CONVERSATIONAL HEURISTICS FOR ENHANCING PERSONAL UNDERSTANDING OF THE WORLD

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ABSTRACT

A suite of computer programs (PEGASUS,FOCUS, MINUS,CORE,ARGUS and SOCIOGRIDS) has been developed, each one acting as a cybernetic tool to enhance man's capabilities to understand both himself and his relationships with other perspectives of the world. In particular PEGASUS is described, including PEGASUS-BANK which can be used to explore the relationship of an individual with another individual(or group). Shared understanding within small groups can be investigated using the SOCIOGRIDS program which produces a mapping of the intra-group relationships, and the subject content which led to agreement in the group.

A study involving the exchange of subjective standards in human judgement is briefly described, and an analogy drawn to the understanding of different perspectives in the treatment of a medical or clinical patient.

CONVERSATIONAL MODELS

A physical science paradigm is not necessarily helpful in dealing with people as subject matter. 'Experiments' cannot be conducted on the assumption that either the subject or the experimenter remains unchanged as a result of the interaction. When a physical scientist sets up his experimental conditions he does so in such a way as to stabilize his observations which can then be repeated; that is, measured by other scientists looking from the same point and with the same perspective. The social scientist, however,is unable to keep his subject matter constant in quite the same way. There can no longer be an external observer but only participants helping each other. Therefore interaction between entities able to model themselves and others must necessarily take the form of conversation. Many people have recognised the need for personal involvement in learning, motivation and creativity, notably Rogers'(1969) learning contract Kelly's(1962) and Maslow's(1954) ideas of motivation, and Kierkegaard's(1941) process of man "becoming his potentialities".

Several models of conversation are useful in this context. Jahoda and Thomas(1965) have developed a "science of learning conversations" in which the learning experience is viewed from different perspectives.

Purpose	Learner	Teacher
Prospective	1	2
Retrospective	3	4

Figure 1. The Science of Learning Conversations. Each of the four quadrants represents a different and valid point of view: quadrant 1 represents the learner's anticipation of the event; quadrant 2 represents the teacher's objectives; whereas quadrants 3 and 4 denote a retrospective view of the experience from the perspectives of the learner and the teacher respectively.

Luft's 'Johari Window'(1961) is a model of inter-personal awareness which demonstrates the interaction of the two variables known/not known to self and known/not known to others, elaborated by Hanson (1973)in Figure 2.

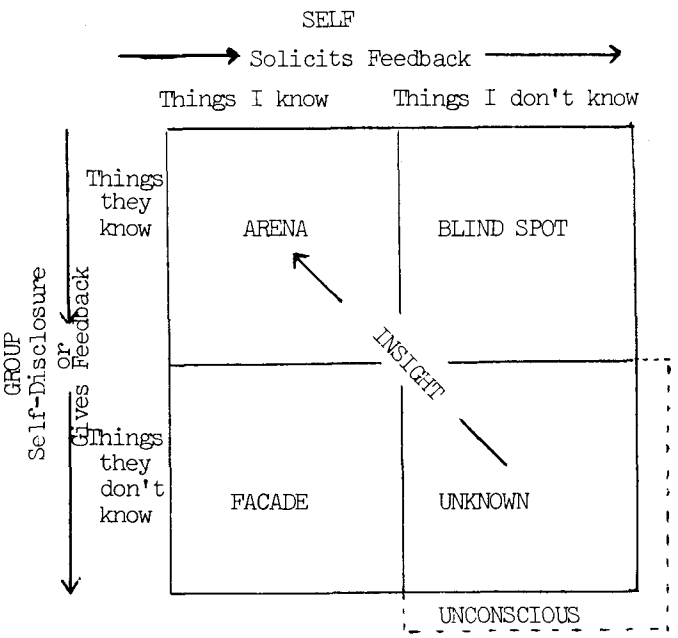


Figure 2. The Johari Window

The 'arena' is characterized by free and open exchange of information and has an area proportional to the level of trust between the individual and the group. The 'blind spot' contains information of which the individual is not aware but may have been communicated to the group by verbal or non-verbal cues. Quadrant 3 is the 'facade' which

contains information hidden from the group by the individual; and quadrant 4 represents information 'unknown' to either the individual or the group.

Pask's(1975) "theory of conversations and individuals" suggests that participants in a conversation cannot be regarded simply as distinct processors, but he distinguishes a 'mechanically characterized (M) individual' as a biologically self-replicating system and a 'psychologically characterized (P) individual' as a procedure executed in some processor. These P-Individuals are then similar in some ways to roles, perspectives, or points of view existing within and among the former M-Individuals. There may be several P-Individuals in one head as in a conversational private thinking or problem-solving activity, or one P-Individual constituting a conversation in a group. Each of these conversational models contributes to the ways in which a person can become a self-organized learner, able to act effectively in changing himself and his situation to be more viable in the world.

THE PERSONAL SCIENTIST

For many years psychologists and others have been interested in how a person categorises his experiences and classifies his environment. If the individual can become aware of how he is achieving this organization, he can not only use this awareness to predict more accurately and hence act more effectively, but also to change his system to adapt to specific needs of himself and others. Kelly's (1955) theory of a personal scientist was that each individual is seeking to predict and control events by forming theories, testing hypotheses and weighing experimental evidence. He suggests that the differences between the personal viewpoints of individuals may correspond to the differences between the theoretical viewpoints of scientists.

Each personal scientist uses himself as participative subject matter and construes and interprets the results in a personally meaningful way. To do this effectively a conversational method is used which is adapted from the repertory grid (Kelly 1955). This is used as a tool together with the computer to enable an individual to examine and bring into awareness his own conceptual system. This technique assumes that each person can express his conceptual structure as a unique system of bipolar dimensions known as personal constructs through which he experiences life, and categorizes his experiences. This system of constructs acts like a pair of spectacles, focusing and colouring his external and internal worlds, and explains how similar events can produce quite different behaviour in different people.

THE REPERTORY GRID.

The repertory grid is a schema or two-dimensional array of events or observations and abstractions so interlaced as to enable each to have meaning in the context of the other. It is a finite system of cross-references between personal observations an individual has made and the personal constructs he has erected to make sense of his experiences. A set of constructs can be thought of as representing a P-Individual as it is a personal model of a topic emphasizing how a person thinks and feels about the topic in his own terms. These personal observations are known as elements and are chosen from the set of all observations to be relevant to the purpose for exploring this aspect of the individual's own phenomenological world. The elements then might be people, objects, events or ideas such as work colleagues or patients, books or symptoms, events or experiences in a course of treatment, aspects of self or possible careers. Care must be taken to ensure that each of the elements is well known and personally meaningful to the individual; and each construct is important to the individual in the context of the particular problem. Thoughts and feelings, objective and subjective descriptions, attitudes and prejudices all constitute valid constructs. The labels given to the constructs merely serve to remind the participants of the conversation. As an example think of the three learning activities of reading, writing and thinking. In what way are two of these alike and thereby different from the third ?

Mr. A says: "Reading and writing are more alike because they are organized activities whereas thinking is haphazard".

Miss. B says: "Writing and thinking are more alike because they concern only oneself whereas reading involves ideas from someone else".

Mrs. C says: "Reading and thinking are more alike because they are fun and interesting whereas writing is hard work".

Clearly each person has a different opinion and a different value system. Each of these dimensions is a personal construct because it is expressed in personally meaningful terms, and is significant to the person who used it. As each construct is elicited all the elements are assigned to one pole or the other. In the above example Mr A's construct became:

	Reading	Writing	Thinking	Understanding	Listening	Talking	Discussing	
*								x
Organised activities	*	*	x	x	x	*	x	Haphazard

To elicit such constructs is a skilled activity. The eliciter must be careful not to contribute parts of his own construct system nor to distort in any way the constructs which are offered by the subject.

PEGASUS

In order to carry out a systematic elicitation process the computer program PEGASUS was developed. This program, however, goes beyond the normal clinical method of grid elicitation and also provides an on-going analysis of the links being made between constructs and between elements.

Figure 3 demonstrates the interaction rather

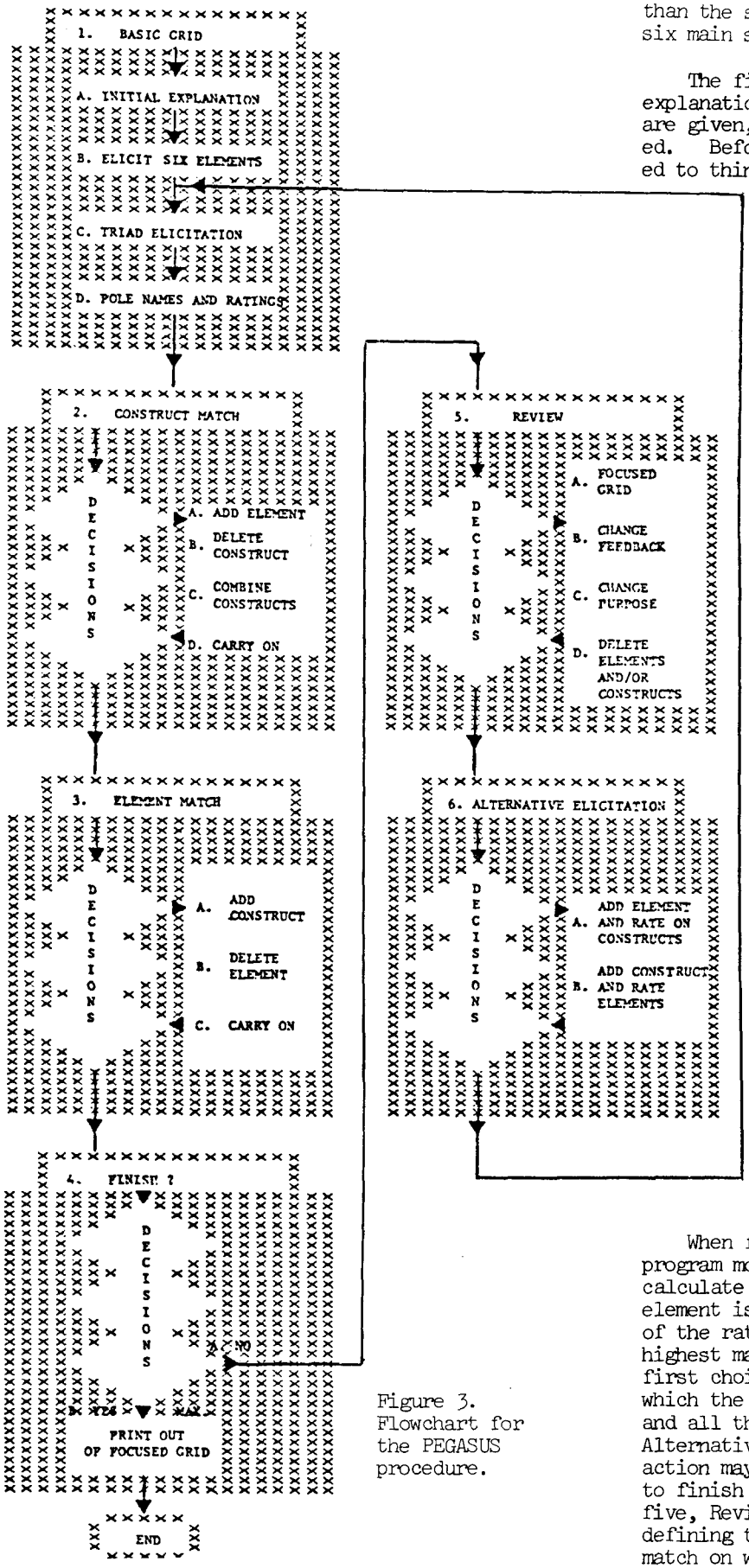


Figure 3. Flowchart for the PEGASUS procedure.

than the structure of the program and indicates the six main sections.

The first section is the Basic Grid in which explanations of grids and the use of the terminal are given, and the first four constructs are elicited. Before the user chooses his elements he is asked to think about his purpose which defines the universe of discourse and enables him to choose elements which are relevant and representative of the topic area. The choice of elements largely determines the depth of interaction which can be achieved. The conventional method is then used to elicit the first few constructs, that is to present a triad of elements to be divided into a pair and a singleton indicating the poles of the construct. After the user has named the poles the computer assigns a 1 to the pair and a 5 to the singleton, and he then has to assign ratings from 1 to 5 to each of the other elements. These are then retyped in groups to highlight the relative position of each element with respect to the others, and an option to change the ratings is given.

POLE 1 -- TALKATIVE

2	ROBERT	1
3	BILL	1
4	JOHN	3
1	RAY	4
5	NEIL	5
6	LYNN	5

POLE 5 -- QUIET

Figure 4. Elements Rated on a Construct

The second section, Construct Match, provides feedback when two constructs are highly related. The user is first asked to add an element which is either at pole 1 on the first construct and pole 5 on the second or vice versa. If he can add a new element it must then be rated on all the constructs so far elicited , but if he cannot split the two constructs this way he is asked if he would like to delete a construct, combine two construct into one, or just carry on.

When four constructs have been entered, the program moves into the third section and begins to calculate matching scores between elements. Each element is correlated with every other on the basis of the ratings used, and a comment is made on the highest match if it meets the set criterion. The first choice offered is to add a new construct on which the two elements are placed at opposite poles, and all the elements must be rated in the usual way. Alternatively an element may be deleted, or no action may be taken. Section four allows the user to finish at this stage during any cycle. Section five, Review, gives the choice of adjusting or redefining the purpose, and altering the level of match on which feedback commentary is given. There

is an opportunity to see a focused version of the grid to date, and to delete any element or construct which is felt to be unsatisfactory. In the sixth section, Alternative Elicitation, the user is given the freedom to add an element or to add a construct without using a triad if he so wishes.

When the grid reaches the maximum size allowed, or if the user chooses to finish before that, the results are analysed using the FOCUS procedure. This is a two-way hierarchical cluster analytic technique which systematically reorders the rows of constructs and columns of elements to produce a focused grid which shows the least variation between adjacent constructs and adjacent elements. The printout shows the element and construct matching scores matrices, and the trees for the elements and constructs as well as the focused grid with the element and construct labels.

Educationalists, therapists, and trainers who use grid techniques will see this program as a useful grid elicitation package which extends the use and application of the grid by using the real-time data processing of the computer to provide feedback during the elicitation, and the analysis of the results immediately on completion. Although this 'grid-centred' point of view construes the program as convenient and systematic, it misses the full potential of the 'learning-centred' approach of the cognitive model. A personal scientist models reality in order to anticipate events, and the quality of a person's models undoubtably determines the level of competence and creativity he is able to achieve. There is considerable potential in programs such as PEGASUS to enable a person to become aware of his models, and revise them in order to increase his capacity for anticipation. Awareness raising cannot be measured by the level of achievement of behavioural objectives, but rather it is a change in the personal construing of the individual and the revision of his cognitive model. This 'learning centred' approach has recommended PEGASUS to teachers and trainers, industrial inspectors and maintenance engineers, managers and appraisers, in addition to researchers and psychotherapists.

Another version of the program is PEGASUS-BANK. This allows a grid to be stored in the computer representing an area of public knowledge. The user elicits a grid in the usual PEGASUS way, but the feedback is given not only in terms of how the user's constructs map onto each other, but how they map onto the 'expert' view. This can also be used to initiate a user into the views and culture of a group, and help him to understand the words and terms used by the experts. This technique, therefore, offers a useful starting point for assessment and training. Although the analysis and the feedback of the results is central to the elicitation, the process of the PEGASUS procedure is both stimulating and demanding. The computer acts as a cognitive mirror in which the user sees himself, and with PEGASUS-BANK the world external to himself.

SHARED UNDERSTANDING

The PEGASUS-BANK technique of storing in the computer a bank of constructs which represents an area of public knowledge or the construing of a group of specialists, shows how an individual can use the grid methodology to interface between his early gropings and the articulate formulations of the group. It can also be used for two people to come to an understanding of each other. One may elicit a grid which is stored in the computer for the other to use as he elicits his own grid using the same elements. At each stage the bank may be increased or modified hence encouraging each of the two participants to take on the construct system of the other by mapping out the similarities between the patterning, and hence meanings can be exchanged between the pair. Alternatively, if each elicits a grid independently, using a shared set of elements, the two grids may be compared by matching the patterning of the responses.

The FOCUS algorithm provides a convenient method for this comparison. As the two grids have the same elements but different constructs they may be combined and treated as one grid, the first n constructs being from person A and constructs n + 1, --- , N from person B. By matching each of the rating patterns of the constructs from grid A in turn with each of the constructs in grid B, a measure of the extent of similarity between the two grids can be established. Clearly if A and B are using constructs in the same way to order the elements then this will be revealed despite the verbal labels which have been attached to them. This technique can then be extended to investigate the commonality in a group by considering the overlap between every possible pair of grids. This is the basis of the SOCIOGRIDS program.

A 'mode' grid of the most commonly used constructs by all the members of the group is extracted and focused, exhibiting the content of the shared construing in the group. A set of 'socionets' is also produced which shows those members of the group who have the most in common and those with strongly individualistic viewpoints. For example, in the treatment of a patient, the patient's problems may have quite different meanings for a harrassed nurse, a chief consultant, or a physiotherapist. The position, responsibilities and experience of each of these people will have led them to develop a different set of personal constructs and so each will construe the patient differently. The constructs which a person brings to a situation lead him to see that situation in a particular way. They lead him to select certain aspects and ignore others and they determine the way in which perceived dimensions are combined into an overall meaning. For example, the details which concern the nurse are unimportant to the consultant, and the physiotherapist might see that a particular treatment would be suitable for Mr. A but not for Mrs. B.

The grid techniques offer a means of discovering the terms in which these different people, all of whom have the same objective with respect to the patient, appreciate the problems involved. It can reveal the basic structure of values which forms the basis of human judgement, often only vaguely appreciated by the individual himself.

EXCHANGE OF SUBJECTIVE STANDARDS

A study was carried out recently into subjective standards in the inspection of knitwear (Pope, Shaw and Thomas 1977, Shaw 1979) . At first sight this is totally removed from medical and clinical practice, but on examination it can be seen to be an analogous situation. The purposes of the study were to help each manager, supervisor and inspector to become more aware of his or her own personal dimensions for judging faults in garments and to explore the pattern of judgements within the group in order to discuss the similarities and differences that exist between individuals. Four final inspectors from the production line out of a total of eight participated in the exercise together with the inspection supervisor, the production manageress, the production manager, the divisional manager and a trainee production technologist. Figure 5 shows the hierarchy within the organization of those involved.

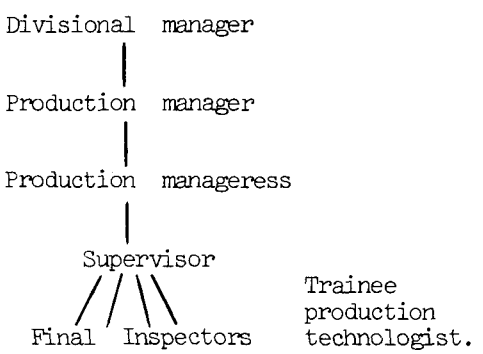


Figure 5. The Organisational Structure.

Each member of this group was shown a range of garments currently in production and asked to describe the process of inspection and the faults which would specifically be looked for during the inspection procedure. As this was done, the faults mentioned were noted and subsequently used as elements in a grid. After each person had separately identified elements of quality and elicited a grid, the group, excluding the production manager and divisional manager, met together to examine the total list of elements produced, and negotiate a common set of elements which could be shared by them all. (The reason for the exclusion was partially practical in terms of time commitment, and partially to avoid inhibiting the less senior members of the organisation.) Each person then elicited a new grid using the negotiated element set, and the constructs which had been personally produced on the previous occasion with the addition of one offered construct. The opportunity was given to add extra elements and constructs. The two grids from each person were then FOCUSed, and the second set analysed on SOCIOGRIDS. A number of other analyses were performed, including a clustering of the original element list from the verbal labels, and the extraction of a grid made up of the offered construct from each person.

A week after the initial grids were elicited, each person was presented with his/her personal results, and the group results. During the feedback of the results, each person was encouraged to indentify his/her position with respect to the other people in the group, both from the links made in the socionets and from the list of constructs ordered by common usage; also examining similarities and differences shown by the clustering of elements and constructs in the personal individual grids.

Following the individual feedback sessions, the four inspectors met to discuss the variety in the group. This led to the negotiation and exchange of meaning of the exact nature of the faults concerned.

Figure 6 shows a grid from the first set elicited from one of the final inspectors using her own elements. The elements used by people in other positions in the company varied somewhat, but all agreed on a common set of elements for the second set of grids.

Figure 7 shows the mode grid made up of the eleven most shared constructs. Two of the inspectors and the divisional manager contributed nothing to this grid, whereas one of the inspectors contributed four constructs, and the production manager contributed three. The element clusters show the three faults 'shading fault', 'fabric fault', and 'print fault' to be construed similarly on the left of the tree, and the three faults 'broken seams', 'tabs', and 'welts' to be construed similarly on the right of the tree. This right hand cluster then gradually incorporates each of the remaining faults one at a time, until 'dirt and oil' enables it to join with the other cluster. It can be seen that 'dirt and oil', 'general appearance' and to some extent 'trimmings' are viewed variably, not being clearly to one or other pole of all the constructs as the other faults are.

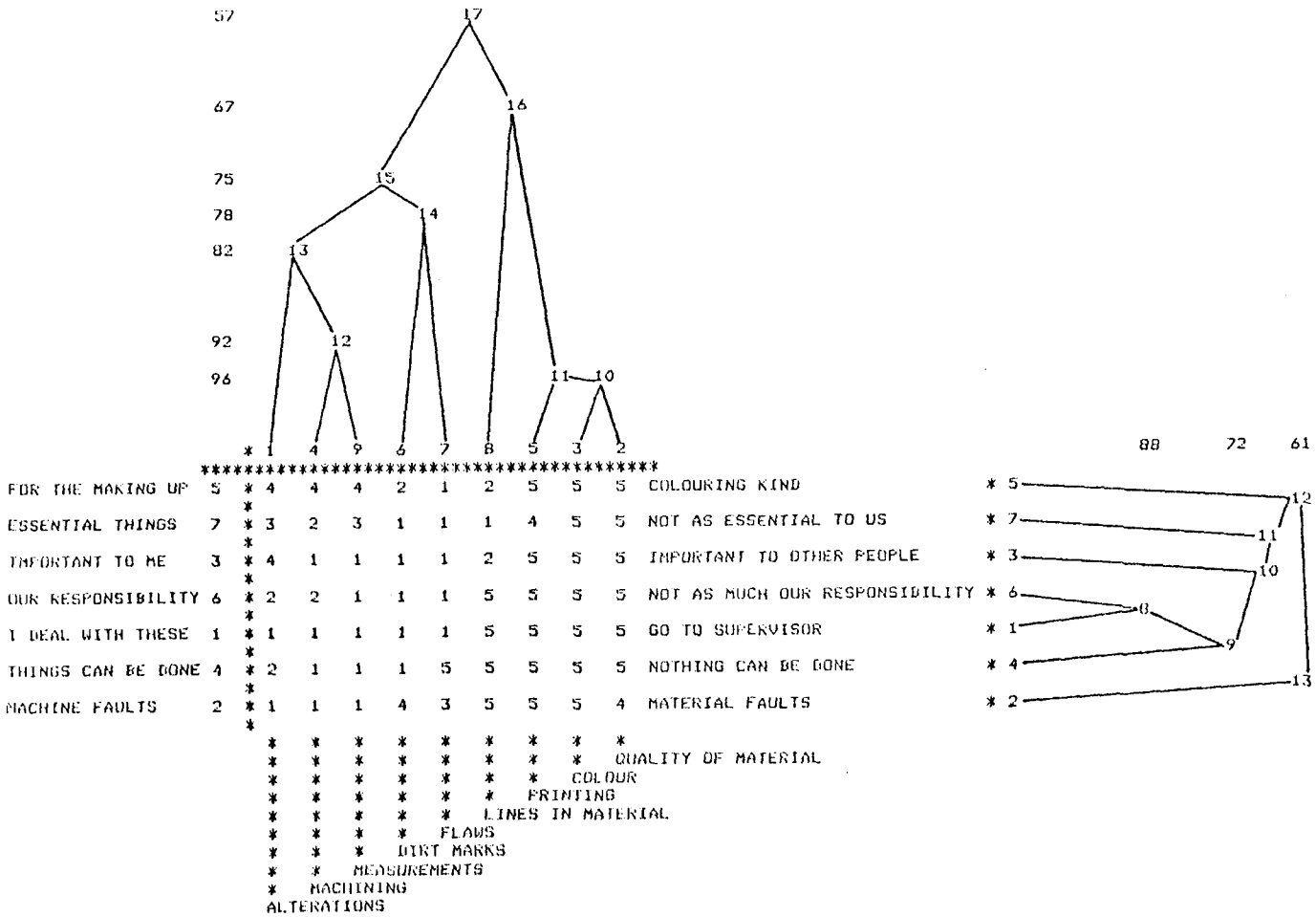
Since everyone was using the same set of elements, it was possible to extract the one offered construct 'very important - not so important' from each grid. This is shown in Figure 8. The construct tree now shows the relationship of the people who took part in this study with respect to the importance they attach to different faults in the garments. It is interesting to note that reading down from the top of the construct tree one is reading down the hierarchy within the group; 8 is the divisional manager, 7 is the production manager, 6 is the manageress, 5 is the supervisor, 1 to 4 are the inspectors and 9 is the trainee. A possible explanation of the separateness of 4 is the difference in the use of the 1 to 5 scale. Whereas person 4 used the two poles 1 and 5, most other inspectors used 1 and 2 to differentiate importance.

Figure 9 shows diagramatically the system of connections between the participants (expressed as links to the three grids which were most like the person's own grid). Points of interest are:-

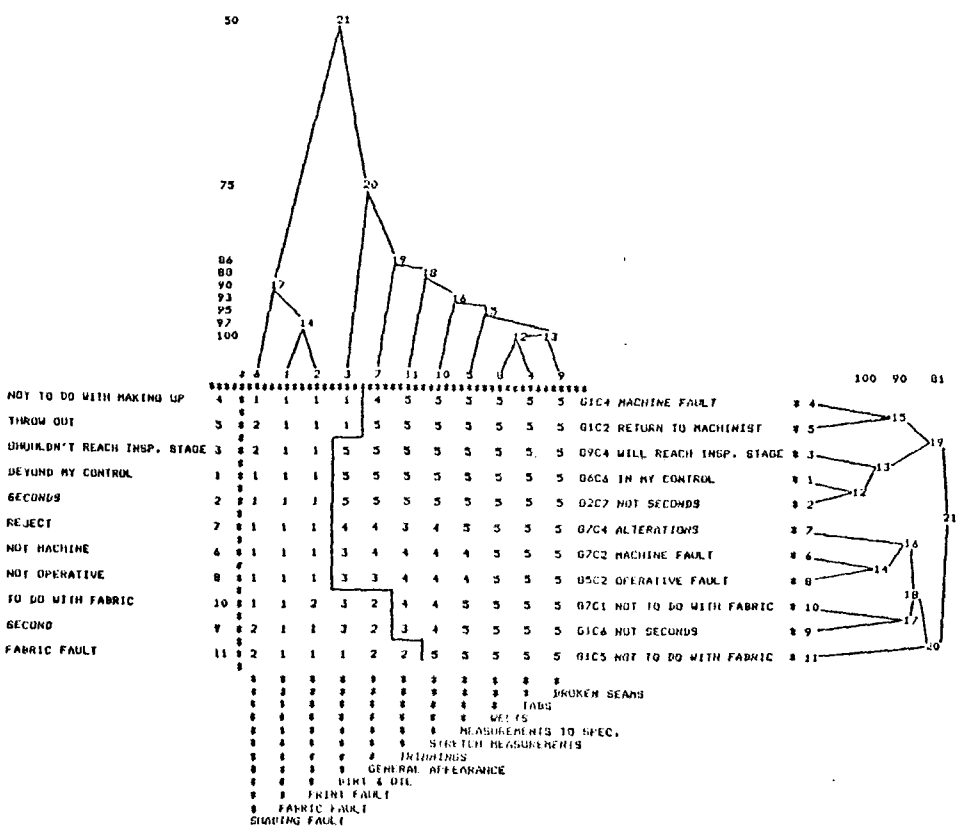
(i) three inspectors and the trainee production technologist shared similar views of faults;

(ii) one of the inspectors seemed to differ from this group;

(iii) the supervisory and management group



Above. Figure 6.
A Grid On Faults In Garments from the First Set Using a 5 Point Scale



Left. Figure 7.
The Mode Grid on Faults in Garments.

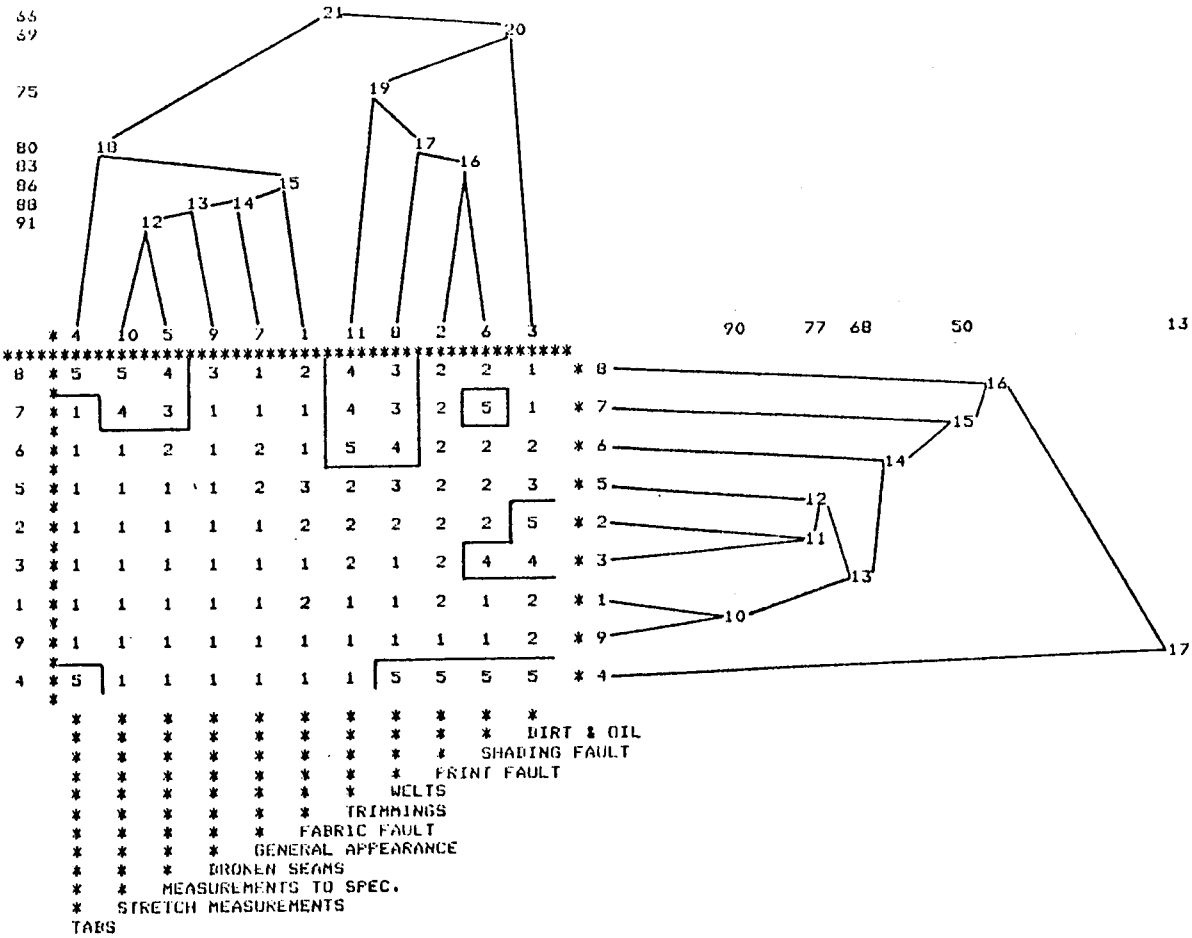


Figure 8. The 'Offered Construct' Grid on Faults in Garments.

shared similar views of faults although the similarity is less strong and differs from that of the inspectors;

(iv) the patterns of reciprocal similarities, i.e. among inspector and trainee, between supervisor and production manager and divisional manager;

(v) each of the supervisory/management group relate to inspector 2.

The results show that different roles within the company incorporate different viewpoints of quality, and provide a foundation for the negotiation and exchange of meaning. This can help both the company and the individuals to realise each position and how it contributes to the whole. In the case of the patient also, a better understanding of each person's point of view, how he or she sees the links in the whole system, and awareness of effect of individual action within the system must contribute to a more viable working relationship, and hence benefit all concerned.

CONCLUSION

The grid is therefore a rigorous but flexible structure which is held by the computer whilst the system of constructs is elicited from the individual and processed in a participative way (Shaw, 1978). The personal scientist can use the grid together with the computer as a sensitive instrument to enhance his essentially human skill, not as a machine which removes the human part of the work and reduces man to a moronic button-pusher. Gaines (1977) goes even further by suggesting that the computer can become more like a colleague, expressing sympathy and understanding to the user.

With the decreasing cost of microprocessors, the personal computer will soon be commonly available to anyone. These grid techniques may then be incorporated as additional resources in the cybernetic toolbag to explore systems of personal meaning in a non-directive and supportive way, enabling the individual to build, review, and revise his personal models of the world and hence predict and act more effectively.

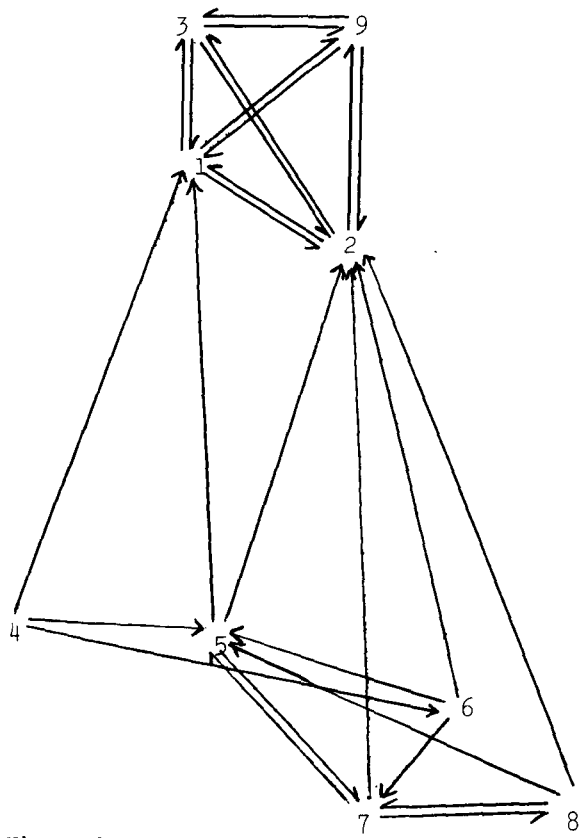


Figure 9.
Diagram Showing the Systems of Connection Between Participants.

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