1	ECUADOR
36	5 227 5 3 441	87	1	EGYPT
27	7 530 6 3 049	100	1	FIJI
15	9 931 9 42147	130	1	GERMAFE
49	4 128 3 0 328	67	1	GHANA
42	9 730 8 2 223	81	1	GREECE
11	9 830 5 1 198	152	1	GUYANA
20	9 931 4 52140	119	1	HUNGARY
50	4 126 2 1 132	67	1	INDIA
51	7 428 2 3 220	66	1	INDONES
30	4 228 4 0 057	95	1	IRAN
13	9 930 9 41068	139	1	IRELAND
2	9 832 7209883	257	1	ISRAEL
21	9 931 7 21146	115	1	ITALY
19	7 829 5 0 071	120	1	JAMAICA
6	9 931 9144758	177	1	JAPAN
23	5 129 7 0 162	105	1	JORDAN
25	9 827 8 61134	103	1	KOREA S
28	6 431 712 829	97	1	KUWEIT
45	7 531 5 3 025	76	1	LEBANON
40	3 031 6 1 339	83	1	LYBIAN
55	3 115 0 0 022	41	1	MALAWI
22	7 530 5 1 360	111	1	MAURITI
32	7 729 3 2 244	94	1	MEXICO
54	3 021 2 0 018	44	1	NEPAL
7	101030 9 72581	172	1	NETHERL
8	9 932 9 82481	172	1	NORWAY
53	2 022 1 3 120	49	1	PAKISTA
24	7 730 6 4 150	105	1	PANAMA
47	8 628 5 4 219	72	1	PERU
41	8 828 611 120	82	1	PHILIPP
33	7 630 5 1 338	90	1	PORTUGA
52	1 018 1 0 040	60	1	SENEGAL
35	8 529 5 2 929	87	1	SINGAPO
39	9 830 8 3 421	83	1	SPAIN
46	8 629 5 2 122	73	1	SRI LAN
16	101030 7 22050	129	1	SWITZER
29	9 928 5 1 242	96	1	TRINIDA
44	7 427 3 1 136	79	1	TURKEY
12	9 931 8111557	140	1	UNIT-KI
4	9 931 9313464	187	1	UNIT-ST
3	10103110 75772	197	1	USSR
26	8 729 3 2 350	102	1	VENEZUE
17	9 730 8 31354	124	1	YUGOSLA
43	6 325 1 0 046	81	1	ZAMBIA
56	1 015 0 0 018	34	1	NOBODY
1	10103210319898	289	1	NOBODY

There are 56 different profiles

Two-dimensional configuration of the scalogram (Base Coordinates)

Id from 1 to 56

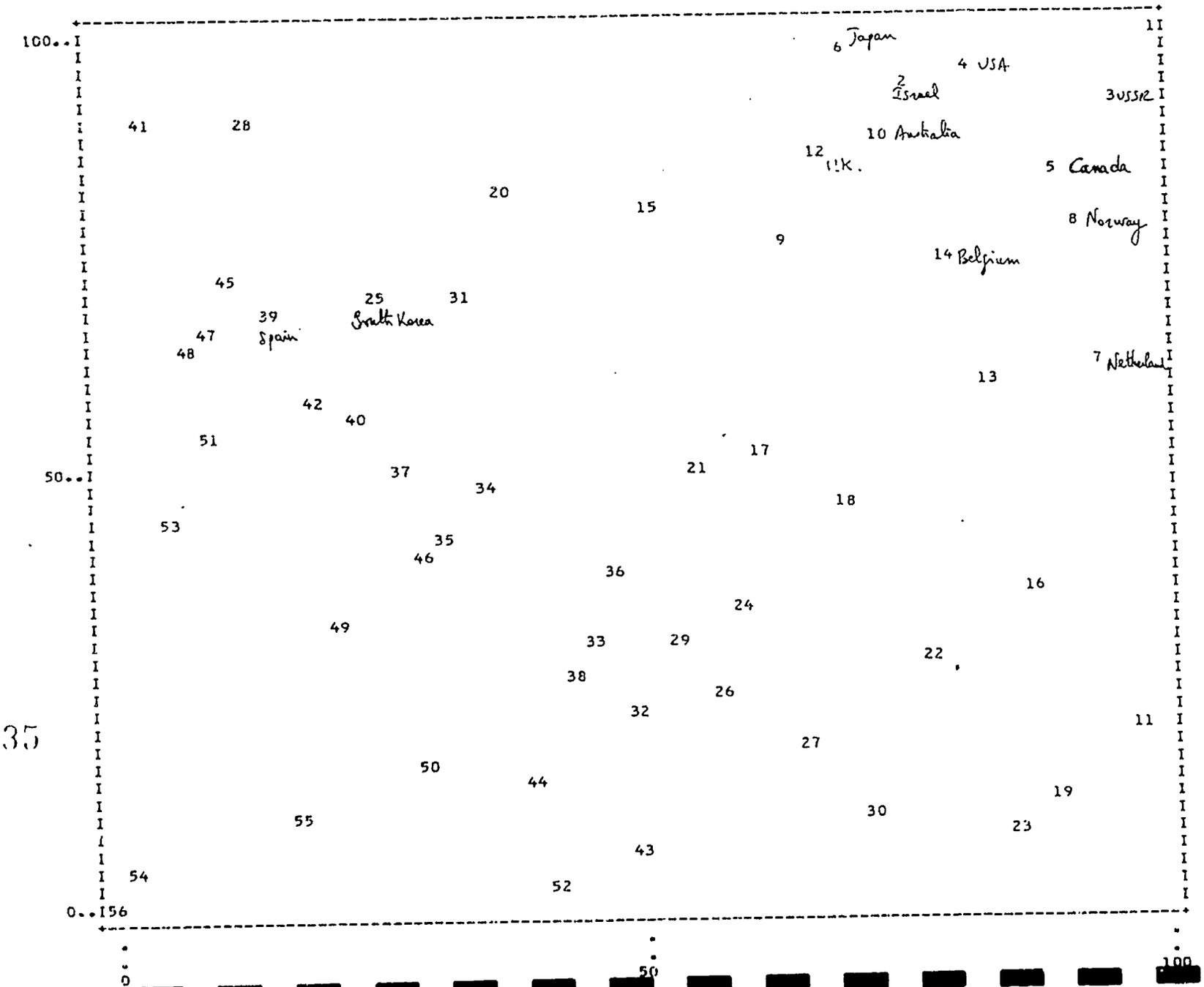

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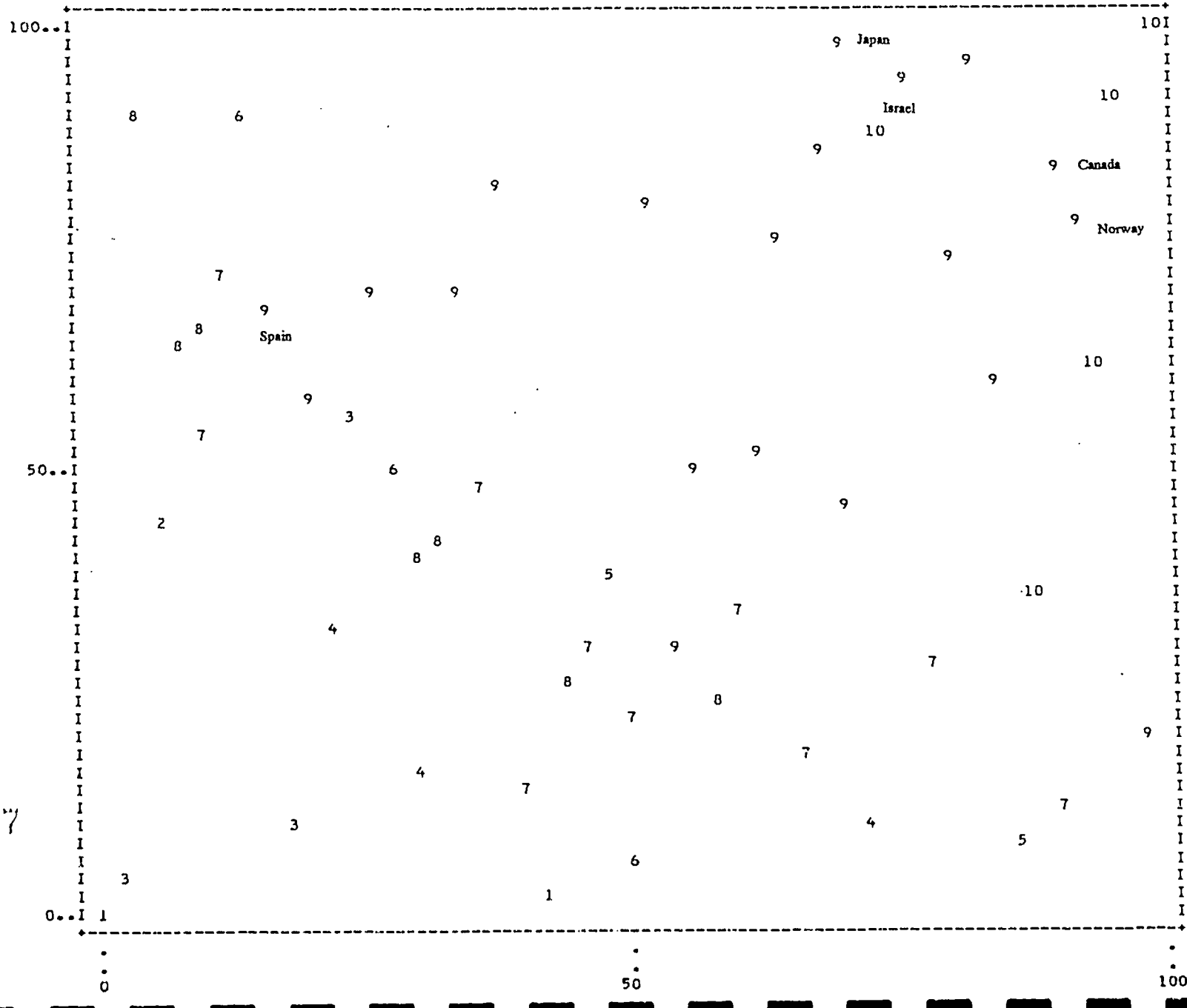
Diagram of Item number 1 : LITHOM



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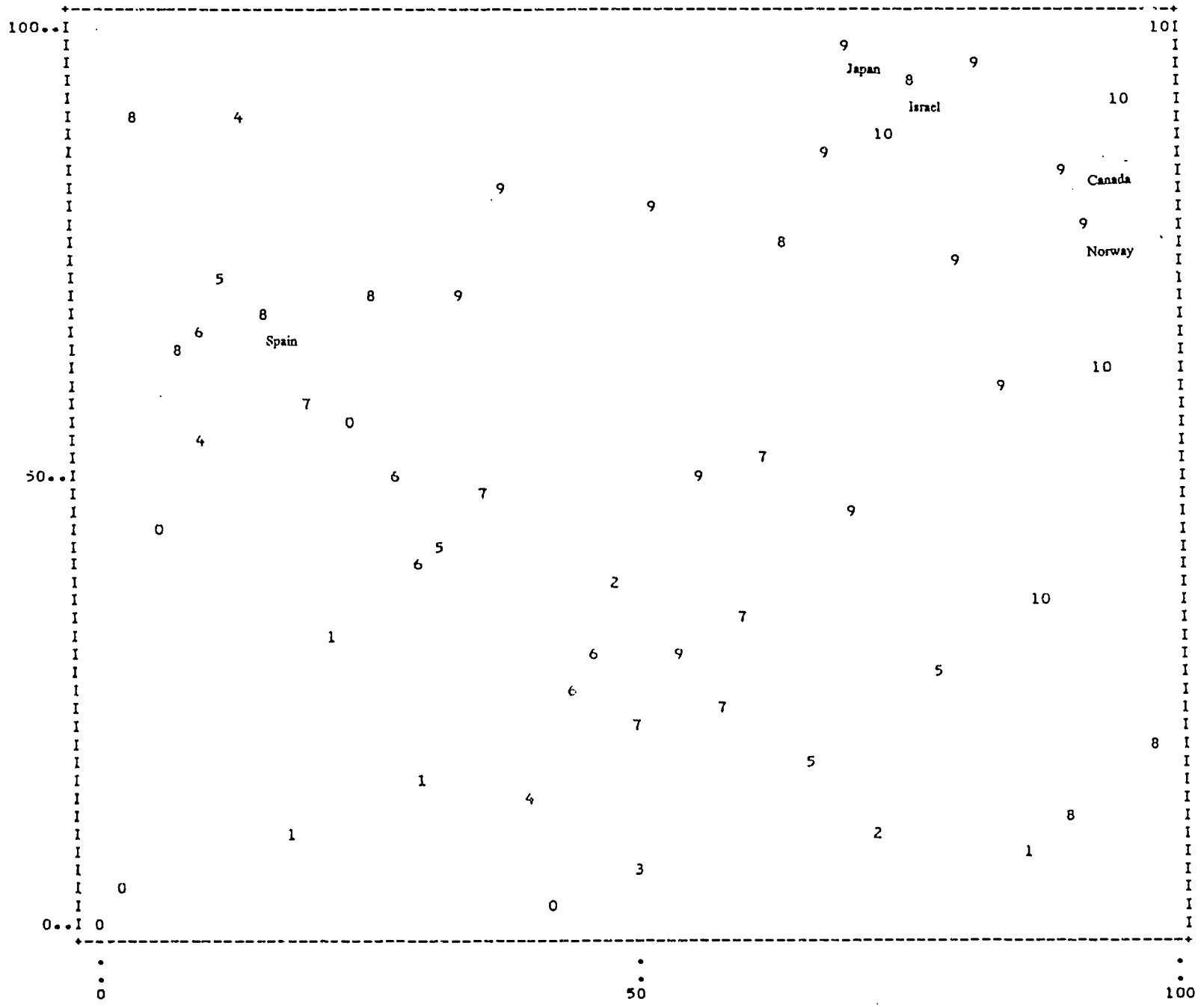

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Diagram of Item number 3 : SCHRATIO

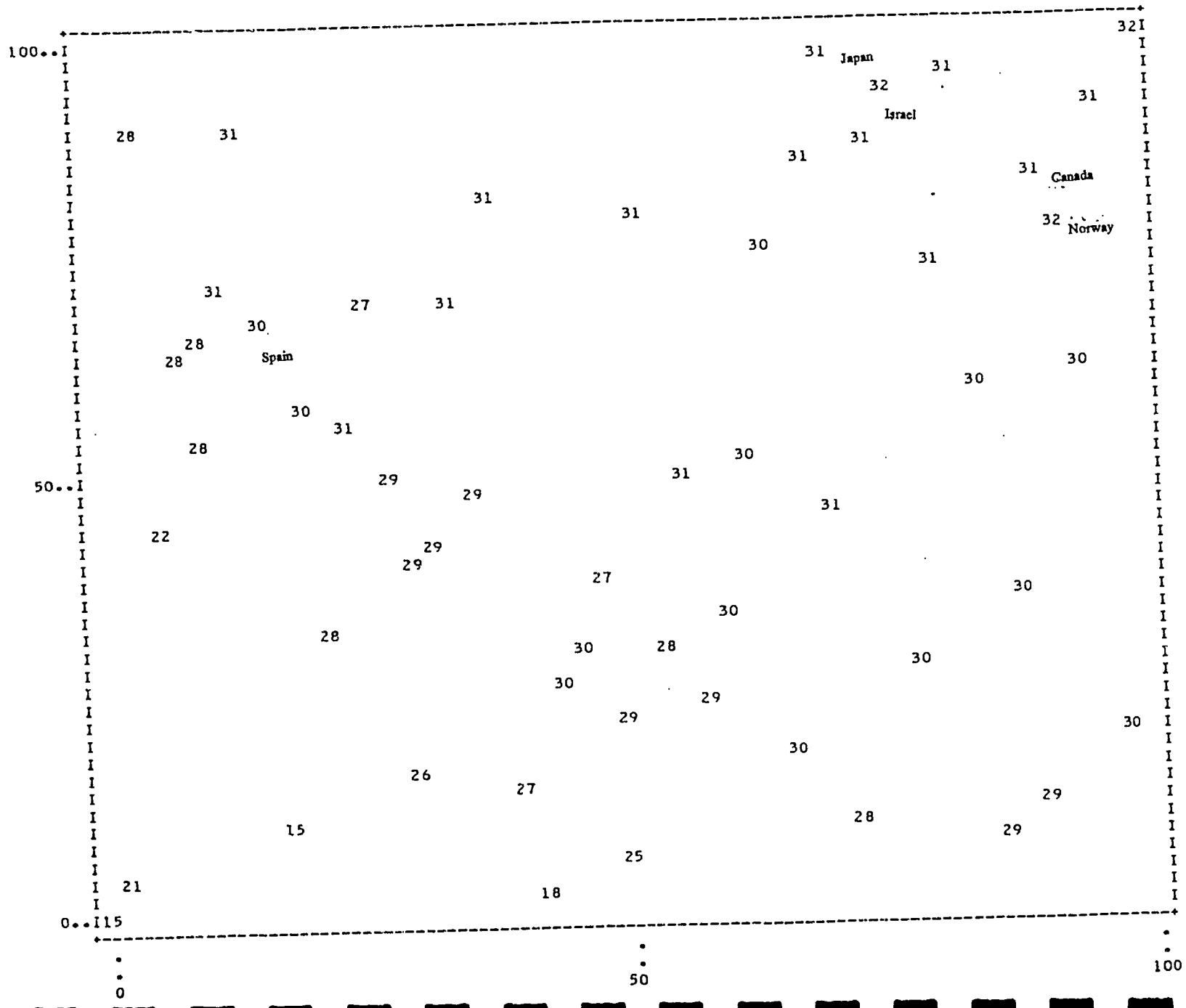

Diagram of Item number 4 : SECRATIO

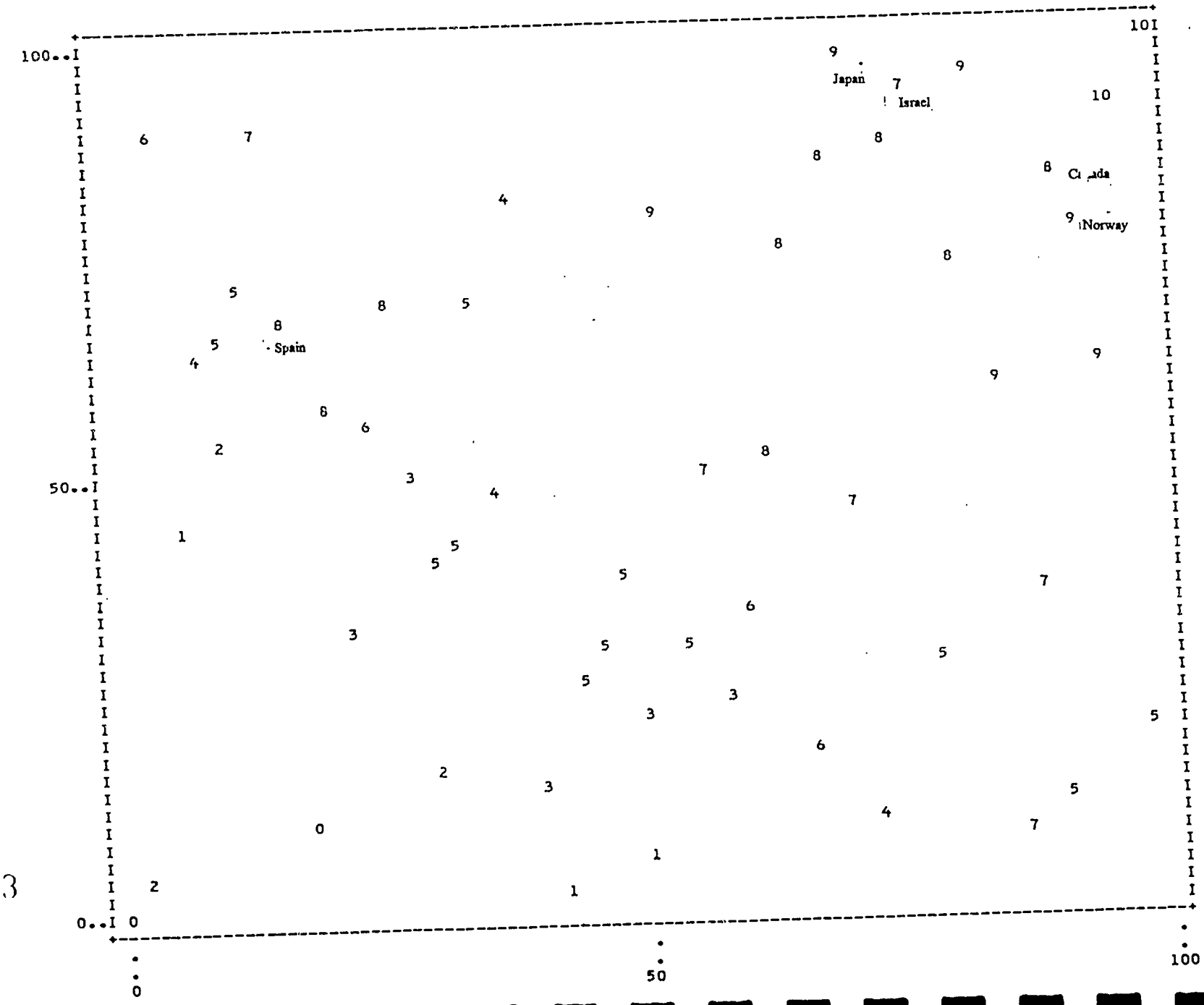

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Diagram of Item number 5 : GRADUATE

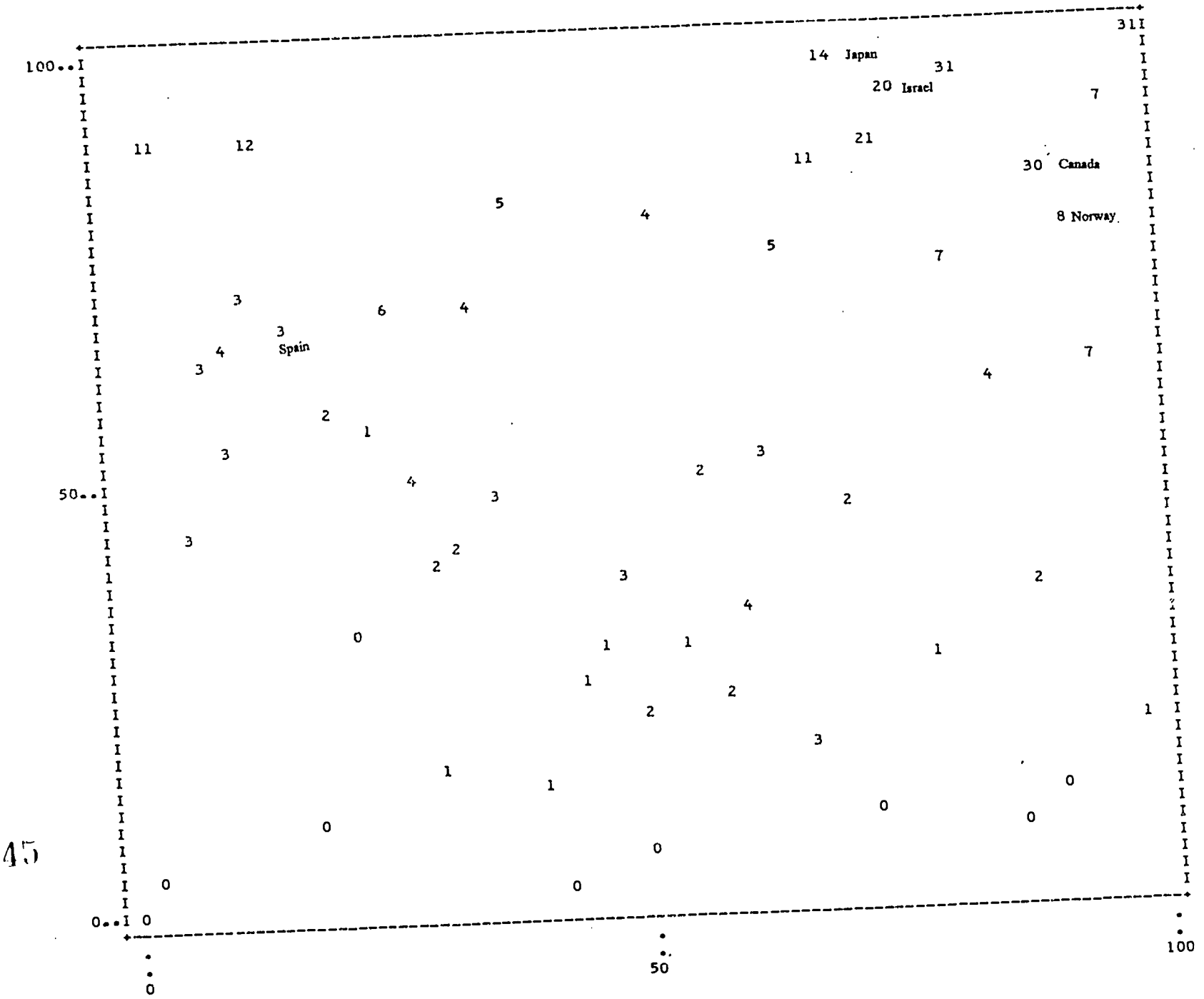


Diagram of Item number 6 : NORMMADA

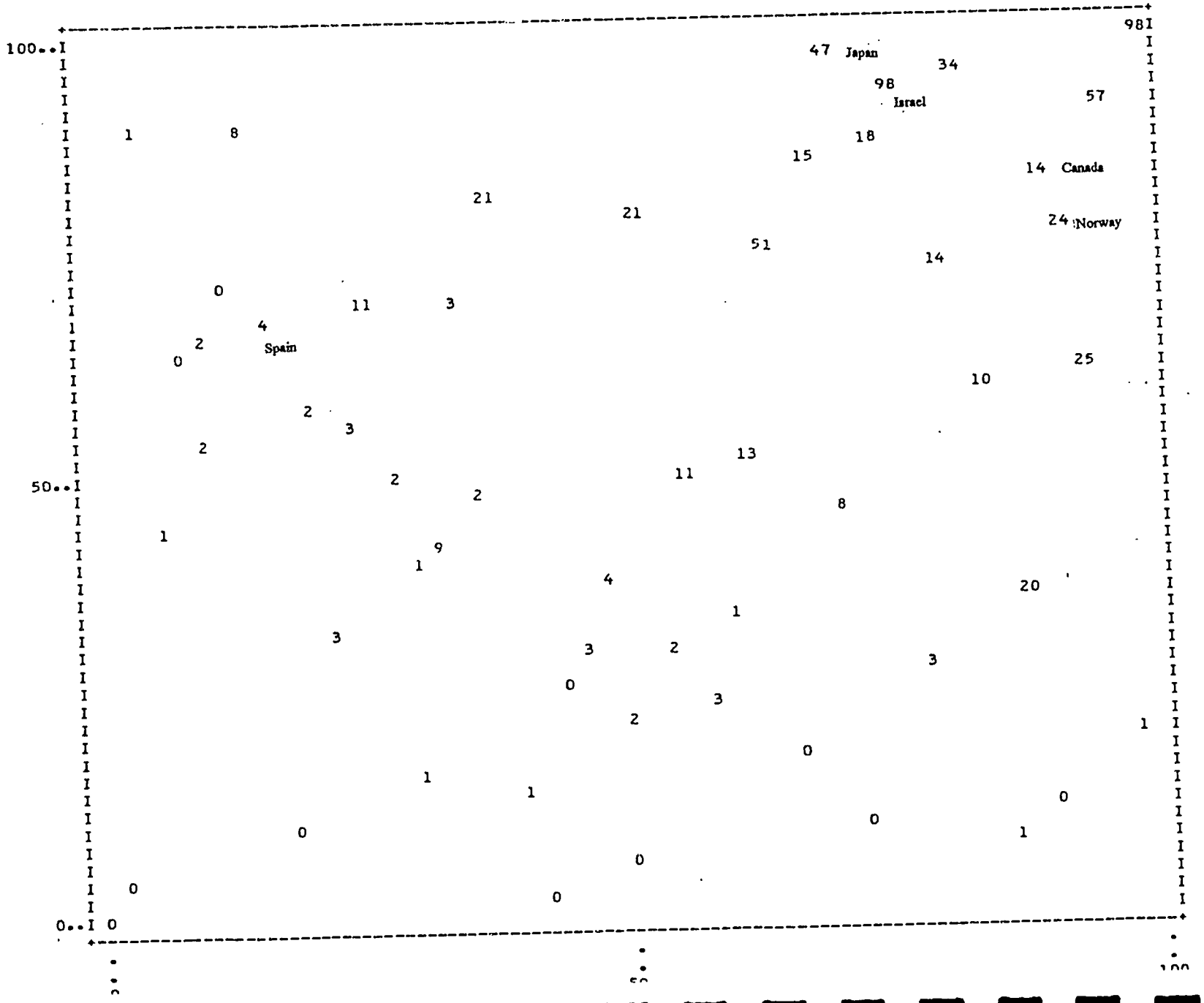
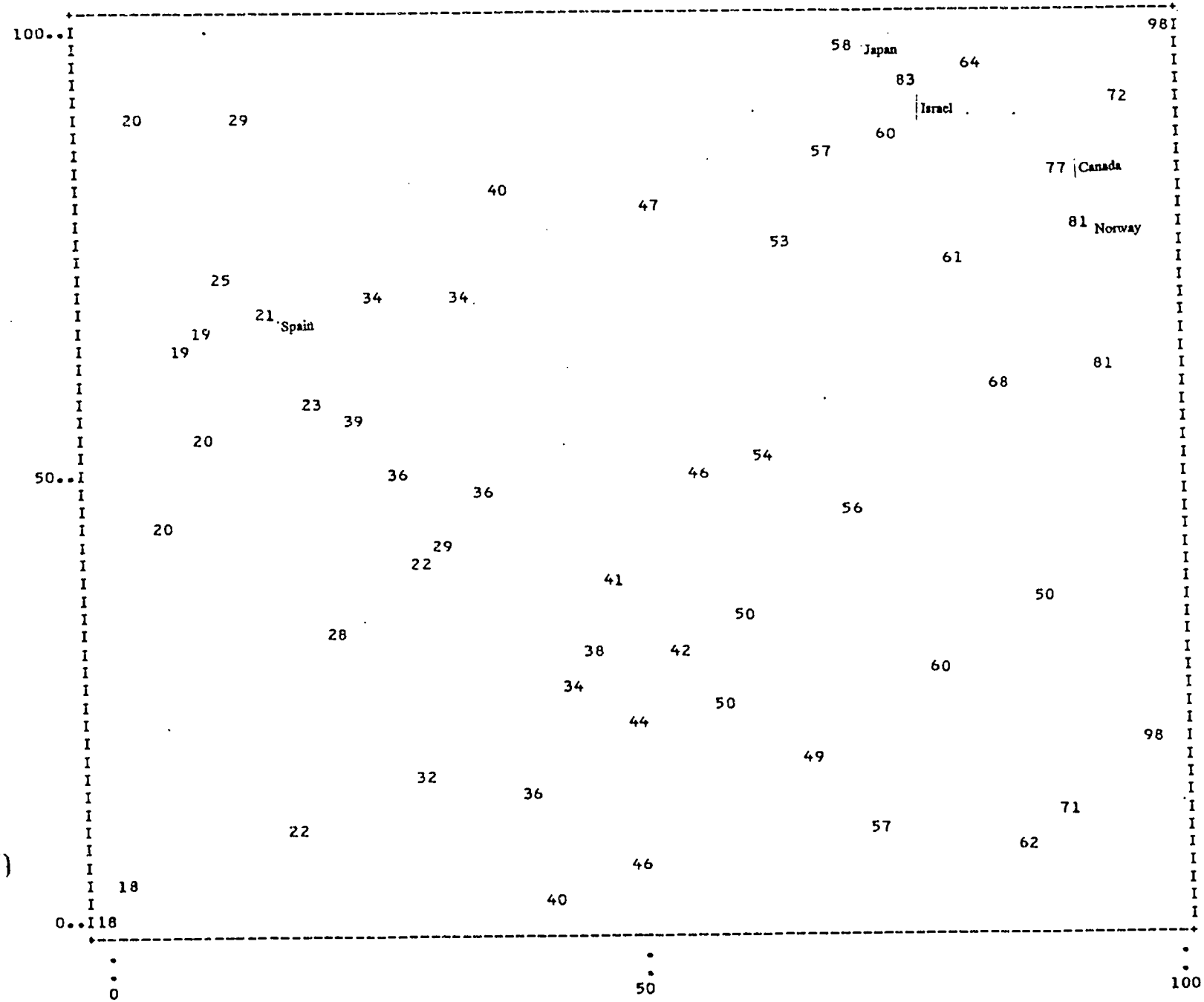


Diagram of Item number 7 : PERGNP



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*****************************************
* TWO-DIMENSIONAL PARTIAL ORDER SCALOGRAM *
*     ANALYSIS WITH BASE COORDINATES      *
*                POSAC1                   *
*****************************************
```

ACCORDING 7 EDUCATIONAL INDICATORS

"2 MISSING VALUES WERE PERMITTED"

Number of Posac variables 7

Number of read cases 137
Number of rejected cases 21
Number of retained cases 116

There are 118 different profiles

Profile variables (column headings, read vertically):

```
L L S S G N P
I I C E R O E
T T H C A R R
H F R R D M G
O E A A U M N
M M T T A A P
    I I T D
    O O E A
```

Id	Profile	Sco	Freq	User Id
96	1 019 1 3-117	76	1	AFGHANI
74	4 128 3 0-1-1	92	1	ALGERIA
48	0 027 0-1-147	115	1	ANGOLA
72	9 931 5 4 334	95	1	ARGENTI
14	101031 8211860	158	1	AUSTRAL
38	9 931 7 2 856	122	1	AUSTRIA
100	3 022 1 0-115	71	1	BANGLAD
24	9 931 8 71461	139	1	BELGIUM
58	1 018 1-1-147	104	1	BENIN
35	7 530 3 5-135	125	1	BOLIVIA
25	3 328 2 0-177	137	1	BOTSWAN
82	6 629 3 4 236	86	1	BRAZIL
12	9 830 8 55153	164	1	BULGARI
117	2 0 4 0-1 029	41	1	BURUNDI
76	3 024 1 0-131	90	1	CAMERDO
7	9 931 8301477	178	1	CANADA
111	1 0 2 0-1-123	55	1	CHAD
29	8 829 5 3-138	130	1	CHILE
103	8 828 4 3 019	70	1	COLOMBI
20	3 029-1-1 494	142	1	CONGO
53	-1 829 4 5 159	109	1	COSTA R
43	0 025 1-1 086	119	1	COTE D'
19	7 831 7-11071	144	1	CUBA
83	8 630 5 1 034	84	1	CYPRUS
21	9-130 4 44149	142	1	CZECHOS
17	9 932 8-11663	148	1	DENMARK
64	6 626 3 0-121	101	1	DOMINIC
78	7 729 4 3 236	88	1	ECUADOR
79	5 227 5 3 441	87	1	EGYPT
52	5-125 2 1-132	109	1	EL SALV
110	0 0 4 1-1-123	60	1	ETHIOPI
65	7 530 6 3 049	100	1	FIJI
13	101031 9 6-157	158	1	FINLAND
32	7 931 8-11835	126	1	FRANCE
49	0 023 1 0-167	113	1	GAMBIA
4	9-130 8 87858	195	1	GERMADE
28	9 931 9 42147	130	1	GERMAFE
106	4 128 3 0 328	67	1	GHANA
88	9 730 8 2 223	81	1	GREECE
77	5 324 1 1-119	89	1	GUATEMA
104	1 015 1-1 243	69	1	GUINEA
16	9 830 5 1 198	152	1	GUYANA
101	2 121 1 0-115	71	1	HAITI
54	5 526 2 1-135	109	1	HONDURA
63	9 6-1 6 3-129	101	1	HONG KO
41	9 931 4 52140	119	1	HUNGARY
105	4 126 2 1 132	67	1	INDIA
107	7 428 2 3 220	66	1	INDONES
55	3 129 5 0-132	106	1	IRAK
70	4 228 4 0 057	95	1	IRAN
23	9 930 9 41068	139	1	IRELAND
2	9 832 7209883	257	1	ISRAEL
46	9 931 7 21146	115	1	ITALY
40	7 829 5 0 071	120	1	JAMAICA
8	9 931 9144758	177	1	JAPAN
56	5 129 7 0 162	105	1	JORDAN
60	3 128 1-1 061	102	1	KENYA
59	9 827 8 61134	103	1	KOREA S
67	6 431 712 829	97	1	KUWEIT
95	7 531 5 3 025	76	1	LEBANON
91	4 626-1 0-1 6	80	1	LESOTHO
51	1 025 2 1-155	109	1	LIBERIA
84	3 031 6 1 339	83	1	LYBIAN
92	4 224 3-1 037	80	1	MADAGAS
116	3 115 0 0 022	41	1	MALAWI
18	5 429 5-1-158	146	1	MALAYSI
94	0 010 0 0-146	76	1	MALI
50	7 530 5 1 360	111	1	MAURITI
73	7 729 3 2 244	94	1	MEXICO
30	3 125 2-1-160	130	1	MOROCCO
108	8 421 2-1 016	64	1	MYANMAR
115	3 021 2 0 018	44	1	NEPAL
9	101030 9 72581	172	1	NETHERL
10	9 931 820-156	172	1	NEW ZEA
68	5 526 4-1 343	96	1	NICARAG
114	0 0 0 0-1 043	48	1	NIGER
98	2 025 2-1 033	72	1	NIGERIA
11	9 932 9 82481	172	1	NORWAY
113	2 022 1 3 120	49	1	PAKISTA
57	7 730 6 4 150	105	1	PANAMA
71	8 729 2 2-113	95	1	PARAGUA
99	8 628 5 4 219	72	1	PERU
86	8 828 611 120	82	1	PHILIPP
45	9 930 7 512-1	116	1	POLAND
75	7 630 5 1 338	90	1	PORTUGA
15	8 8-1 912-182	156	1	PUERTO
102	1 018 1-1 043	71	1	REP. CE
26	9 830 7 4-132	136	1	ROMANIA
112	2 015 0-1 026	52	1	RWANDA
109	1 018 1 0 040	60	1	SENEGAL
66	-1 023 1 0-140	98	1	SIERRA
80	8 529 5 2 929	87	1	SINGAPO
81	0 021 0-1-118	87	1	SOMALIA
33	5 528 7 3-143	126	1	SOUTH A
85	9 830 8 3 421	83	1	SPAIN
97	8 629 5 2 122	73	1	SRI LAN
87	2 022 1-1 147	81	1	SUDAN
6	9 932 8-12591	184	1	SWEDEN
31	101030 7 22050	129	1	SWITZER
39	6 229 4 1-149	121	1	SYRIA
34	4 125 0-1-157	126	1	TANZANI
42	8 729 2 1-132	119	1	THAILAN
44	2 026 3 0-163	118	1	TOGO
69	9 928 5 1 242	96	1	TRINIDA
47	5 227 2 1-149	115	1	TUNISIA
93	7 427 3 1 136	79	1	TURKEY
90	4 221 0 0-118	80	1	UGANDA
22	9 931 8111557	140	1	UNIT-KI
5	9 931 9313464	187	1	UNIT-ST
36	9 930 6 6-121	125	1	URUGUAY
3	10103110 75772	197	1	USSR
61	8 729 3 2 350	102	1	VENEZUE
37	9 730 8 31354	124	1	YUGOSLA
27	4 126 2-1-163	135	1	ZAIRE
89	6 325 1 0 046	81	1	ZAMBIA
62	4 323 1 0-143	102	1	ZIMBABW
118	0 0 0 0 0 0 8	8	1	NOBODY
1	10103210319898	289	1	NOBODY

There are 118 different profiles

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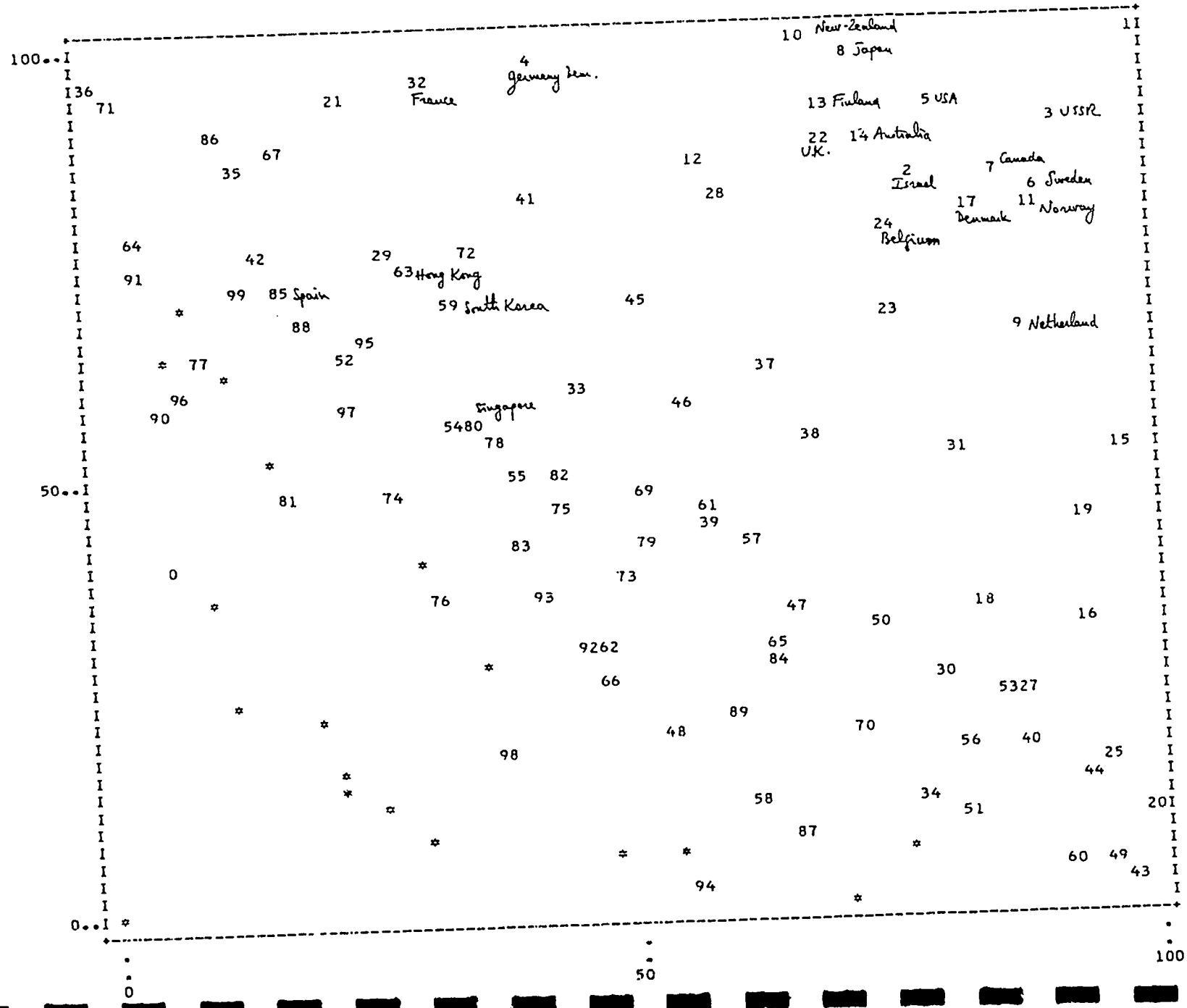
Two-dimensional configuration of the scalogram (Base Coordinates)

Id from 1 to 100



Two-dimensional configuration of the scalogram (Base Coordinates)

Id from 101 to 118

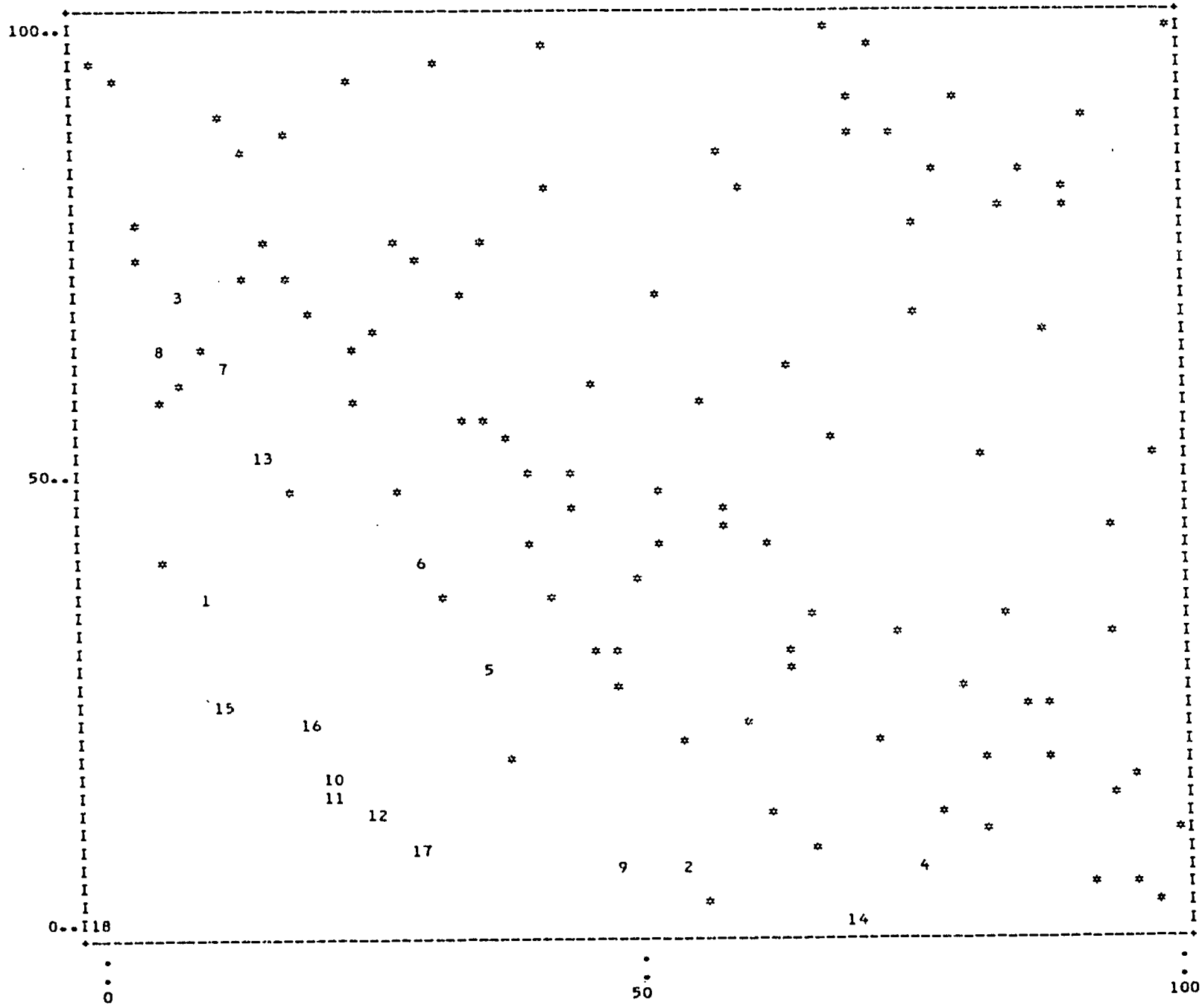


Diagram of Item number 1 : LITHOM

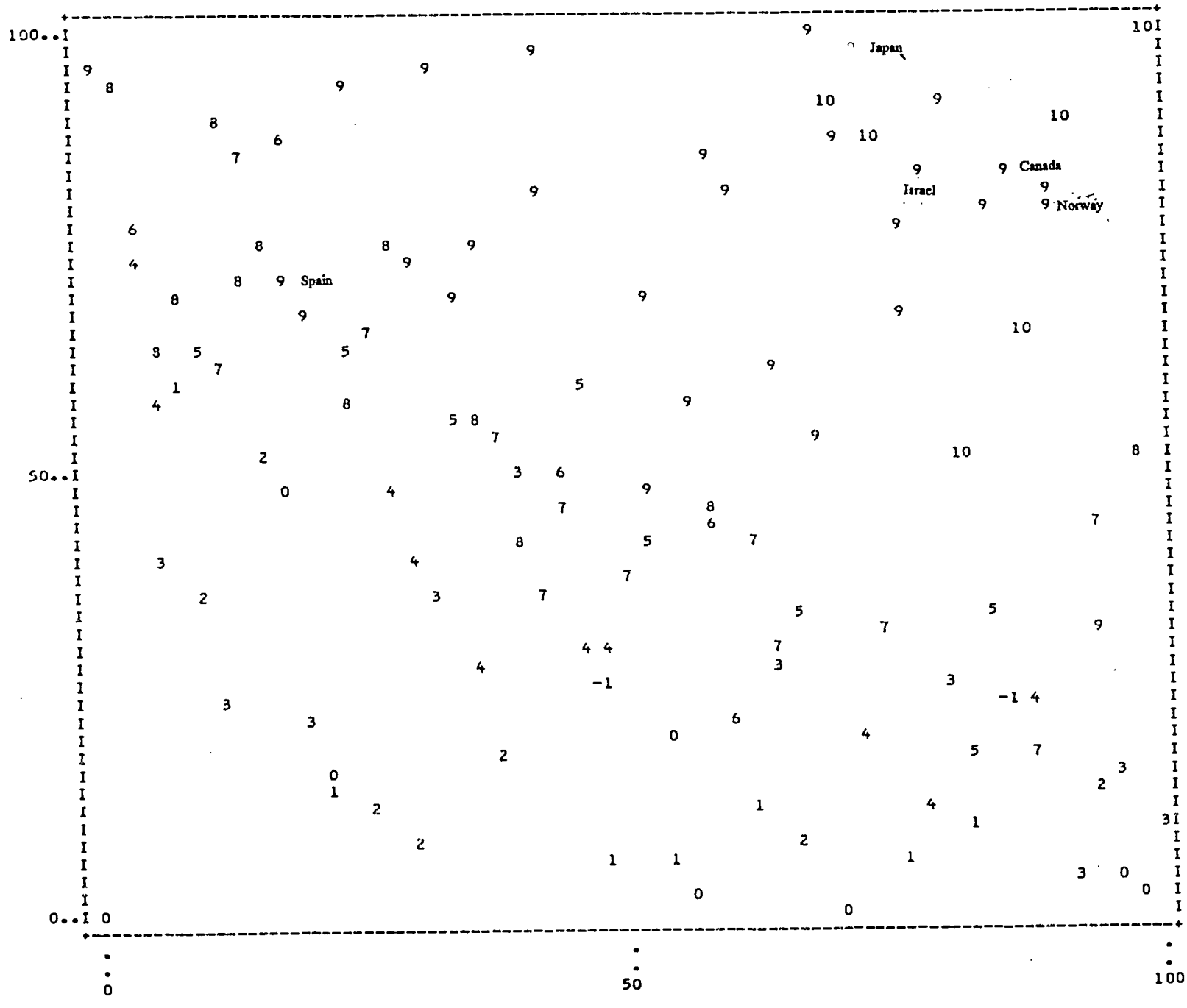


Diagram of Item number 2 : LITFEM

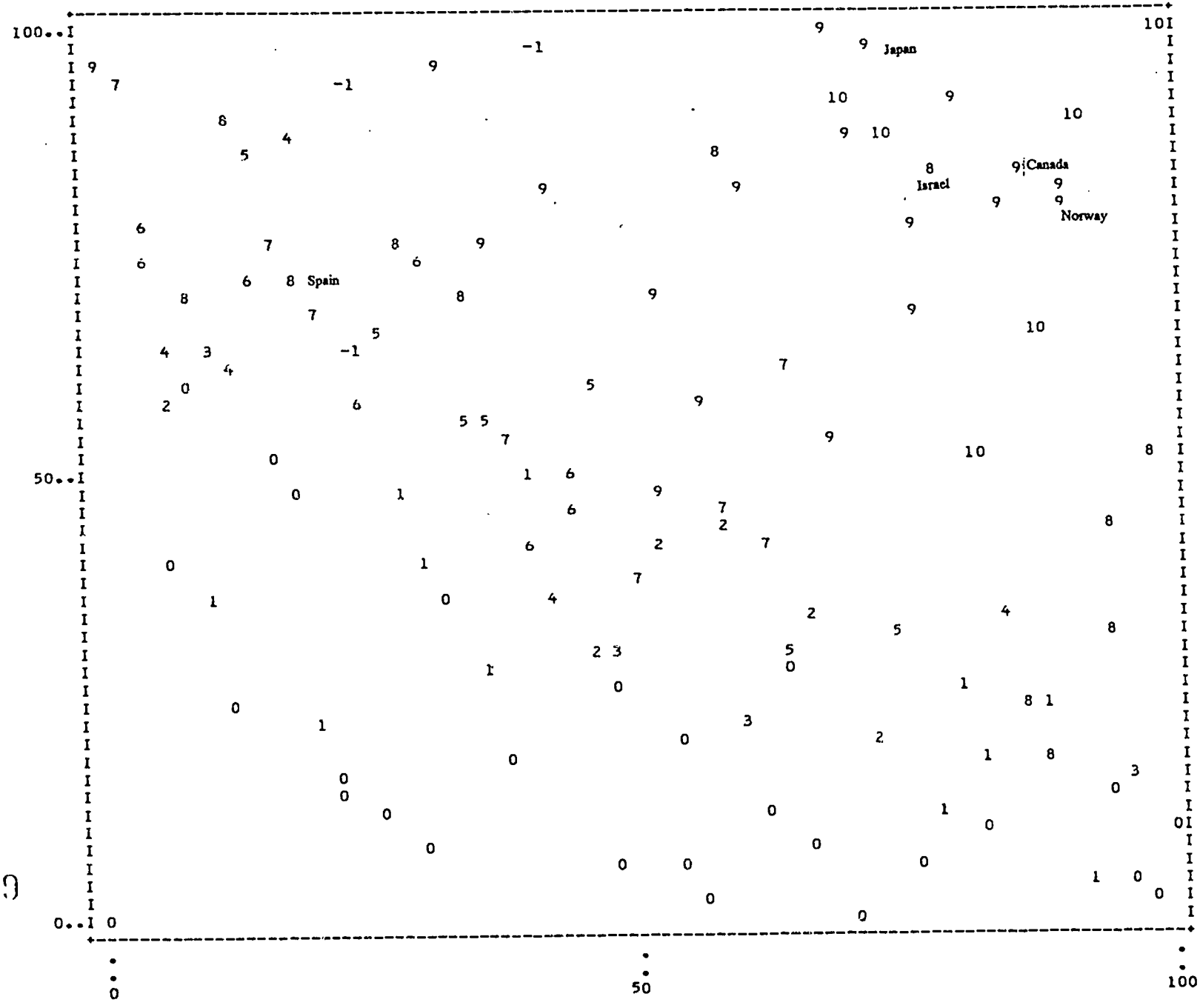


Diagram of Item number 3 : SCHRATIO

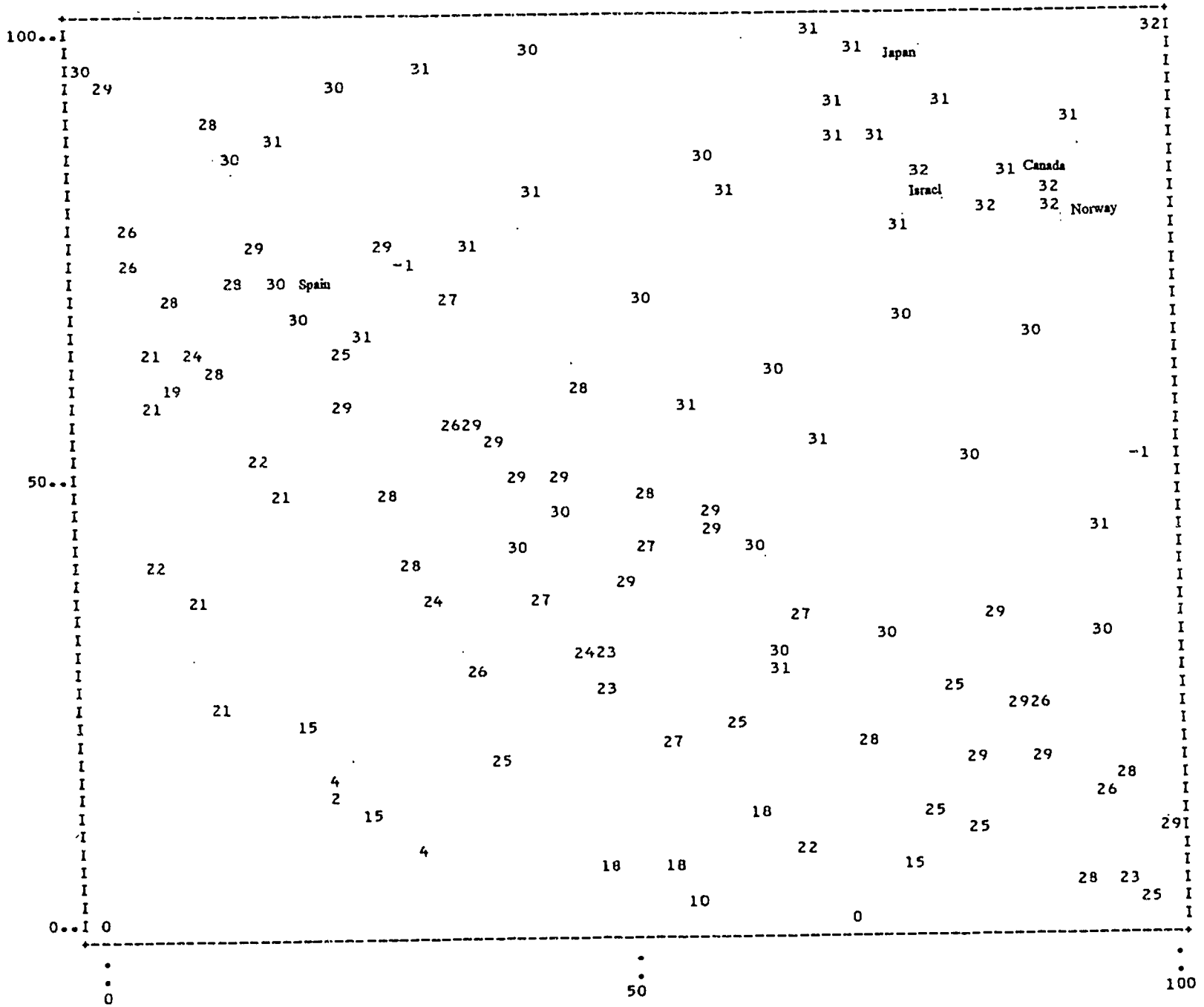


Diagram of Item number 4 : SECRATIO

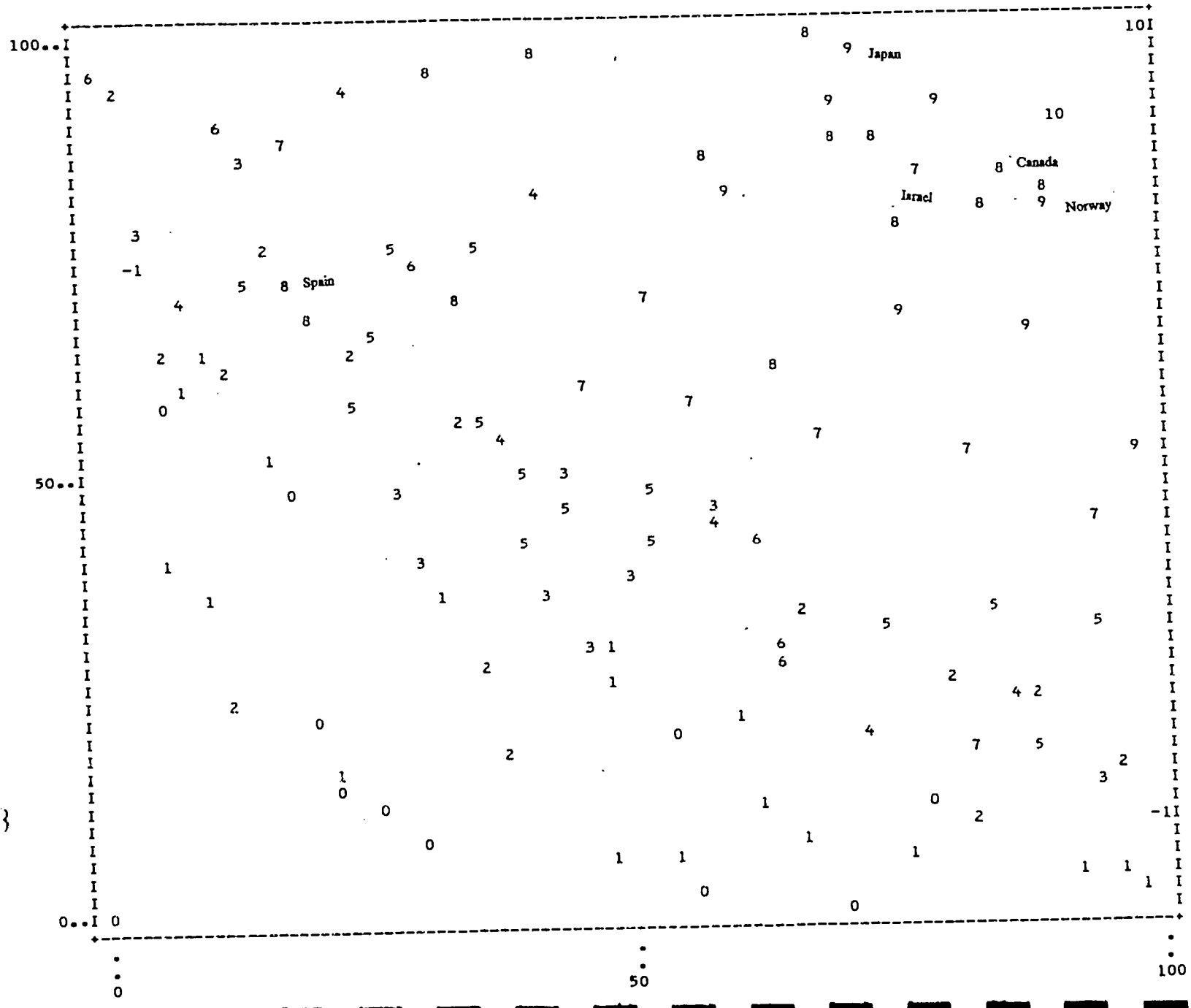


Diagram of Item number 5 : GRADUATE

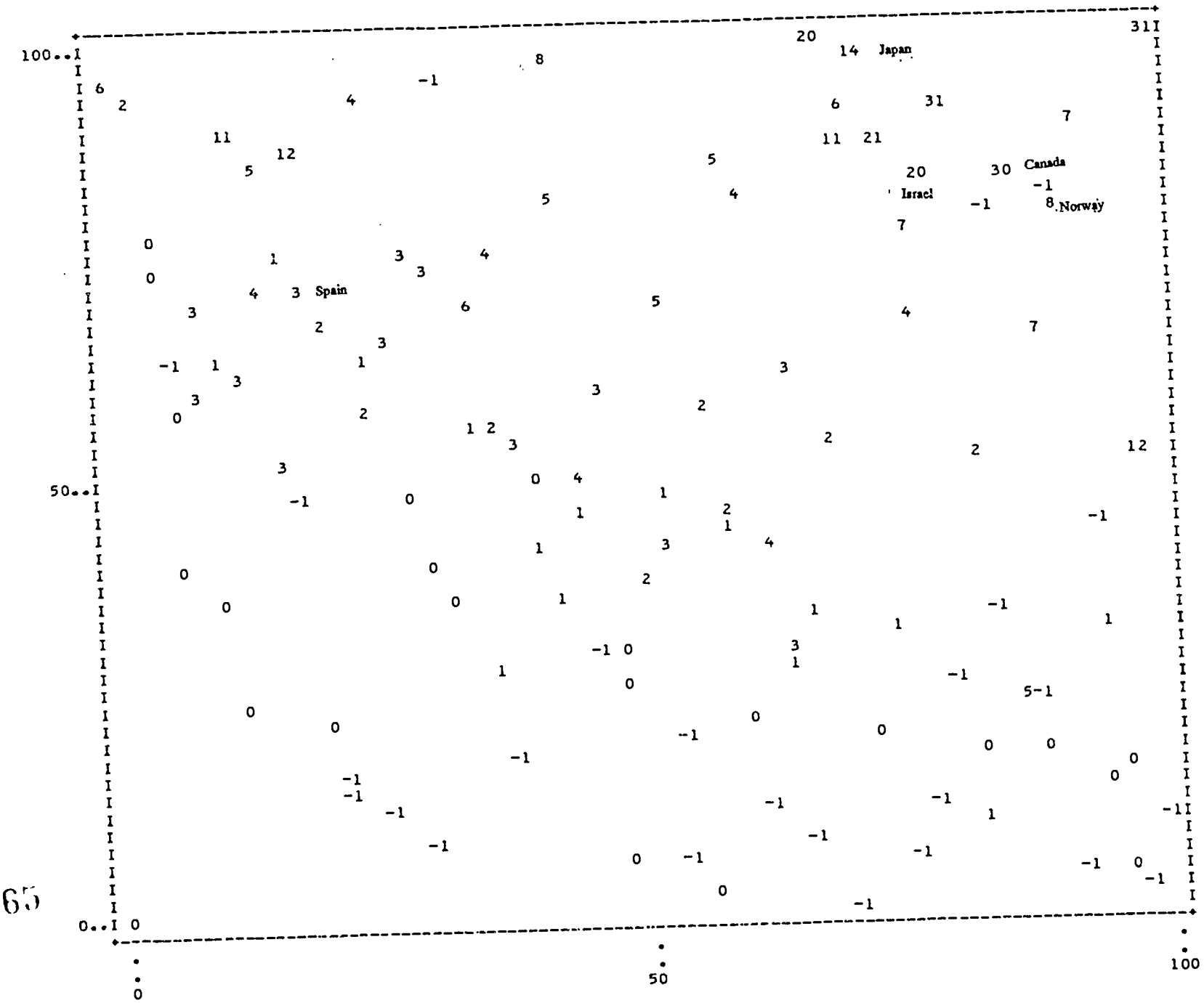


Diagram of Item number 6 : NORMMADA

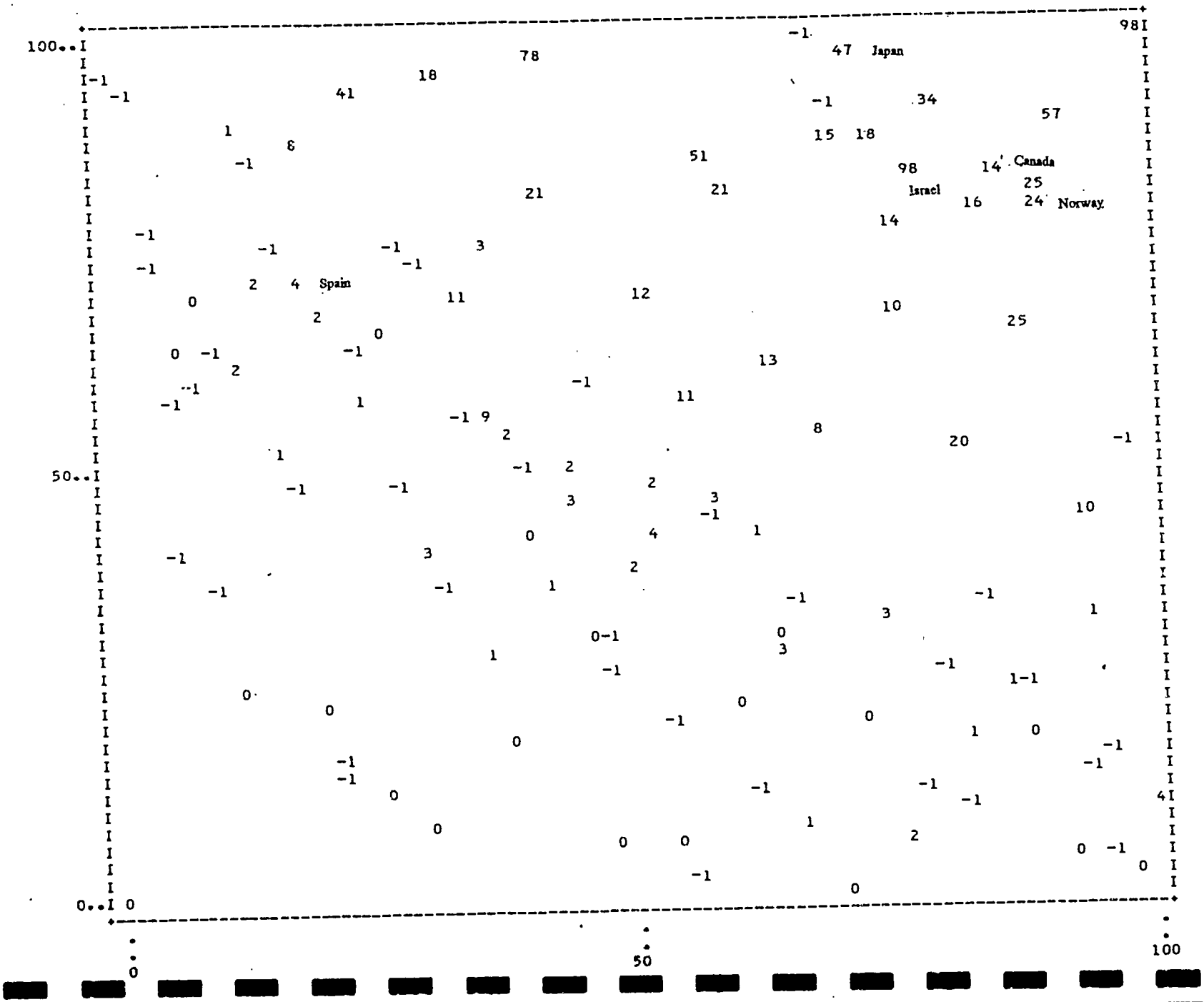
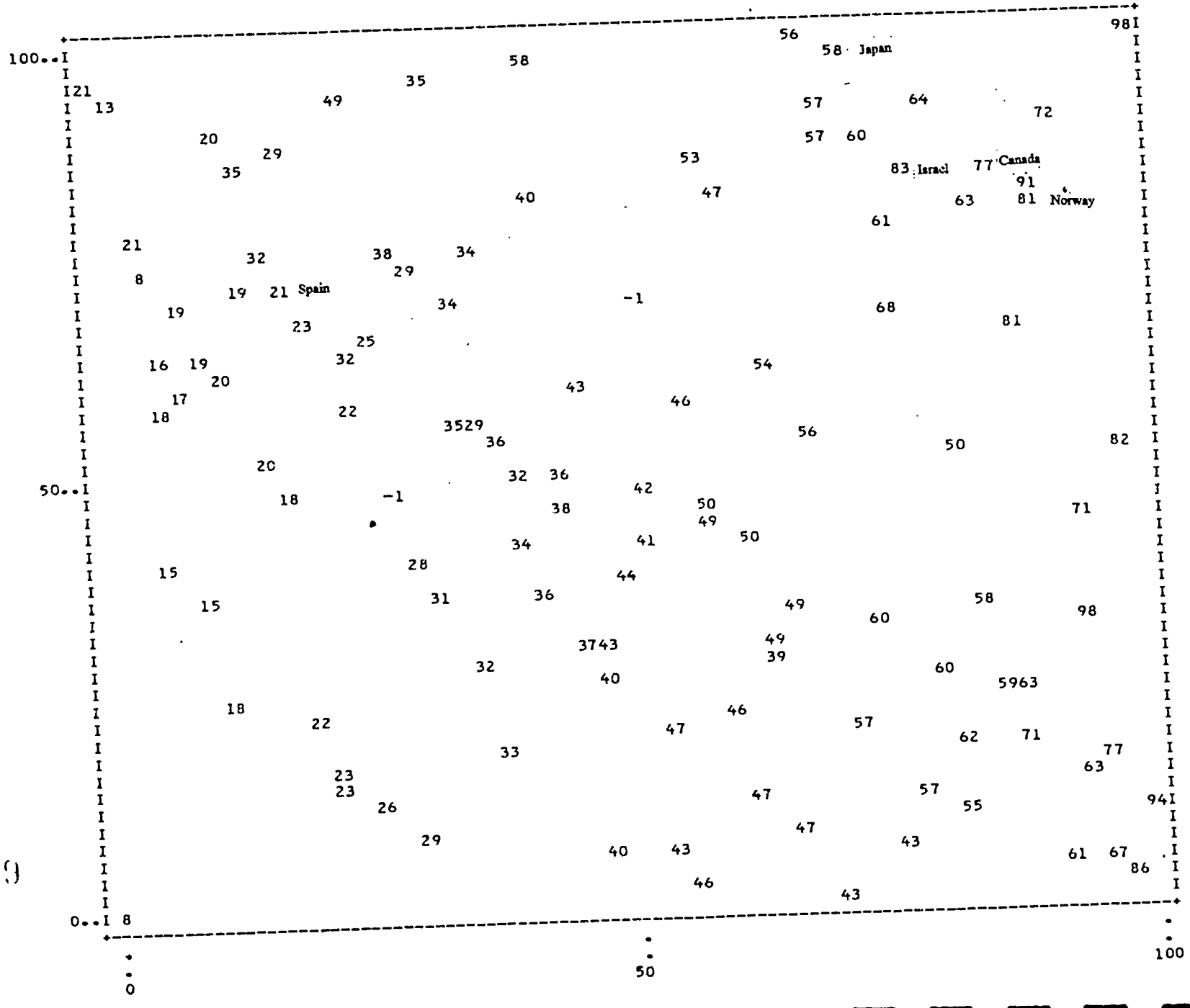


Diagram of Item number 7 : PERGNP



Institute for the Study of Educational Systems Jerusalem October 1991 Erik H. Cohen 49

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**********************
* MULTIDIMENSIONAL   *
*    STRUCTUPLE      *
*      ANALYSIS      *
*        MSA1        *
**********************
```

Number of Msa1 variables 15

Number of read cases 137
Number of rejected cases 17
Number of retained cases 120

Names of the 15 variables/indicators used in this MSA1 in order to establish the similarity between the different countries.

There are 119 different profiles

Id	Profile														Sco	Freq	User Id
	E	F	P	T	M	U	C	G	G	L	S	S	G	N	N			
	S	E	E	E	O	R	A	N	N	I	C	E	R	O	O			
	P	R	R	L	R	B	L	P	P	T	H	C	A	R	R			
	E	T	G	E	T	A	O	R		F	R	R	D	M	M			
	R		N		I	N	R	A		E	A	A	U	B	M			
	F		P		N		I	T		M	T	T	A	O	A			
	E				F			I			I	I	T	O	D			
	M							O			O	O	E	K	A			
72	4	3	0	1	3	1	2	0	1	2	3	3	0	2	0	25	1	ALBANIA
65	3	1	0	1	2	2	2	7	3	1	2	2	1	1	0	28	1	ALGERIA
114	1	1	2	1	1	1	1	0	1	1	2	1	0	1	0	14	1	ANGOLA
28	4	3	2	3	3	4	3	4	3	4	3	2	1	1	1	41	1	ARGENTI
1	4	4	3	4	3	4	3	6	5	4	3	4	4	1	3	55	1	AUSTRAL
18	4	4	3	3	3	2	3	7	5	4	3	3	1	3	1	49	1	AUSTRIA
96	2	2	1	1	1	1	1	4	1	1	2	1	1	1	0	20	1	BANGLAD
13	4	4	3	3	3	4	0	6	4	4	3	4	3	3	2	50	1	BELGIUM
107	1	1	2	1	1	1	2	4	1	1	1	1	0	0	0	17	1	BENIN
84	2	1	2	1	1	2	2	3	1	2	3	2	1	0	0	23	1	BOLIVIA
57	2	1	3	0	3	1	2	12	1	1	2	1	1	0	0	30	1	BOTSWAN
46	3	2	2	2	2	3	2	7	2	2	3	2	1	1	1	35	1	BRAZIL
23	4	4	3	2	3	3	3	0	4	4	3	4	2	2	3	44	1	BULGARI
87	2	1	1	0	2	1	2	7	1	1	1	1	0	1	1	22	1	BURUNDI
79	2	2	1	0	1	2	2	8	1	1	2	1	1	0	0	24	1	CAMEROO
6	4	4	3	4	3	3	3	7	5	4	3	4	4	0	2	53	1	CANADA
117	1	2	1	0	1	1	1	2	1	1	1	1	0	0	0	13	1	CHAD
38	4	3	2	2	3	4	2	4	2	4	3	2	1	1	0	37	1	CHILE
52	4	4	0	1	3	2	2	9	1	0	3	2	0	1	0	32	1	CHINA
42	3	2	1	2	3	3	2	6	2	3	2	2	1	2	1	35	1	COLOMBI
75	2	1	3	1	1	2	2	7	2	1	2	0	0	0	1	25	1	CONGO
40	4	2	3	1	3	2	2	5	2	4	3	2	2	1	1	37	1	COSTA R
83	2	1	3	1	1	2	2	5	1	1	2	1	0	0	1	23	1	COTE D'
32	4	4	3	3	3	3	3	0	3	3	3	3	0	1	2	38	1	CUBA
70	4	4	2	2	0	0	0	0	4	2	3	2	1	1	1	26	1	CYPRUS
33	4	4	2	3	3	3	3	0	4	0	3	2	1	3	3	38	1	CZECHOS
8	4	4	3	3	3	4	3	6	5	4	3	4	0	3	3	52	2	DENMARK
67	3	1	1	1	2	2	2	7	1	2	2	2	1	0	0	27	1	DOMINIC
51	3	3	2	1	2	2	2	7	2	2	3	2	1	0	1	33	1	ECUADOR
55	3	2	2	1	2	2	3	7	1	1	2	2	1	1	1	31	1	EGYPT
91	3	2	1	1	2	2	2	3	1	0	2	1	1	0	0	21	1	EL SALV
68	4	2	1	2	3	3	3	0	5	1	3	0	0	0	0	27	1	EMIRATE
118	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	12	1	ETHIOPI
88	3	3	2	0	0	0	0	0	2	2	3	3	1	1	1	21	1	FIJI

This number identifies each different country in the space diagram.

SWEDEN — These two countries have exactly the same profile.

14	4	4	3	3	3	2	3	7	5	4	3	4	2	3	0	50	1	FINLAND
15	4	4	2	3	3	3	3	6	5	4	3	4	0	3	3	50	1	FRANCE
50	4	4	3	3	0	0	0	0	5	0	3	4	3	1	3	33	1	GERMANY
9	4	4	2	3	3	4	3	6	5	4	3	4	1	3	3	52	1	GERMANY
100	2	1	1	1	2	1	1	2	1	1	2	2	1	0	1	19	1	GHANA
24	4	4	1	2	3	3	3	7	3	3	3	4	1	2	1	44	1	GREECE
92	2	1	1	1	2	1	2	5	1	1	2	1	1	0	0	21	1	GUATEMA
116	1	1	2	1	1	1	1	0	1	1	1	1	0	0	1	13	1	GUINEA
82	4	3	3	0	0	0	0	0	1	4	3	2	1	1	1	23	1	GUYANA
102	2	2	1	1	1	1	1	4	1	1	2	1	1	0	0	19	1	HAITI
78	3	1	2	1	2	2	2	4	1	2	2	1	1	0	0	24	1	HONDURA
26	4	4	1	3	3	4	2	10	4	2	0	3	1	0	0	41	1	HONG KO
16	4	4	2	3	3	2	3	9	3	4	3	2	2	3	3	50	1	HUNGARY
80	2	2	1	1	1	1	2	6	1	1	2	1	1	1	1	24	1	INDIA
64	2	3	1	1	2	1	2	8	1	1	2	1	1	1	1	28	1	INDONES
81	3	2	1	1	2	3	2	0	3	1	3	2	1	0	0	24	1	IRAK
76	2	2	3	1	2	2	3	0	2	1	2	2	1	1	1	25	1	IRAN
19	4	3	3	3	3	2	3	6	3	4	3	4	1	3	2	47	1	IRELAND
7	4	3	3	3	3	4	3	7	4	4	3	3	4	2	3	53	1	ISRAEL
20	4	4	2	3	3	3	3	7	4	4	3	3	1	1	2	47	1	ITALY
43	4	3	3	2	3	2	2	2	2	4	3	2	1	1	1	35	1	JAMAICA
2	4	4	3	4	3	3	2	8	5	4	3	4	4	1	3	55	1	JAPAN
66	3	1	3	1	3	3	2	0	2	1	3	3	1	0	1	27	1	JORDAN
73	3	1	3	1	2	1	2	6	1	1	2	1	0	0	1	25	1	KENYA
17	3	4	2	2	3	3	2	11	3	4	2	4	2	3	2	50	1	KOREA S
34	4	2	1	3	3	4	3	0	5	1	3	3	4	1	1	38	1	KUWEIT
74	3	2	1	0	1	1	2	9	1	2	2	0	1	0	0	25	1	LESOTHO
105	2	1	3	1	1	2	2	0	1	1	2	1	1	0	0	18	1	LIBERIA
60	3	1	2	1	2	3	3	1	4	1	3	3	1	0	1	29	1	LYBIAN
93	2	1	2	1	1	1	2	2	1	1	2	2	0	1	1	20	1	MADAGAS
99	1	1	1	0	1	1	2	5	1	1	1	1	1	1	1	19	1	MALAWI
44	4	2	3	2	3	2	2	8	2	1	3	2	0	1	0	35	1	MALAYSI
101	1	1	2	0	1	1	2	5	1	1	1	1	1	1	0	19	1	MALI
113	1	1	3	0	1	1	2	3	1	0	1	1	0	0	0	15	1	MAURITA
35	4	4	3	2	3	2	2	7	2	1	3	2	1	1	1	38	1	MAURITI
39	3	3	2	2	3	3	3	6	2	2	3	2	1	1	1	37	1	MEXICO
85	3	2	0	1	2	2	2	0	1	0	3	4	1	2	0	23	1	MONGOLI
69	3	2	3	1	2	2	2	6	1	1	2	1	0	0	0	26	1	MOROCCO
119	1	1	0	1	1	1	1	0	1	1	1	1	0	1	0	11	1	MOZAMBI
97	3	2	1	1	2	1	2	0	1	1	2	1	0	1	1	19	1	MYANMAR
115	1	1	1	0	1	1	2	0	1	1	2	1	1	0	1	14	1	NEPAL
5	4	4	3	3	3	4	3	6	4	4	3	4	3	3	3	54	1	NETHERL
11	4	4	3	3	3	4	3	5	4	4	3	4	4	3	0	51	1	NEW ZEA
77	3	2	2	1	2	2	2	1	1	2	2	2	0	1	1	24	1	NICARAG
111	1	1	2	1	1	1	2	2	1	1	1	1	0	0	1	16	1	NIGER
89	2	1	1	1	1	1	2	5	1	1	2	1	0	1	1	21	1	NIGERIA
3	4	4	3	3	3	3	3	7	5	4	3	4	3	3	3	55	1	NORWAY
62	2	1	1	4	3	1	0	10	3	0	2	1	0	0	0	28	1	OMAN
86	2	1	1	1	1	1	2	6	1	1	2	1	1	0	1	22	1	PAKISTA
30	4	3	3	2	3	2	2	6	3	3	3	3	1	0	1	39	1	PANAMA
58	3	2	1	1	3	2	2	7	1	3	3	1	1	0	0	30	1	PARAGUA
63	3	2	1	1	2	3	2	4	1	2	2	2	1	1	1	28	1	PERU
45	3	3	1	1	3	2	2	5	1	4	2	3	3	1	1	35	1	PHILIPP
36	4	4	0	3	3	3	3	0	3	4	3	3	2	1	2	38	1	POLAND
27	4	4	2	2	3	1	3	7	3	2	3	2	1	3	1	41	1	PORTUGA
104	1	2	2	1	1	2	1	3	1	1	1	1	0	0	1	18	1	REP. CE
47	4	4	1	2	3	2	3	0	3	4	3	3	1	1	0	34	1	ROMANIA
108	1	1	1	0	1	1	1	5	1	1	1	1	0	1	1	17	1	RWANDA
48	3	1	3	3	2	3	3	8	4	0	3	1	0	0	0	34	1	SAUDI A
98	1	1	2	1	2	1	2	3	1	1	1	1	1	0	1	19	1	SENEGAL
112	1	1	2	1	1	1	1	0	1	1	2	1	1	1	0	15	1	SIERRA
25	4	4	1	0	3	4	2	11	4	2	3	2	1	0	2	43	1	SINGAPO
110	1	1	1	0	1	1	2	4	1	1	2	1	0	0	0	16	1	SOMALIA
61	3	2	2	1	2	2	2	5	2	2	2	3	1	0	0	29	1	SOUTH A

21	4	4	1	3	3	3	3	6	3	4	3	4	1	3	1	46	1	SPAIN
49	4	3	1	1	3	1	2	7	1	2	3	2	1	1	1	33	1	SRI LAN
94	2	1	2	1	1	1	2	4	1	1	2	1	0	0	1	20	1	SUDAN
12	4	4	3	4	3	3	3	5	5	4	3	3	1	3	3	51	1	SWITZER
56	3	1	2	1	3	2	3	7	2	1	3	2	1	0	0	31	1	SYRIA
95	2	1	3	1	1	1	2	3	1	1	2	1	0	1	0	20	1	TANZANI
53	3	4	1	1	3	1	2	8	1	2	3	1	1	1	0	32	1	THAILAN
90	2	1	3	0	1	1	2	4	1	1	2	2	1	0	0	21	1	TOGO
31	4	3	2	3	3	3	3	5	3	4	2	2	1	0	1	39	1	TRINIDA
59	3	2	2	1	3	2	2	7	2	1	2	1	1	1	0	30	1	TUNISIA
54	3	2	2	2	2	2	3	6	2	1	2	2	1	1	1	32	1	TURKEY
109	2	1	1	1	1	1	2	1	1	1	2	1	1	0	0	16	1	UGANDA
4	4	4	3	4	3	4	3	6	4	4	3	4	3	3	3	55	1	UNITED
10	4	4	3	4	3	3	3	5	5	4	3	4	4	0	3	52	1	UNITED
37	4	3	1	2	3	4	2	5	2	4	3	2	2	1	0	38	1	URUGUAY
29	4	3	3	3	3	3	3	0	0	4	3	4	3	1	3	40	1	USSR
41	4	2	3	2	3	4	2	3	3	3	3	2	1	0	1	36	1	VENEZUE
22	4	4	3	2	3	2	3	7	3	3	3	4	1	2	2	46	1	YUGOSLA
106	2	1	3	1	1	1	2	2	1	1	2	1	0	0	0	18	1	ZAIRE
103	2	1	2	1	2	2	0	2	1	1	2	1	1	0	1	19	1	ZAMBIA
71	3	2	2	1	3	1	2	5	1	1	2	1	1	1	0	26	1	ZIMBABW

DIMENSIONALITY 2

Serial Number	Distance from Centroid	Plotted Coordinates 1	2
1	48.82	2.96	82.26
2	42.17	7.53	77.40
3	49.82	0.05	80.45
4	51.39	0.04	82.86
5	49.03	0.00	79.11
6	47.23	1.63	78.25
7	35.46	5.12	60.46
8	49.20	0.13	79.55
9	40.71	5.04	71.92
10	50.98	0.84	83.15
11	46.22	1.13	75.93
12	39.27	5.70	70.30
13	46.24	0.72	75.39
14	38.47	4.78	67.18
15	43.42	3.01	73.75
16	28.56	10.25	51.95
17	21.41	18.12	42.89
18	26.89	12.71	56.03
19	28.06	10.70	51.32
20	25.96	12.75	50.73
21	26.87	12.90	56.60
22	27.87	13.76	36.40
23	37.01	2.54	57.02
24	24.82	17.79	35.50
25	19.92	21.80	38.33
26	18.49	20.77	44.24
27	19.88	25.12	34.38
28	21.54	20.17	37.87
29	38.61	4.50	66.96
30	31.61	25.88	20.04
31	20.28	23.51	35.46
32	29.89	8.98	45.41
33	30.82	8.72	56.27
34	20.88	19.89	58.10
35	23.96	32.12	25.89
36	32.91	5.77	50.43
37	27.14	23.33	26.55
38	29.07	25.78	22.88
39	40.85	31.07	8.81
40	23.35	31.28	26.79
41	28.02	26.39	23.75
42	41.57	37.97	7.38
43	30.37	28.83	20.21
44	28.37	34.36	20.90
45	13.55	39.09	35.41
46	46.37	40.55	2.62
47	24.00	19.23	34.84
48	8.68	30.13	50.57
49	18.77	42.58	30.59
50	53.26	0.52	86.12
51	48.38	44.08	0.87
52	13.04	34.51	36.58
53	12.16	46.55	39.70
54	40.22	45.09	9.24
55	29.55	50.69	21.96
56	25.59	41.44	23.51
57	22.52	57.65	61.04

These details indicate the place of each profile in the space diagram for Dimensionality 2 with the help of the coordinates.

The serial number refers to the identity of each country. For example, (7) refers to Israel.

71

58	23.63	46.88	26.79
59	28.75	51.47	23.22
60	14.54	38.61	34.41
61	47.20	48.93	2.88
62	22.91	48.93	69.42
63	34.41	50.88	16.79
64	21.92	59.61	42.52
65	30.23	52.16	21.90
66	20.23	39.96	28.75
67	34.86	55.75	18.57
68	16.83	22.08	46.01
69	25.05	57.44	32.38
70	29.20	26.39	22.45
71	19.87	56.33	39.89
72	18.74	35.53	30.47
73	22.47	61.03	46.95
74	25.59	59.56	34.20
75	19.87	57.77	43.53
76	28.95	48.74	21.82
77	39.75	53.14	11.93
78	30.13	58.03	25.87
79	24.11	62.75	48.34
80	24.84	63.31	51.95
81	32.22	44.79	17.31
82	16.98	29.77	34.48
83	24.77	62.03	57.11
84	20.42	53.86	35.32
85	28.69	42.60	20.53
86	29.53	66.08	59.90
87	30.62	65.74	63.23
88	48.98	36.82	0.00
89	30.14	66.02	61.57
90	23.23	60.35	57.24
91	30.72	58.57	25.56
92	27.13	65.53	52.64
93	23.73	62.25	51.47
94	30.95	66.80	61.81
95	30.89	64.05	66.54
96	31.44	66.46	63.62
97	27.23	63.06	36.86
98	31.72	66.09	64.87
99	39.03	(66.79	75.99
100	25.31	63.86	51.27
101	41.02	67.09	78.51
102	33.99	68.17	65.80
103	23.88	61.58	42.24
104	38.32	67.79	73.83
105	26.11	63.46	57.09
106	33.78	65.70	69.17
107	47.78	70.91	84.20
108	53.03	70.93	91.02
109	31.84	67.22	62.99
110	43.55	70.41	78.74
111	43.16	69.39	79.25
112	42.65	70.26	77.58
113	54.65	68.22	94.90
114	47.97	72.37	83.07
115	37.66	69.35	70.76
116	56.66	74.62	92.72
117	56.85	73.35	93.98
118	59.37	75.00	95.88
119	63.55	76.50	100.00

Space Diagram for Dimensionality 2 . Axis 1 versus Axis 2 .

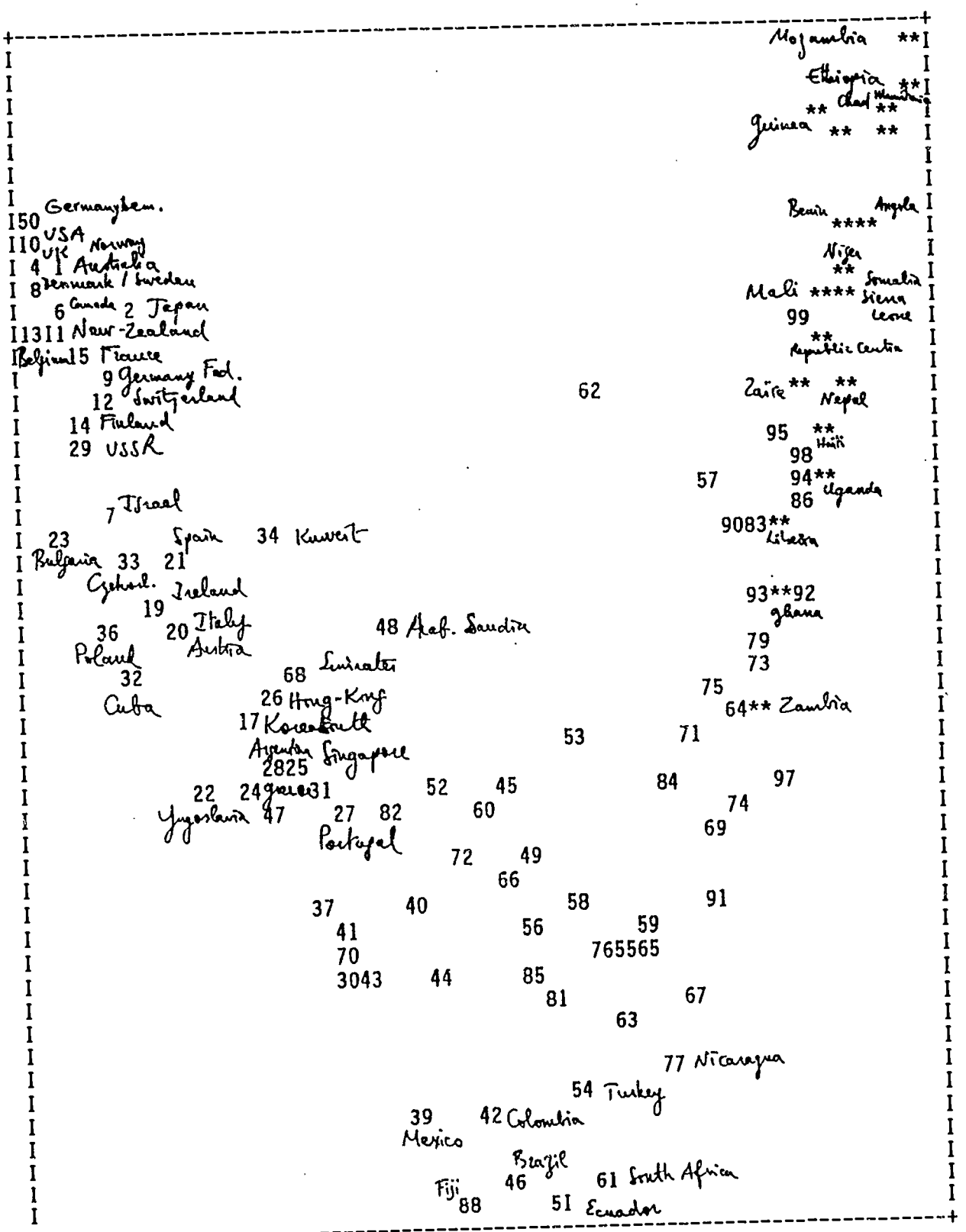


Diagram of Item number 1 : ESPERFEM

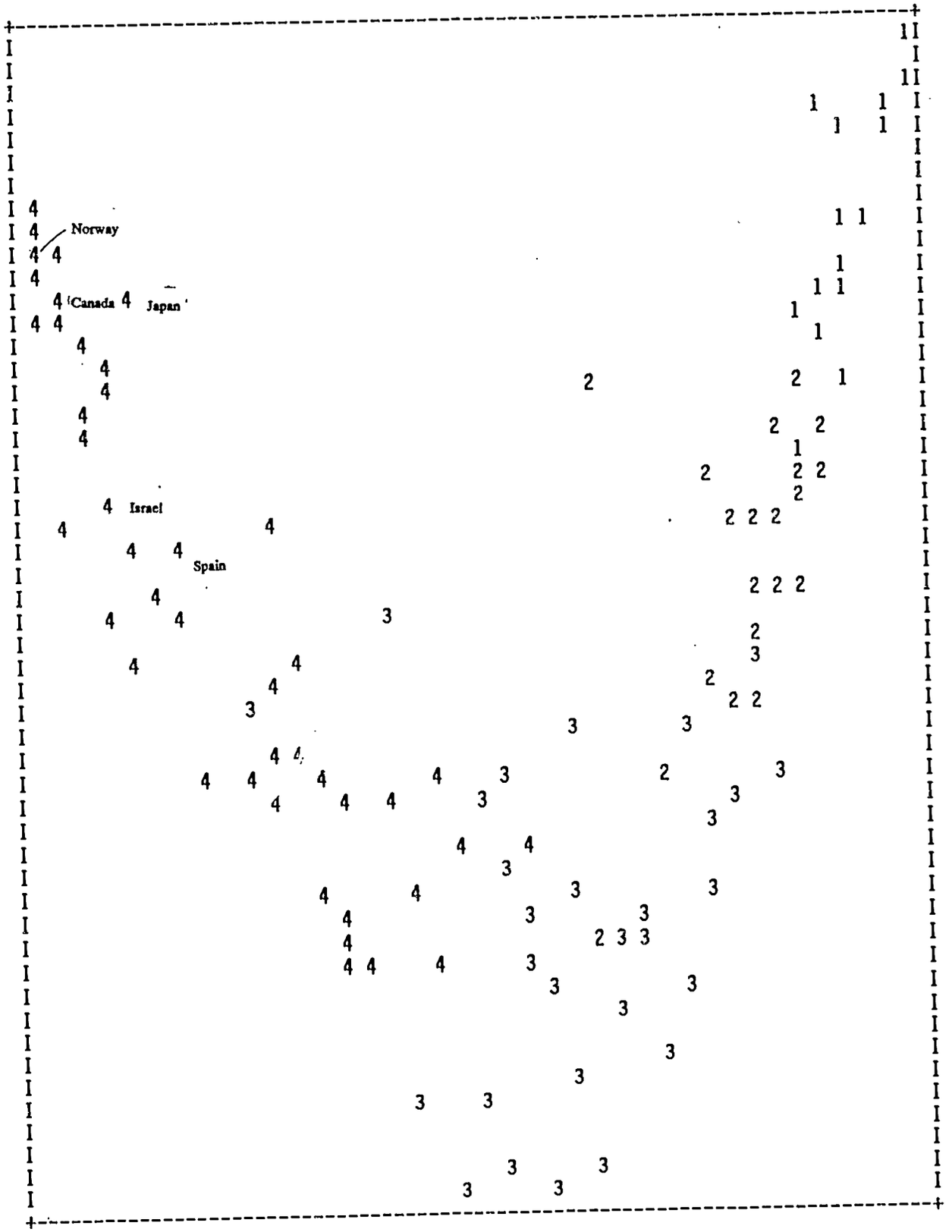


Diagram of Item number 2 : FERT

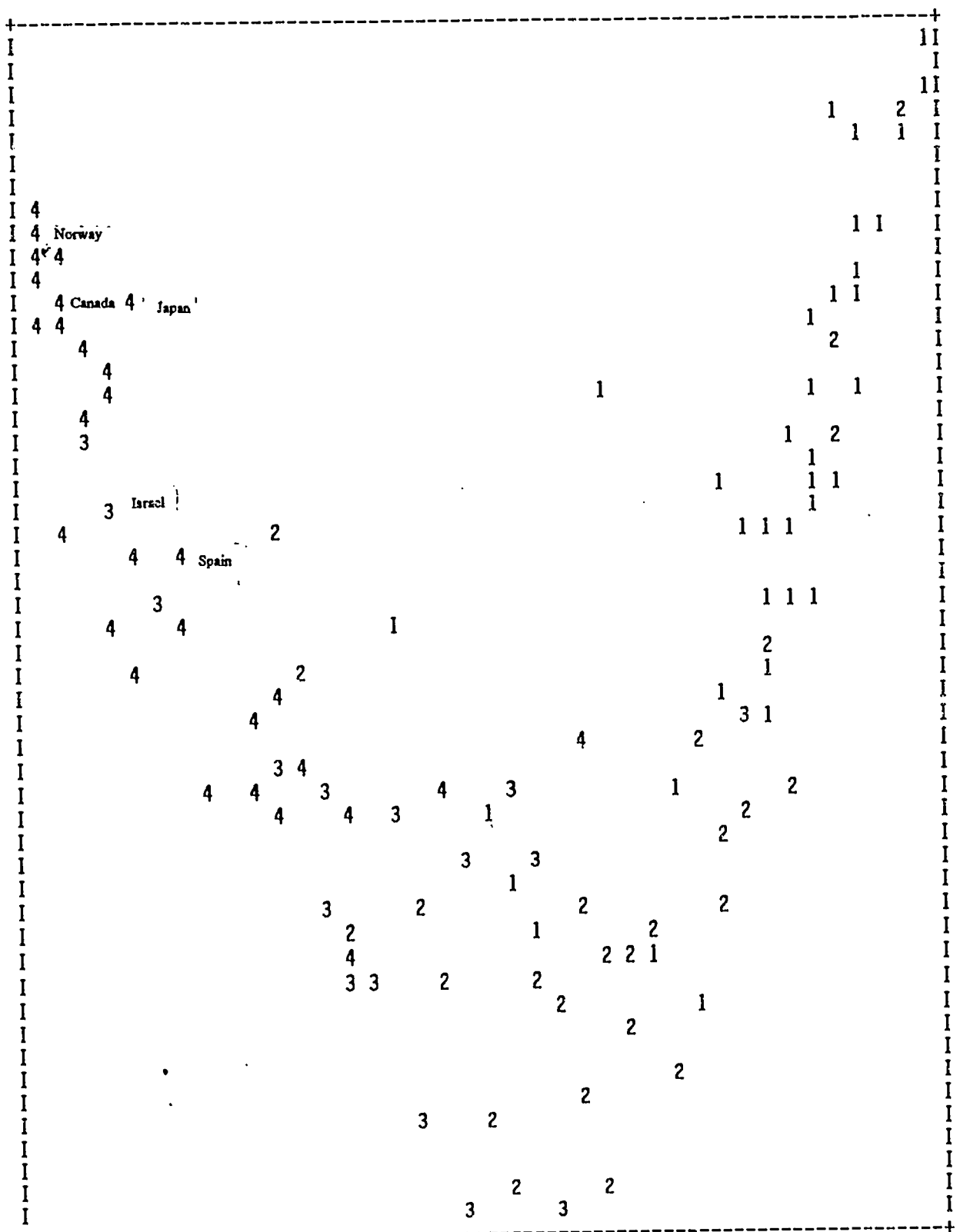


Diagram of Item number 3 : PERGNP

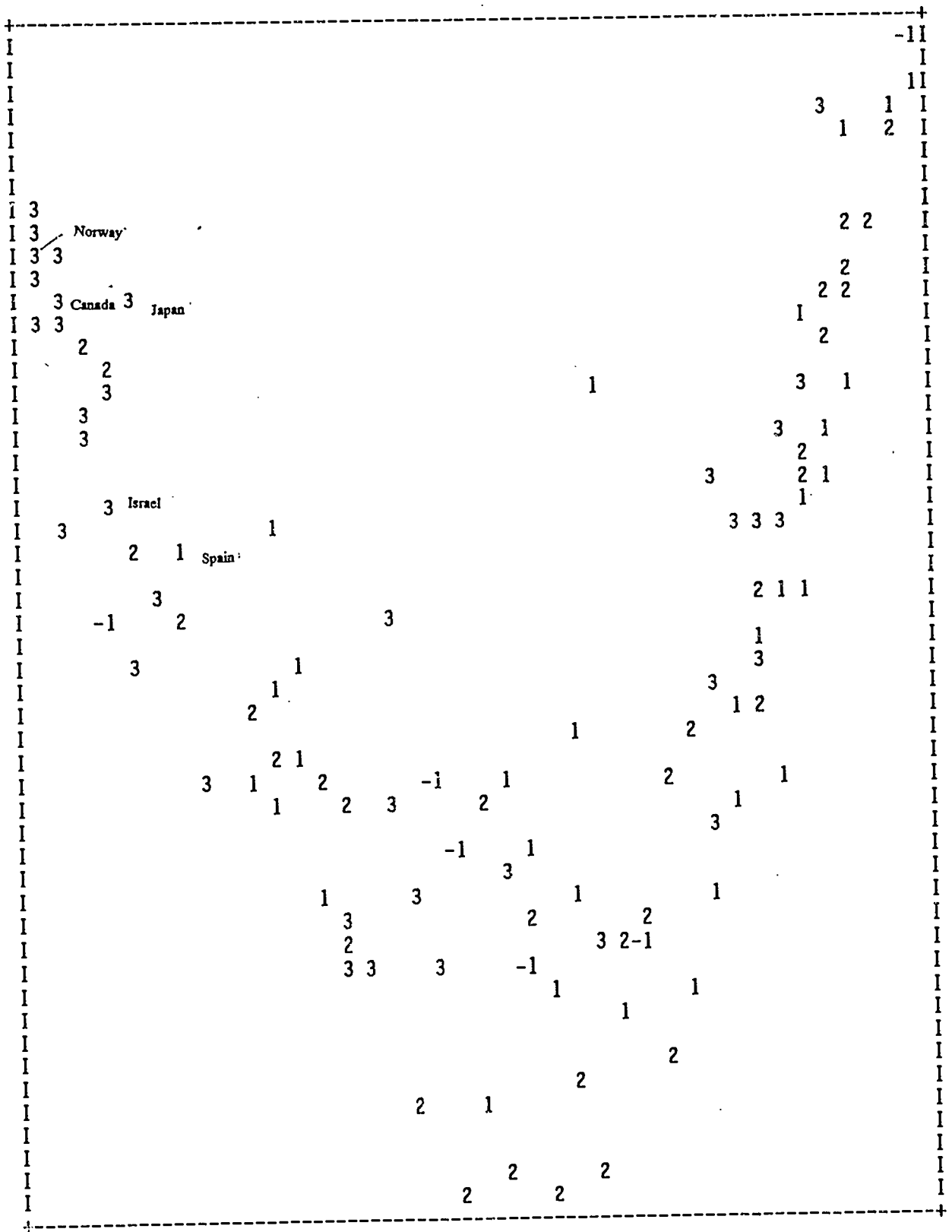


Diagram of Item number 4 : TELE

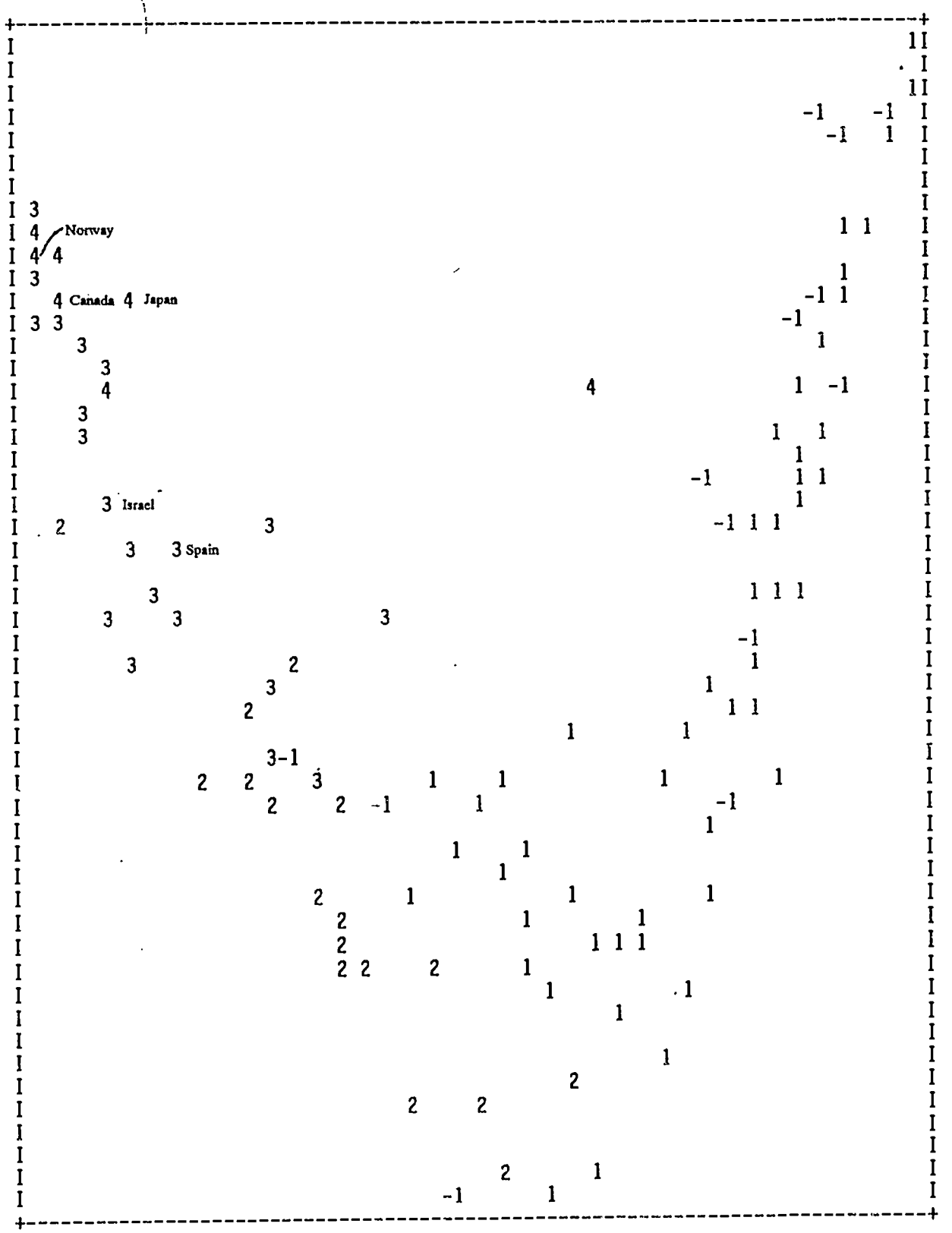


Diagram of Item number 5 : MORTINF

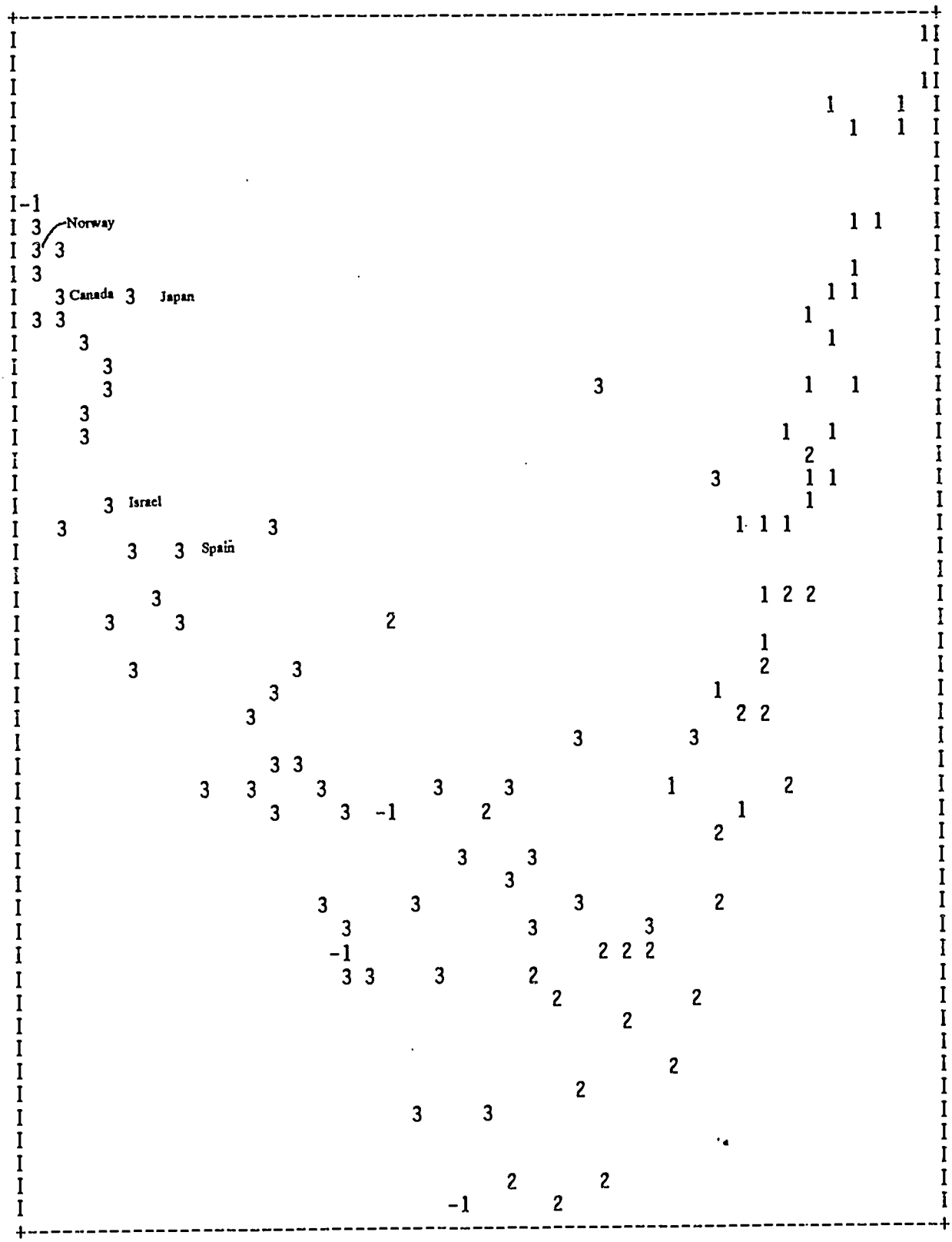


Diagram of Item number 6 : URBAN

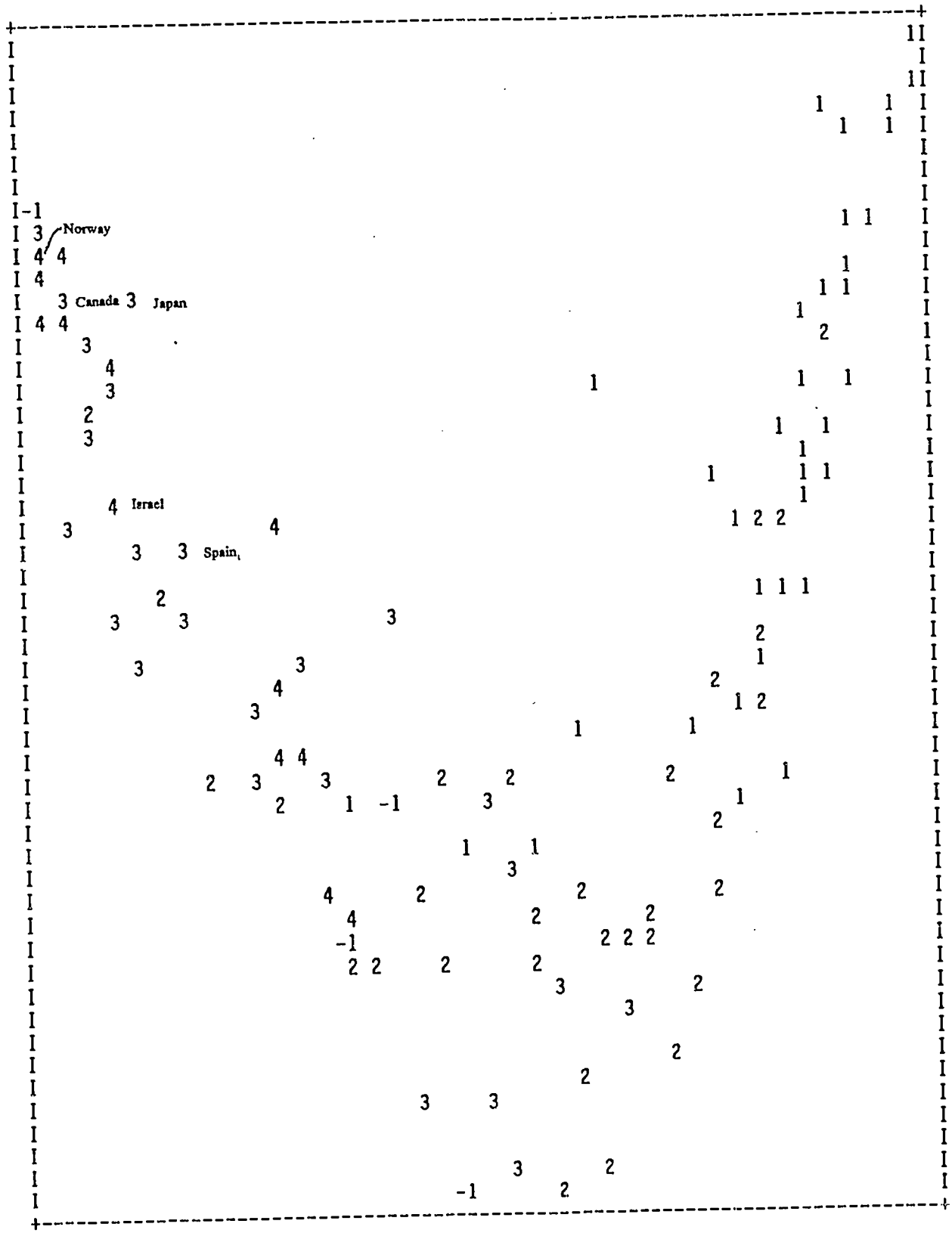


Diagram of Item number 7 : CALORI

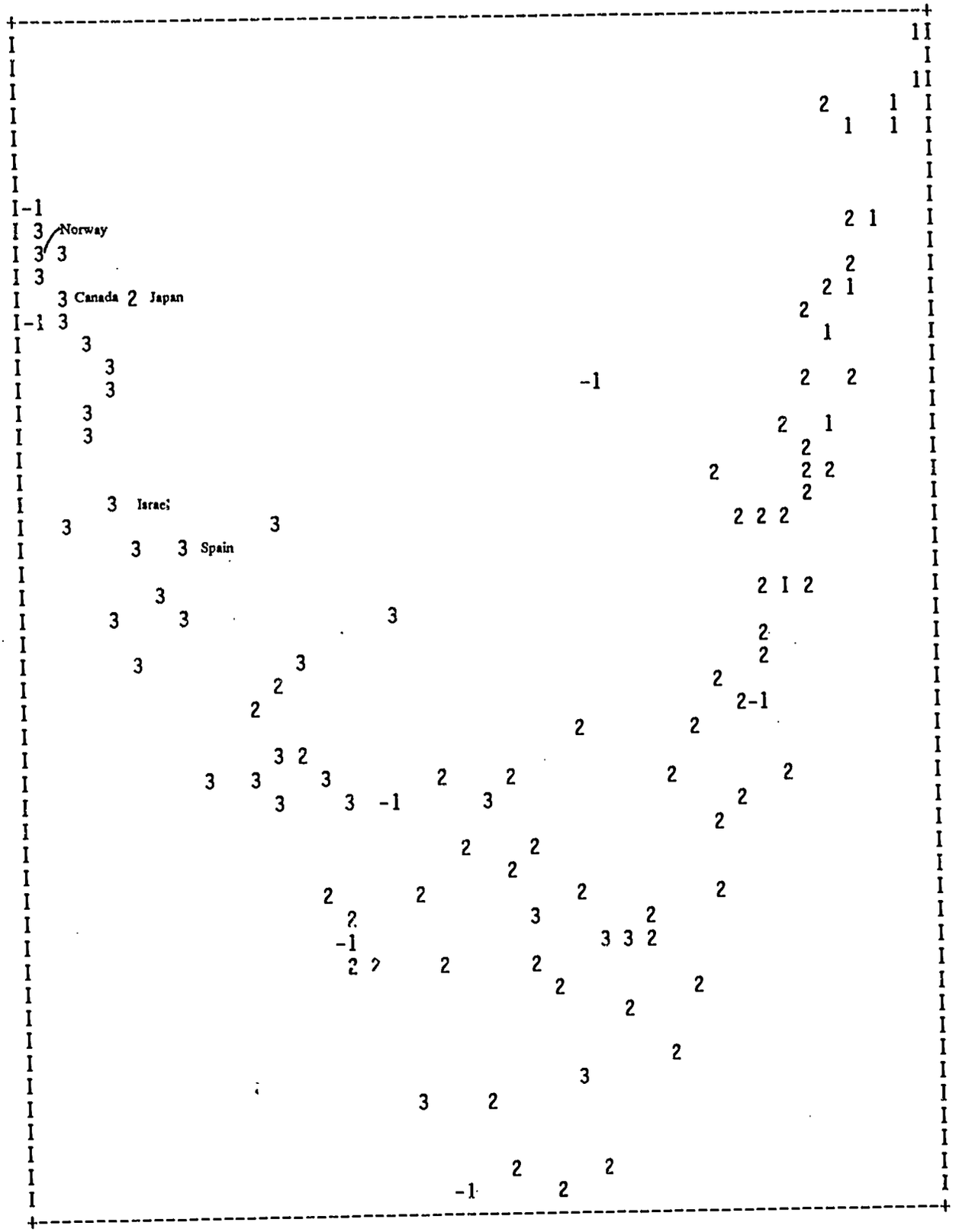


Diagram of Item number 8 : GNPRATIO

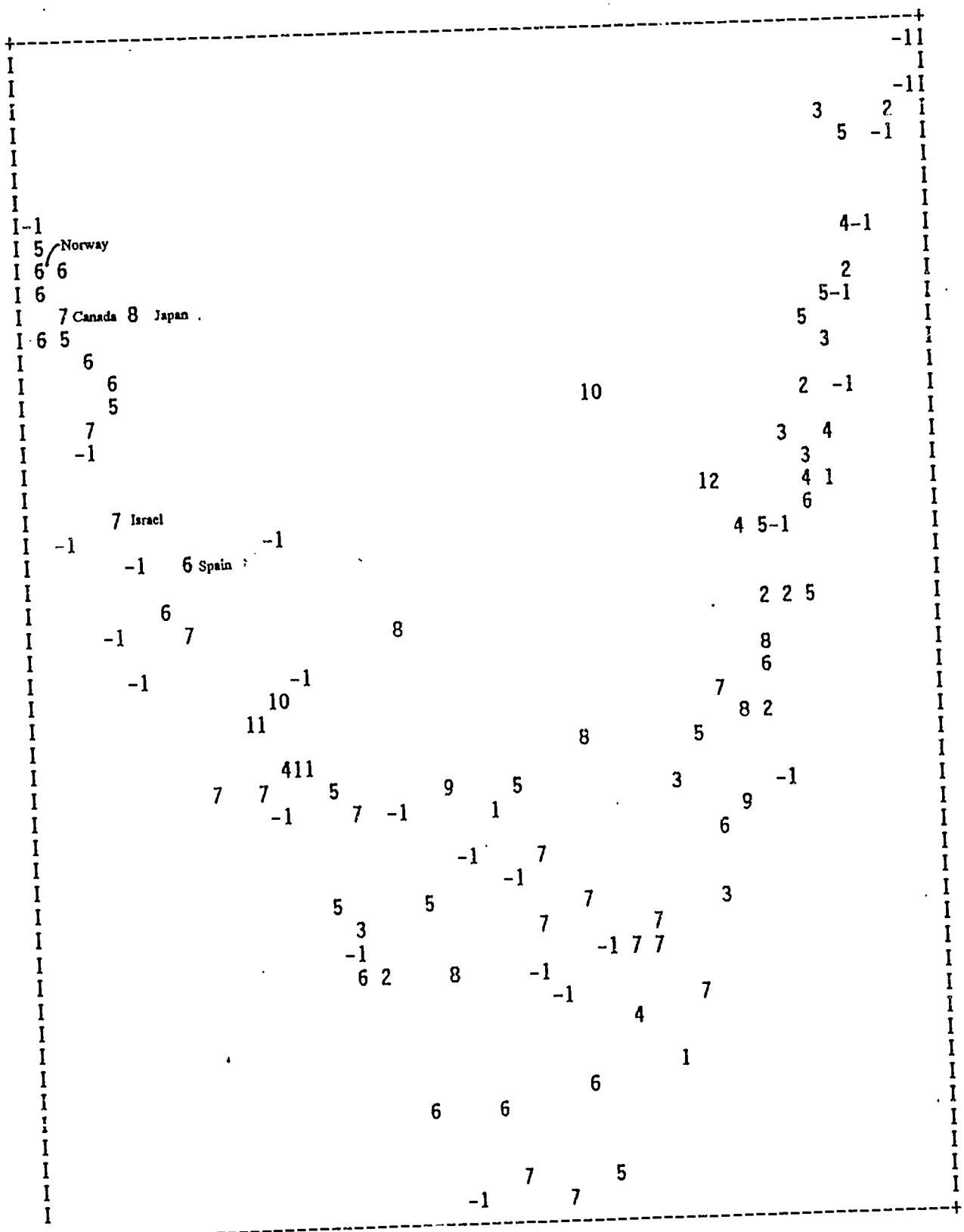


Diagram of Item number 9 : GNP

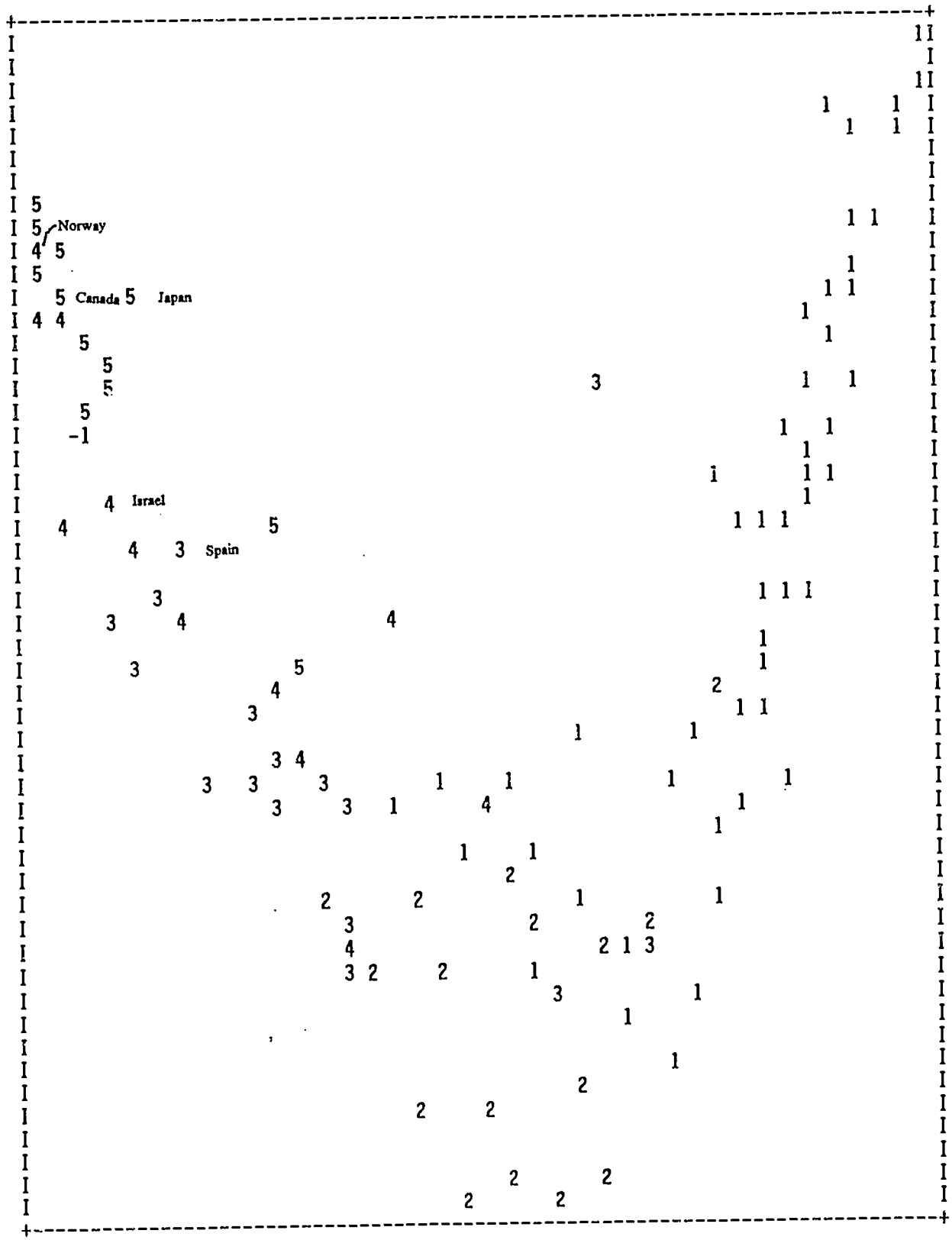


Diagram of Item number 10 : LITFEM

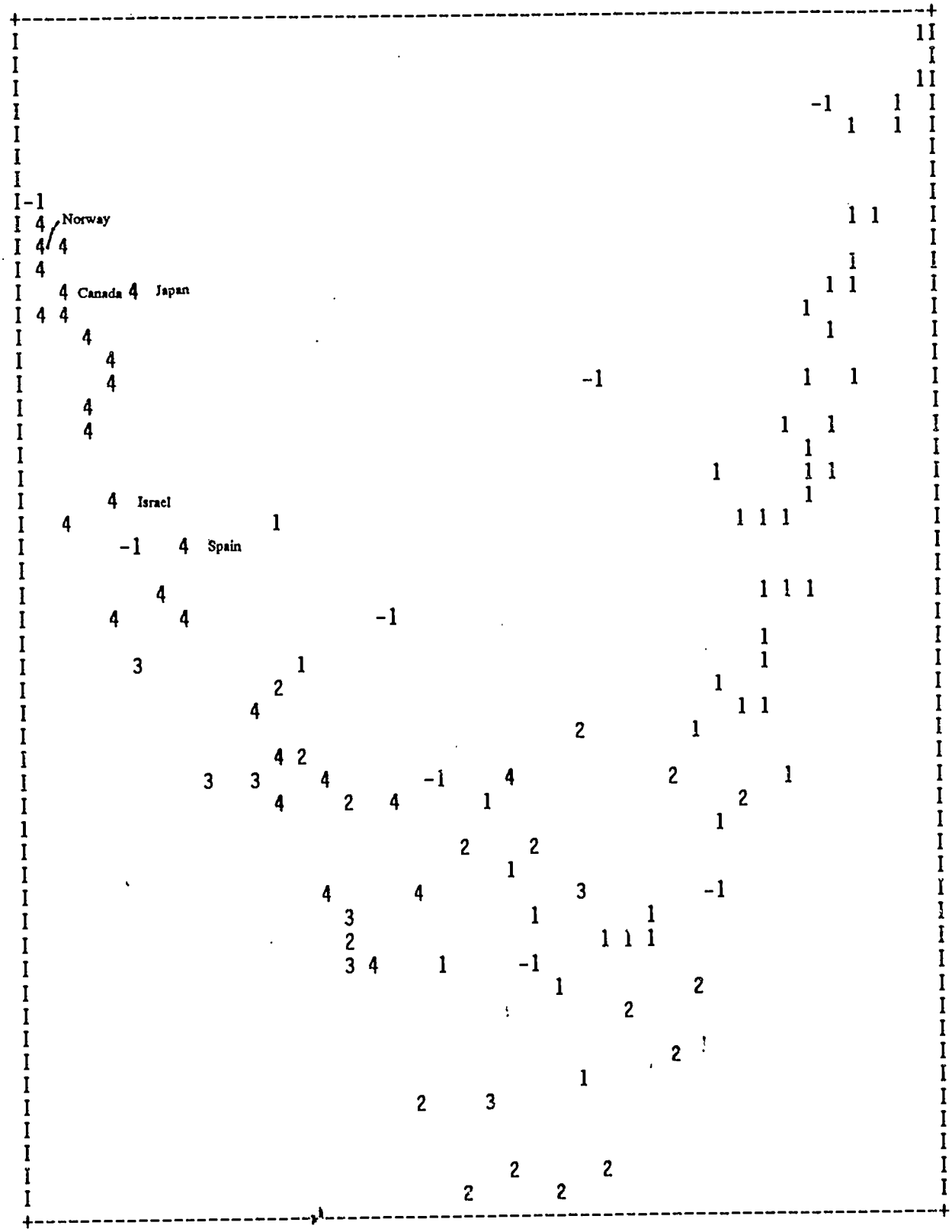


Diagram of Item number 11 : SCHRATIO

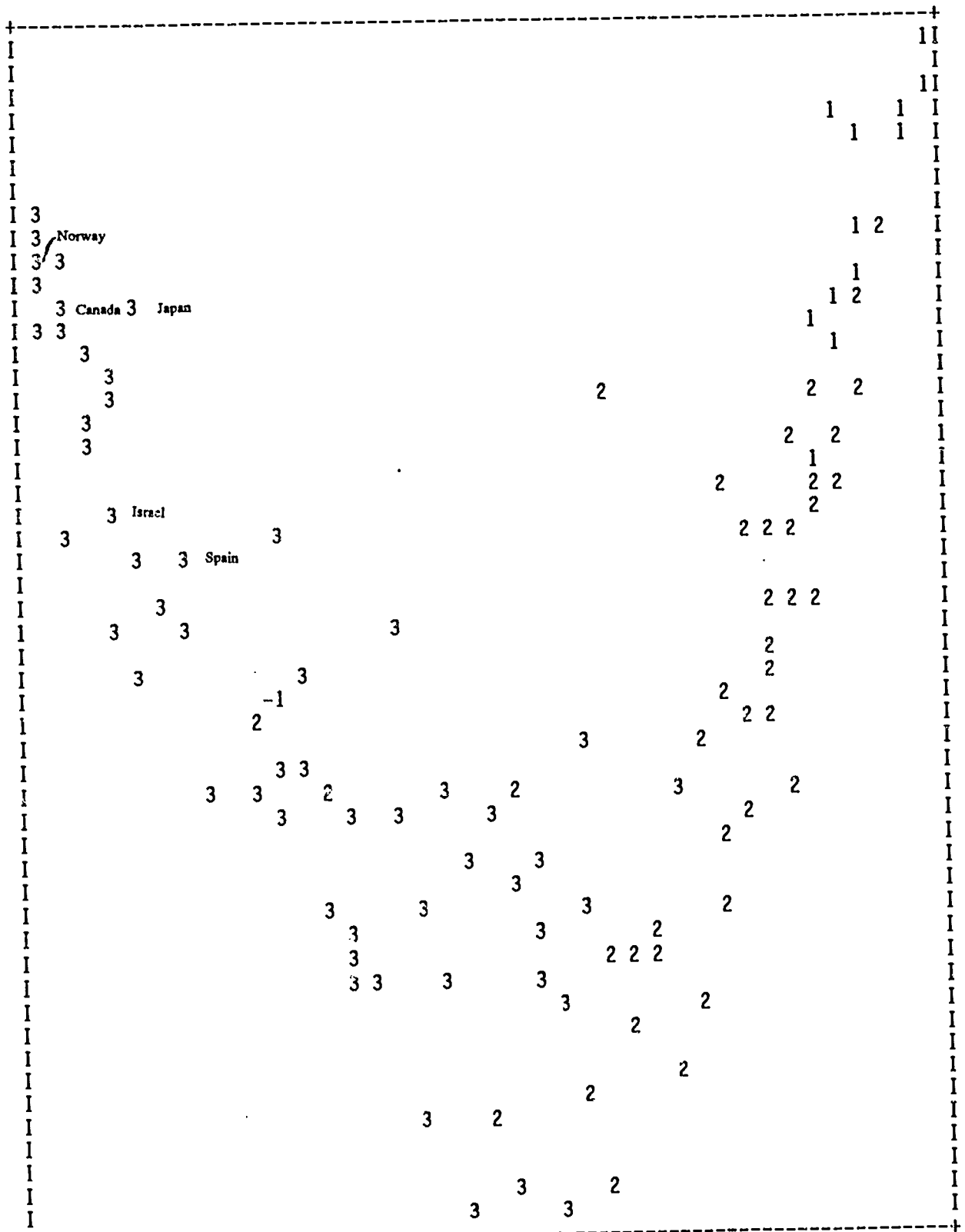


Diagram of Item number 12 : SECRATIO

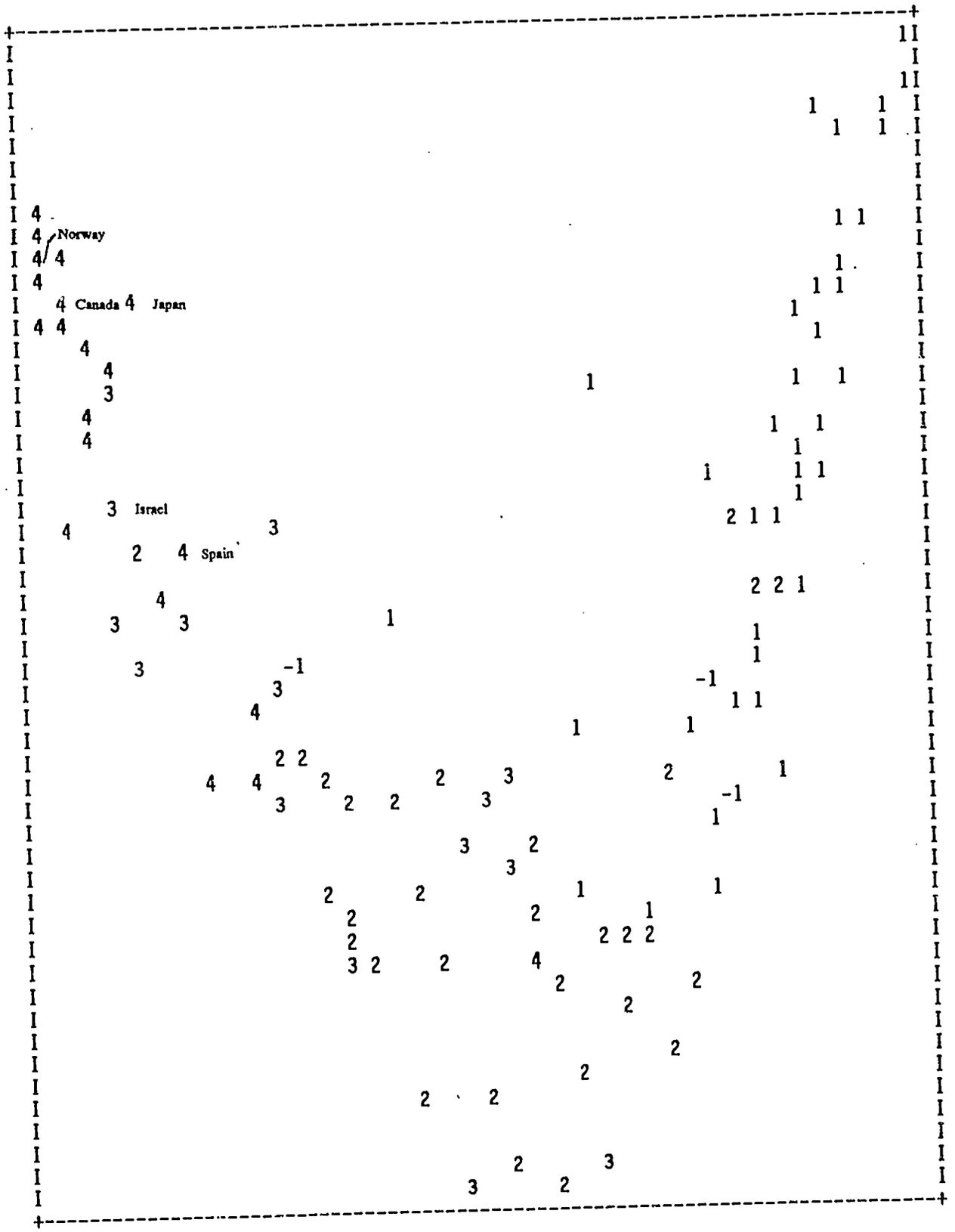


Diagram of Item number 13 : GRADUATE

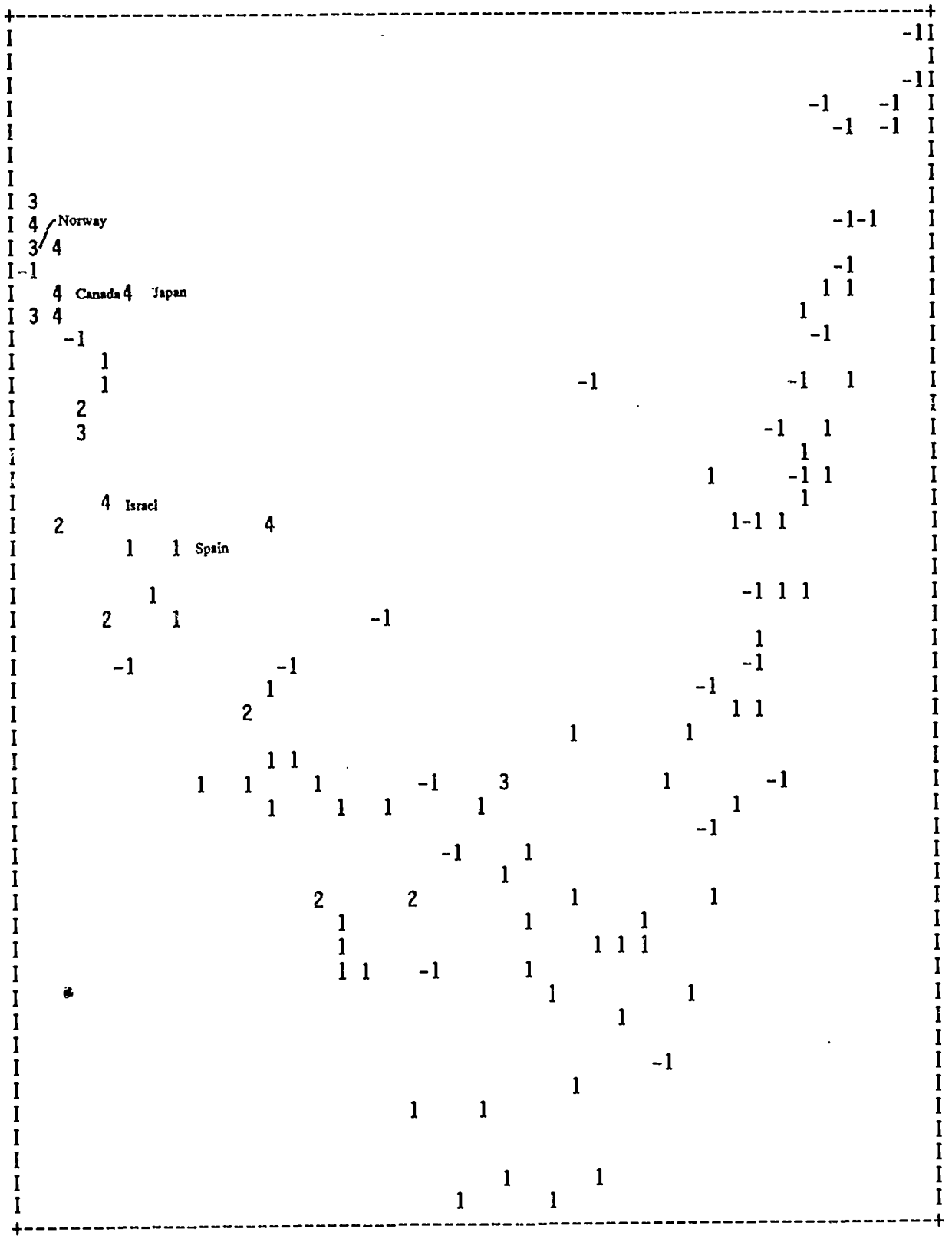


Diagram of Item number 14 : NORMBOOK

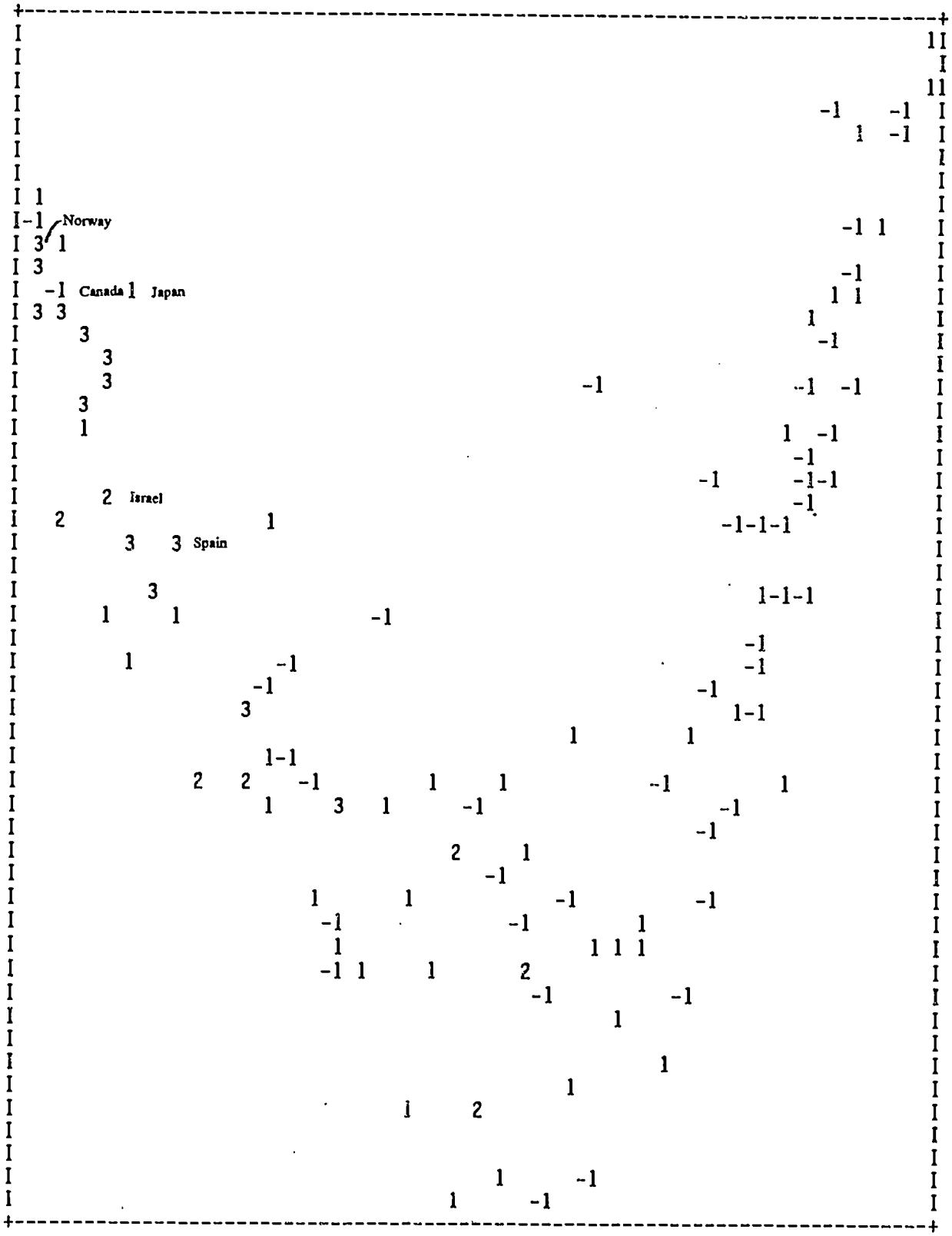
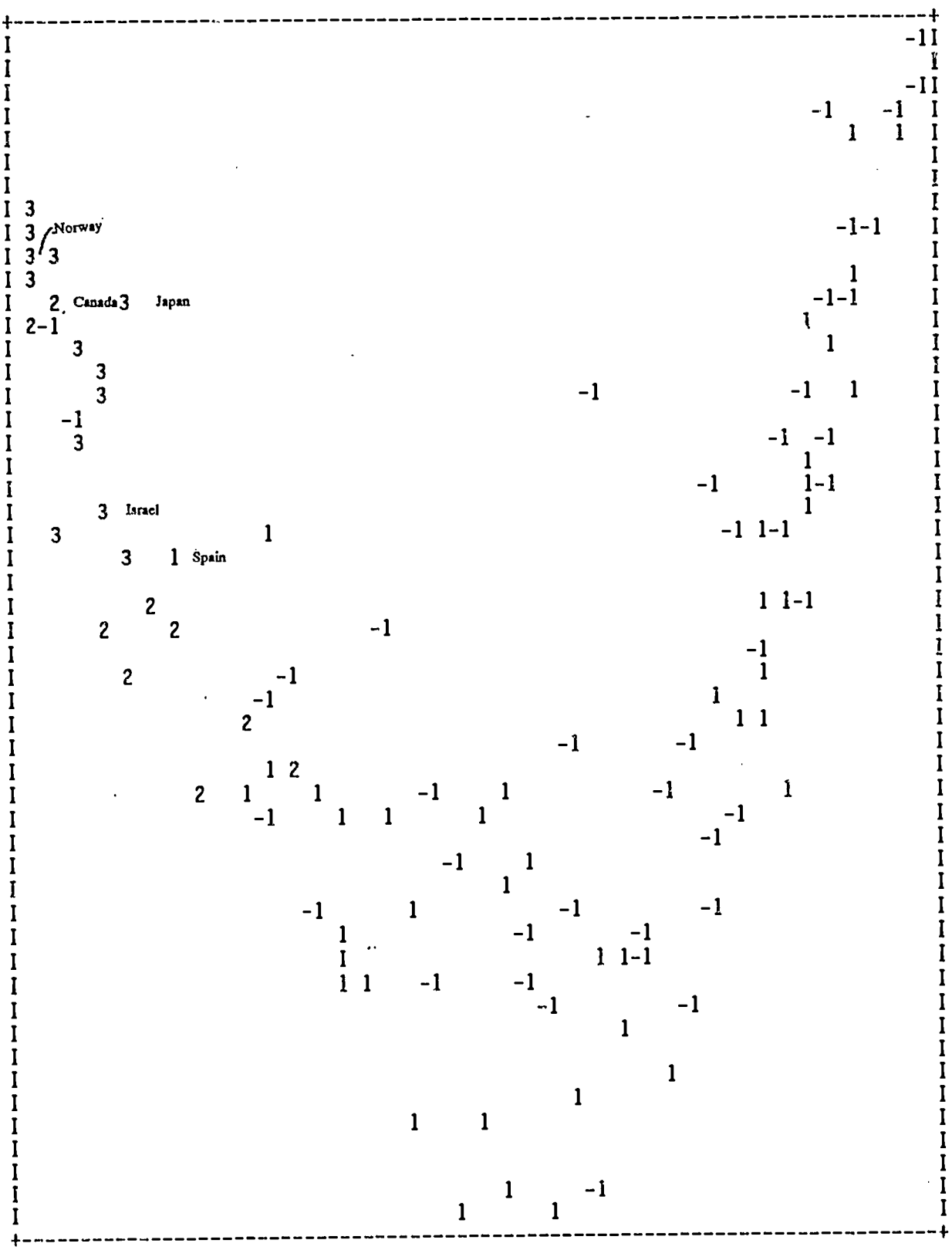


Diagram of Item number 15 : NORMMADA



THE PARTIAL ORDER OF THE COUNTRIES ACCORDING TO 12 SELECTED CRITERIA:

(see next page)

ESPERFEM, FERT, TELE, MORTINF, URBAN, CALORI, LITFEM, SCHRATIO, SECRATIO, GRADUATE, NORMBOOK, NORMMADA.

The different countries are ordered according to their joint score, or axes x+y. This joint score is a good indication of the success of the countries.

The four countries we recommended in the final option appear here in the top ones.

Furthermore, we may observe here that Israel and Norway have exactly the same joint score. A similar case is found between Spain and Japan.

These facts strenghthen our final choice.

THE DIFFERENT COUNTRIES ORDERED ACCORDING TO THEIR POSAC JOINT SCORE.

(The order takes account of 12 criteria at once)

User Id	Joint	Profile											
		ESPERFEM	FERT	TELE	MORTINF	URBAN	CALORI	LIFEM	SCHRATIO	SECRATIO	GRADUATE	NORMBOOK	NORMADA
Maximal possible profile	200.00	81	76	81	16	10	37	10	32	10	31	21	98
UNITED STATES	167.21	78	65	81	16	7	36	9	31	9	31	-1	34
NEW ZEALAND	166.39	77	63	35	15	8	34	9	31	8	20	10	-1
DENMARK	163.93	77	69	38	16	8	36	9	32	8	-1	21	16
GERMANY FED	163.93	78	70	37	16	8	35	9	31	9	4	10	21
NETHERLAND	163.93	79	68	32	16	8	33	10	30	9	7	10	25
CANADA	162.30	79	67	54	16	7	34	9	31	8	30	-1	14
UK	159.02	77	65	53	16	9	32	9	31	8	11	9	15
FRANCE	155.74	80	65	33	16	7	33	9	31	8	-1	6	18
AUSTRALIA	152.46	79	65	47	16	8	33	10	31	8	21	1	18
ISRAEL	151.64	76	53	26	15	9	30	8	32	7	20	5	98
NORWAY	151.64	79	66	34	16	7	32	9	32	9	8	8	24
FINLAND	150.82	78	68	37	16	6	31	10	31	9	6	17	-1
SWEDEN	150.00	80	75	39	16	8	30	9	32	8	-1	12	25
GERMANY DEM	149.18	75	66	36	-1	-1	-1	-1	30	8	8	3	78
BELGIUM	147.54	76	68	30	16	9	-1	9	31	8	7	8	14
USSR	146.72	73	58	32	14	6	32	10	31	10	7	3	57
BULGARIA	145.08	73	63	18	15	6	36	8	30	8	5	5	51
JAPAN	144.26	81	67	58	16	7	28	9	31	9	14	3	47
SPAIN	144.26	78	63	32	16	7	33	8	30	8	3	10	4
POLAND	143.44	75	62	25	15	6	33	9	30	7	5	2	12
SWITZERLAND	142.62	80	76	41	16	6	34	10	30	7	2	18	20
IRELAND	142.62	75	59	21	16	5	36	9	30	9	4	7	10
ITALY	141.80	78	68	25	16	6	35	9	31	7	2	2	11
CUBA	140.98	75	66	20	15	7	31	8	31	7	-1	2	10
AUSTRIA	140.16	78	69	32	16	5	34	9	31	7	2	12	8
HUNGARY	138.52	73	65	27	15	6	35	9	31	4	5	9	21
CZECHOSLOVAKIA	136.89	74	63	28	15	6	34	-1	30	4	4	6	41
GREECE	136.07	76	65	17	15	6	36	7	30	8	2	4	2
YUGOSLAVIA	131.97	73	63	17	14	4	35	7	30	8	3	4	13
HONG KONG	129.51	79	71	23	16	9	28	6	-1	6	3	-1	-1
URUGUAY	129.51	74	59	17	14	8	26	9	30	6	6	3	-1
ROMANIA	128.69	72	61	17	14	4	33	8	30	7	4	2	-1
CHILE	124.59	75	59	16	15	8	25	8	29	5	3	1	-1
TRINIDAD	122.95	71	53	28	15	6	30	9	28	5	1	-1	2
ARGENTINA	122.13	72	50	21	13	8	32	9	31	5	4	1	3
KOREA SOUTH	121.31	69	68	18	14	6	29	8	27	8	6	8	11
VENEZUELA	121.31	72	49	14	13	8	24	7	29	3	2	-1	3

MEXICO	119.67	66	53	11	12	7	31	7	29	3	2	0	2
COSTA RICA	118.03	77	48	7	15	4	28	8	29	4	5	3	1
SINGAPORE	117.21	74	67	-1	16	10	28	5	29	5	2	-1	9
KUWEIT	116.39	74	43	24	15	9	30	4	31	7	12	1	8
MALAYSIA	116.39	71	48	11	14	4	27	4	29	5	-1	2	-1
MAURITIUS	116.39	71	64	10	14	4	27	5	30	5	1	1	3
LEBANON	114.75	69	50	30	-1	-1	-1	5	31	5	3	-1	0
PORTUGAL	112.30	75	68	15	15	3	31	6	30	5	1	10	3
CYPRUS	112.30	77	60	13	-1	-1	-1	6	30	5	1	1	0
CHINA	111.48	70	60	1	13	5	26	-1	29	5	-1	0	-1
PANAMA	111.48	72	53	16	14	5	24	7	30	6	4	-1	1
COLOMBIA	111.48	69	48	10	13	6	25	8	28	4	3	5	0
ALBANIA	109.84	73	52	8	14	3	27	6	30	6	-1	5	-1
GUYANA	109.02	72	56	-1	-1	-1	-1	8	30	5	1	0	1
SOUTH AFRICA	106.56	63	39	9	10	5	29	5	28	7	3	-1	-1
BRAZIL	105.74	67	49	18	10	7	26	6	29	3	4	1	2
JAMAICA	104.92	76	51	10	15	5	25	8	29	5	0	0	0
TURKEY	102.46	65	48	16	9	4	32	4	27	3	1	1	1
MONGOLIA	102.46	65	30	3	10	5	28	-1	29	8	3	5	-1
EGYPT	102.46	61	31	8	8	4	33	2	27	5	3	0	4
EMIRATES	100.82	72	35	10	14	7	37	0	31	-1	-1	-1	-1
IRAK	100.82	64	42	6	10	7	29	1	29	5	0	-1	-1
THAILAND	100.00	68	65	10	14	2	23	7	29	2	1	1	-1
SAUDI ARABIA	100.00	65	12	26	10	7	30	-1	29	3	-1	-1	-1
ECUADOR	100.00	67	56	7	10	5	20	7	29	4	3	-1	2
TUNISIA	100.00	66	30	6	12	5	29	2	27	2	1	0	-1
LYBIA	100.00	62	15	6	9	6	36	0	31	6	1	-1	3
JORDAN	100.00	67	0	6	12	6	29	1	29	7	0	-1	1
SYRIA	99.18	64	16	5	12	5	32	2	29	4	1	-1	-1
PHILIPPINES	97.54	65	50	3	12	4	23	8	28	6	11	0	1
PARAGUAY	96.72	68	38	2	12	4	28	7	29	2	2	-1	-1
IRAN	95.08	55	27	5	10	5	33	2	28	4	0	1	0
FIJI	93.44	63	52	-1	-1	-1	-1	5	30	6	3	0	0
MOROCCO	92.62	62	35	5	9	4	29	1	25	2	-1	-1	-1
BOLIVIA	90.16	55	23	7	6	5	21	5	30	3	5	-1	-1
VIETNAM	89.34	67	43	3	12	-1	22	-1	29	4	-1	-1	3
GHANA	88.52	55	20	1	8	3	17	1	28	3	0	-1	3
LESOTHO	87.70	60	26	-1	7	1	23	6	26	-1	0	-1	-1
PERU	86.89	66	41	8	8	6	22	6	28	5	4	0	2
NICARAGUA	86.89	64	29	5	11	5	24	5	26	4	-1	0	3
ALGERIA	86.07	63	23	7	9	4	27	1	28	3	0	0	-1
INDONESIA	83.61	57	51	3	10	2	25	4	28	2	3	0	2
DOMINICA	82.79	68	22	8	10	5	24	6	26	3	0	-1	-1
CONGO	82.79	50	24	0	5	4	26	0	29	-1	-1	-1	4
SRI LANKA	77.05	71	52	2	14	2	24	6	29	5	2	1	1
EL SALVADOR	73.77	63	43	7	11	4	21	-1	25	2	1	-1	-1
HONDURAS	73.77	66	21	6	10	4	20	5	26	2	1	-1	-1
ZAMBIA	72.95	52	12	1	9	5	-1	3	25	1	0	-1	0
MYANMAR	72.13	63	43	0	10	2	26	4	21	2	-1	0	0
PAKISTAN	72.13	59	13	1	6	3	23	0	22	1	3	-1	1
BOTSWANA	71.31	59	21	-1	12	2	22	3	28	2	0	-1	-1
GUATEMALA	70.49	59	23	3	11	3	23	3	24	1	1	-1	-1
ZIMBABWE	68.85	60	26	1	12	2	21	3	23	1	0	0	-1
COTE D'IVOIRE	66.39	54	9	5	7	4	25	0	25	1	-1	-1	0
GUINEA	66.39	43	22	0	2	2	11	0	15	1	-1	-1	2
TOGO	64.75	54	23	-1	7	2	22	0	26	3	0	-1	-1
SUDAN	64.75	51	19	5	6	2	22	0	22	1	-1	-1	1
LAOS	63.93	50	26	-1	6	1	23	2	27	1	-1	-1	-1
HAITI	63.93	56	36	0	5	2	19	1	21	1	0	-1	-1
LIBERIA	62.30	56	19	1	4	4	23	0	25	2	1	-1	-1
CAMEROON	61.48	53	26	-1	7	4	20	0	24	1	0	-1	-1
MADAGASCAR	61.48	55	18	0	5	2	24	2	24	3	-1	0	0
KENYA	61.48	60	2	0	10	2	20	1	28	1		1	0

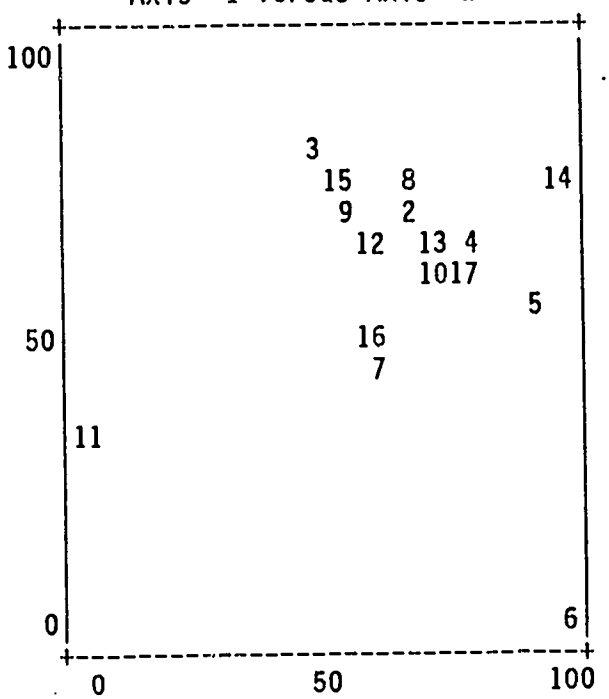
REP. CENTRAFRICAINE	58.20	47	25	0	6	4	19	0	18	1	-1	-1	0
SENEGAL	57.38	47	20	3	9	3	23	0	18	1	0	-1	0
ZAIRE	56.56	54	23	0	7	3	21	1	26	2	-1	-1	-1
NIGERIA	54.10	52	13	0	6	3	21	0	25	2	-1	0	0
INDIA	53.28	52	39	0	7	2	22	1	26	2	1	0	1
CHAD	52.46	47	25	-1	4	3	17	0	2	0	-1	-1	-1
BENIN	51.64	48	13	0	5	4	21	0	18	1	-1	-1	-1
UGANDA	50.82	52	14	0	6	1	23	2	21	0	0	-1	-1
TANZANIA	50.00	54	12	0	6	3	21	1	25	0	-1	0	-1
NEPAL	50.00	48	24	-1	4	0	20	0	21	2	0	-1	0
SOMALIA	49.18	46	18	-1	4	3	21	0	21	0	-1	-1	-1
ANGOLA	48.36	46	20	0	3	2	18	0	27	0	-1	0	-1
BURUNDI	46.72	50	20	-1	9	0	23	0	4	0	-1	0	0
MALAWI	45.90	41	15	-1	2	1	23	1	15	0	0	0	0
NIGER	45.90	46	12	0	3	1	24	0	0	0	-1	-1	0
MOZAMBI	41.80	48	20	0	3	2	15	0	15	0	-1	0	-1
ETHIOPIA	41.80	42	22	0	3	1	17	0	4	1	-1	0	-1
SIERRA LEONNE	38.52	42	19	0	1	2	18	0	23	1	0	0	-1
MALI	36.07	49	17	-1	0	1	20	0	10	0	0	0	-1
RWANDA	29.51	47	1	-1	5	0	18	0	15	0	-1	0	0
Minimal possible profile	0.00	41	0	0	0	0	11	0	0	0	0	0	0

D I M E N S I O N A L I T Y 3

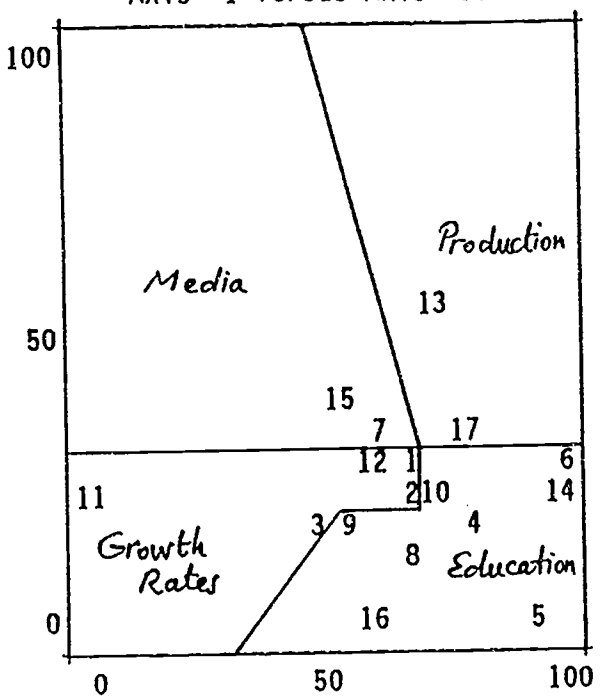
Rank image transformations 8
Number of iterations 14
Coefficient of Alienation 0.13676

Serial Number	Distance from Centroid	Plotted Coordinates 1	2	3
1	15.63	68.32	77.09	26.51
2	12.10	67.27	73.94	22.70
3	28.88	47.94	82.49	15.08
4	15.79	79.65	69.33	19.18
5	35.30	92.21	56.40	0.00
6	70.11	98.93	0.00	28.58
7	20.87	58.60	45.79	34.18
8	23.13	63.90	80.25	9.58
9	16.90	56.64	71.98	14.01
10	5.72	71.91	61.80	21.93
11	72.87	0.00	31.88	22.61
12	9.76	59.14	66.93	27.59
13	32.42	72.92	65.00	55.03
14	37.80	100.00	79.17	24.32
15	28.90	51.85	79.17	41.47
16	27.95	59.78	47.71	0.27
17	17.76	79.60	63.26	35.22

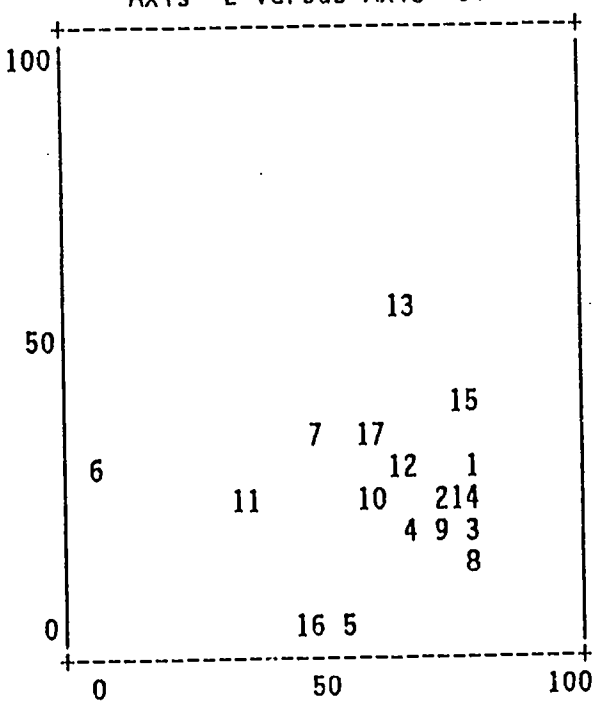
Space Diagram for Dimensionality 3.
Axis 1 versus Axis 2.



Space Diagram for Dimensionality 3.
Axis 1 versus Axis 3.



Space Diagram for Dimensionality 3.
Axis 2 versus Axis 3.



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