Personal Meanings
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The extraction of personal meaning from a repertory grid

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INTRODUCTION

One possible approach to the discovery of *personal meaning* is to explore the *personal semantic* space of the individual and to do so with the minimum injection of structure from the process of exploration. A basis for this approach was established in the epistemological theories of the clinical psychologist George Kelly. These are expressed in his seminal work *The Psychology of Personal Constructs* (Kelly, 1955) which provides a remarkably far-reaching and well-structured foundation for the study of human action. His work is anchored very firmly both in its close correspondence to the actual behaviour of people and in its coherent and consistent philosophy. Kelly put forward the model of man as a *personal scientist* who forms hypotheses about the world and, by using *personal constructs* as filters through which he experiences events, reviews and revises his hypotheses in the light of his experiences. In his clinical work Kelly helped people to make their construct usage explicit by defining distinctions between *elements* to which clinically important personal meanings attach such as oneself and one's close family and acquaintances. His *repertory grid* is derived by assigning each element under consideration to one pole or the other of a construct. This usually involves the poles in being labelled in some way but these are treated as memory aids to the person whose 'meaning' is defined by the way in which they are used rather than by the actual labels themselves.

Figure 1 is a repertory grid from Leach (1981) which was completed by a man whose wife had recently died of cancer. The elements he uses are shown as columns—the people he was in contact with during the event, and the construct names are shown on either side of each row. A '1' indicates assignment of the element in that column to the left pole of the construct, and a '2' indicates assignment to the right pole.

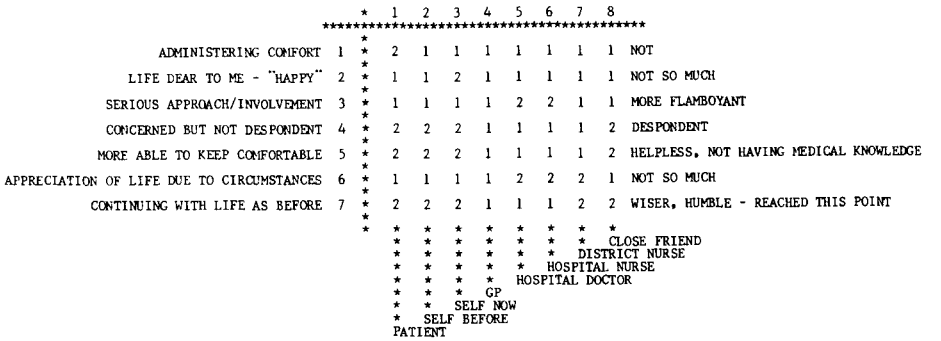

Figure 1 Repertory grid from man whose wife died of cancer (Leach, 1981)

There is an obvious resemblance between Kelly's *repertory grid* and the *semantic differential* methodology of Osgood, Suci, and Tannenbaum (1957). Both techniques eventually produce a matrix of assignments of elements assigned to bipolar rating scales, and both techniques have been applied to similar areas of study. The motivation of the work on semantic differentials has been to provide a psychological theory of meaning in which individual words can be seen to be compounded from relatively few components in a basic semantic space. In itself this is not inconsistent with Kelly's theory but it tends to neglect two features of semantic space that he regarded as epistemologically important: firstly, the *individual* nature of semantic space; and, secondly, the *hierarchical* structure of semantic space. In terms of the practical methodologies, this difference in emphasis shows up in the use of *elicitation* techniques for both constructs and construct hierarchies in work based on Kelly's viewpoint, whereas that deriving from the semantic differential uses consensual constructs over a population.

PEGASUS: A PROGRAM FOR THE EXPLORATION OF PERSONAL SEMANTIC SPACE

PEGASUS (Program Elicits Grids And Sorts Using Similarities) is an interactive computer program which elicits a repertory grid from an individual, simultaneously acting as a psychological reflector for heightening his awareness and deepening his understanding of himself and his processes. This is done by continual real-time feedback commentary on highly related elements or constructs, together with the encouragement to differentiate between them.

The program is divided into six main sections. The first section is the *Basic Grid* in which explanation of grids and the use of the terminal are

given, and the first four constructs 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, since 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 (assuming a five-point scale is being used), and he has then 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.

The second section, *Construct Match*, provides feedback when two constructs are highly related.

THE TWO CONSTRUCTS YOU CALLED
2 FLEXIBLE—RIGID
6 VARIABLE CONTENT—SPECIFIC CONTENT
ARE MATCHED AT THE 85 PERCENT LEVEL
THIS MEANS THAT MOST OF THE TIME YOU ARE SAYING
FLEXIBLE YOU ARE ALSO SAYING
VARIABLE CONTENT
AND MOST OF THE TIME YOU ARE SAYING
RIGID YOU ARE ALSO SAYING
SPECIFIC CONTENT
THINK OF ANOTHER ELEMENT WHICH IS EITHER FLEXIBLE
AND SPECIFIC CONTENT OR VARIABLE CONTENT AND RIGID
IF YOU REALLY CANNOT DO THIS THEN JUST PRESS RETURN
AFTER THE FIRST QUESTION MARK, BUT PLEASE TRY. THEN
YOU MUST GIVE THIS ELEMENT A RATING VALUE ON EACH
CONSTRUCT IN TURN.
TYPE A VALUE FROM 1 TO 5 AFTER EACH QUESTION MARK.
WHAT IS YOUR ELEMENT?VIDEO TAPE
RATINGS:
INVOLVEMENT—REMOTENESS?3
FLEXIBLE—RIGID?2
..... (Shaw, 1980, pp.61–62)

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 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 constructs into one, or just carry on.

When four constructs have been entered, the program moves into the third section, *Element Match*, and begins to calculate matching scores between elements. Each element is matched with every other on the basis of the ratings used, and a comment made on the highest match if it meets the set criterion. In the same way as with matching constructs the first choice offered is to add a new construct on which the two elements are placed at opposite poles, and then all the elements must be rated in the usual way. Alternatively, an element may be deleted, or no action may be taken. The fourth section allows the user to *Finish* at this stage in the cycle; the fifth, *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 any way. 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 trees of the elements and constructs as well as the focused grid with the element and construct labels (see Figure 2).

As a PEGASUS elicitation proceeds this FOCUS algorithm is used to offer to the user a possible explanation and interpretation of his meaning system in the terms of the similar patterns he uses in supposedly different circumstances. Cross-references are mapped across the grid and exhibited to the user in such a way as to offer him the facility to reconsider and change anything he feels to be inappropriate, which in turn enables him to be more aware of the links he is implicitly holding in his cognitive model. In this way the participative analysis extracts and displays the essence of the personally meaningful relationships in the grid.

THE SIGNIFICANCE OF THE COMPUTER

It would be easy to assume that interactive programs such as PEGASUS are merely more convenient ways of eliciting construct systems through extensions of Kelly's repertory grid and do not themselves add anything

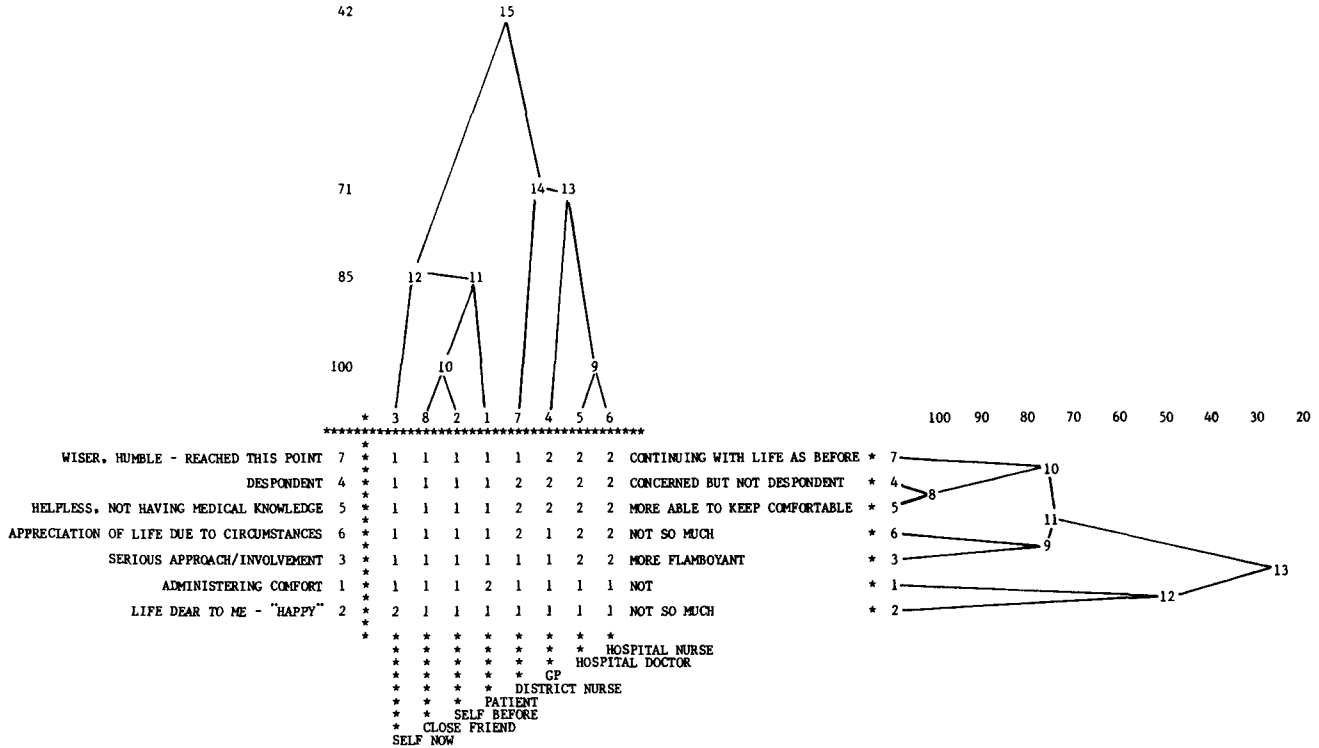

Figure 2 Cluster analysis of the man's grid by FOCUS

qualitatively new to the process. However, such an assumption would be missing certain crucial psychological factors in the person–computer situation and its differences from the person–person situation. It has been observed informally in making PEGASUS available to a wide range of people in a variety of situations that those coming to it for the first time often seem to find it a very dramatic experience. They react to it intensely and become gripped by the interactive process of construct elicitation. They also feel that they are learning something new from the process and are prepared to use this in determining their behaviour.

Probably such involvement is also significant in the elicitation of construct systems by a person rather than computer interaction. However, there are certain quite fundamental differences when the elicitation is done in such a way that interpersonal interaction is clearly absent. In particular, when a *person* is feeding back comments and guidance it is a natural and ready assumption that the constructs are being *injected* rather than elicited. It is easy for the subject to believe that the elicited constructs do not come from himself but that a tutorial or debating situation with another person is taking place. It is necessary to *persuade* him that this is not so and the persuasion has to be stronger the more striking and significant the constructs elicited. However, when a computer is the tool by which his construct structure is being reflected or laid bare then such an assumption of outside injection and interference is far less tenable.

When constructs are being elicited by a computer program then it is more likely to be accepted that it is precisely and only oneself that is being portrayed. We 'trust' a computer program to be doing just what it appears to be doing without deeper motivations and without attempting to persuade us to its point of view. No one is telling the user anything. He is seeing in interacting with PEGASUS, possibly for the first time, the basis for his own thought processes. Very often extreme surprise is the first reaction. If another person were eliciting the construct structure then the surprise would be taken as an indication that he was incorrect and one would ignore him or argue with him. With computer elicitation it is more likely that one will accept the reflected structures as being self-generated and the surprise acts as motivation to know more.

That this knowledge can be totally private to oneself is another important feature of interaction with the computer. We do not like, as Kelly put it, to be 'caught with our constructs down'. When another person is involved we are more reluctant to expose and explore our constructs the more surprising they are; perhaps because the surprise is often the result of a conflict between our ostensive value judgements and the basis of our behaviour. Or it may just be sloppy verbal behaviour:

that we are naming two distinct constructs with the same label. For example, in using PEGASUS a scientist found that he was using the word 'time' to label several different elements and generating confusion in his arguments because of this.

Another reason that we are reluctant to explore construct structures freely in interacting with another person, particularly a professional person, is that we are acutely aware of the possible 'waste' of their time. This phenomenon has been noted (Card *et al.*, 1974) as accounting for a major part of the preferences expressed by patients to be interviewed through an interactive computer program rather than their doctor. There are many pressures and artefacts of interpersonal relationships that can totally obscure and undermine such reflective processes as we require in the elicitation of personal constructs.

A notable technical feature of PEGASUS that profoundly affects human reactions to it is that relationships between constructs may be inferred instantly and queried with the user. This immediate analysis and feedback of personal meaning is a key factor in most applications of interactive computers and can go way beyond what any manual analysis can accomplish. Instant feedback whilst one remembers one's line of reasoning is very different from delayed analyses that are delivered at a later time when the entire context of the replies one has been giving may have been forgotten. Construct structures in particular have a high degree of context-dependence.

REPERTORY GRID ANALYSIS

The analysis of repertory grids has attracted much technical literature and it is worth emphasizing here the role of such analysis. It is to extract possible structure in the personal meanings of an individual and reflect it back to him in such a way that it aids his coming to terms with his problems. The words *possible* and *reflect* are significant since it is the essence of Kelly's approach that one is indeed dealing with *personal* meaning and that any analysis is subject to debate; it is the basis of a conversation rather than some form of absolute model. Clinicians using the repertory grid elicit it through such a direct conversation. In operationalizing Kelly's work through a computer the aim (Gaines and Shaw, 1981) is to develop a *conversational, dialectical* system of computer programs for the *self-reflective* study of one's role as a personal scientist.

For any given construct we may regard the numbers in the grid as a *vector of values* giving the assignment of each element in turn to one or other of the poles of the construct. From this point of view each

construct becomes represented as a point in a multi-dimensional space whose dimension is the number of elements involved. A natural relation to examine between constructs is then the *distance* between them in this space. Two constructs which are zero distance apart are such that all elements are construed in the same way in relation to them and hence we might infer that they are being used in the same way—in some way they are *equivalent* constructs. For constructs which are not equivalent we may analyse the entire constellation in space to determine a set of axes such that the projection of each construct onto the first axis accounts for most of the distance between them, the projection on the second axis accounts for most of the remaining distance, and so on. This is a *principal components analysis* of the construct space, and it is related to the *factor analysis* of semantic space used in the study of semantic differentials. We may also group constructs together that are close together in space using some form of *cluster analysis*.

Shaw's (1980) FOCUS algorithm has already been shown in action in Figure 2. It is a distance-based hierarchical cluster analysis technique that sorts the constructs into a linear order such that constructs closest together in the space are also closest together in the order. It has the advantage in presentation that the sorting is used only to re-present the original grid reorganized by the 'neighbourness' of constructs and elements. It is left to the user to construe his own personal meaning into the result and confirm this directly in terms of the original data. Figure 2 shows the grid of Figure 1 as processed by FOCUS. In reorganizing the grid, FOCUS has reversed constructs 4, 5, and 7. Concentrating on the construct analysis, it can be seen that constructs 4 and 5 are equivalent and close neighbours of 7, and that this cluster is itself a close neighbour of the cluster formed by 3 and 6. Constructs 1 and 2 are not linked into the other constructs at a meaningful level. Now looking at the elements there are two main clusters: 5 and 6 being construed identically—the hospital doctor and the hospital nurse—joining at a lower level is 4 and then 7—the GP and the district nurse. The other cluster is much tighter having a centre of 2 and 8—self before and close friend—being construed identically, and linking either side with 1 and 3—the patient and self now.

The grid of Figure 1 has also been analysed using a form of Slater's (1977) INGRID program for determining the principal components. Figure 3 shows the eight elements and the two poles of each of the seven constructs plotted against the first two principal components. In this case the first component accounted for 68.5 per cent of the variance in the data, and the second, third, and fourth components accounted for 9 per cent each. This indicates the almost linear nature of this construct system

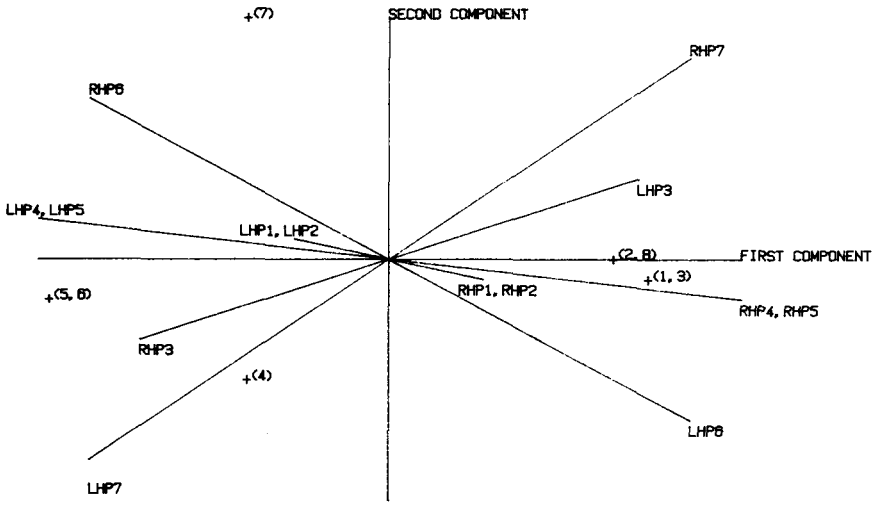

Figure 3 Principal components analysis of the man's grid

as can be seen from the elliptical shape of the clusters. It can be seen that the left-hand poles of constructs 6 and 3 are fairly close to the right-hand poles of constructs 4, 5, and 7. There is a mirror image of the right-hand poles of constructs 6 and 3, together with the left-hand poles of constructs 4, 5, and 7. Because the assignment of elements to poles is such that the vector of assignments to the left-hand pole is the reverse of that to the right-hand pole, such a mirror image is bound to occur with conventionally elicited grids. Although one can see from Figure 1 that constructs 1 and 2 are not identical, they are shown to be the same in their first two principal components. One can also see from its short length that the line denoting constructs 1 and 2 is not fully represented on these two axes, but clearly has components in other dimensions. Again, elements 2 and 8 are shown to be identical, and closely associated with elements 1 and 3. On the other side of the diagram elements 5 and 6 are identical, and cluster more loosely with elements 4 and 7. Thus, for this example at least, the actual clusters produced by FOCUS and INGRID do not differ in any meaningful way.

ENTAIL: A PROGRAM TO DERIVE ENTAILMENTS BETWEEN CONSTRUCTS

The alternative to distance-based methods of grid analysis is a logical analysis, looking at the poles of constructs as predicates applying to

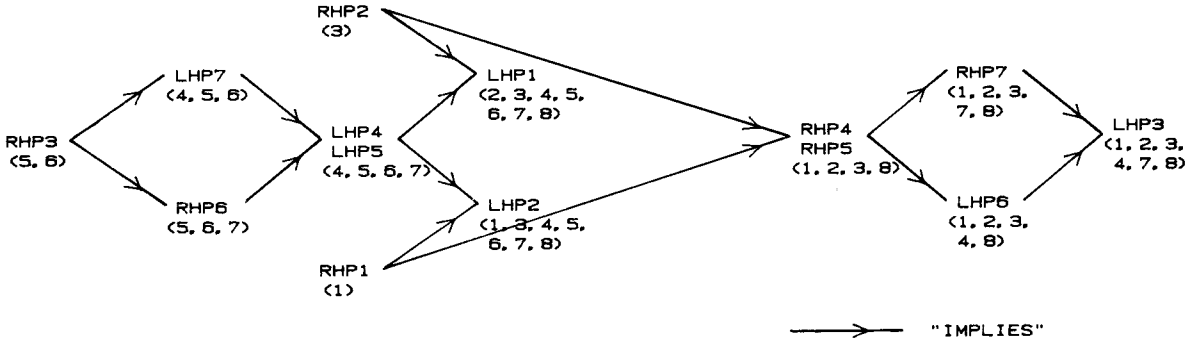

Figure 4 Entailment analysis of the man's grid by ENTAIL

elements (Shaw and Gaines, 1981). The program ENTAIL derives entailment relations between these predicates where a pole of one construct is said to *entail* a pole of another if all the elements assigned to the first pole are also all assigned to the second. Figure 4 shows the directed graph of entailment relations between the poles of the constructs derived by ENTAIL from the grid of Figure 1. There are effectively two main sub-graphs which are mirror images of one another, here connected by weak entailments involving constructs 1 and 2. One of the graphs shows the entailments for one set of poles, and the other the entailments for the opposite poles. Note that the 'reversal' of constructs 4, 5, and 7 apparent in the INGRID and FOCUS analyses shows up as LHP4, LHP5, and LHP7 appearing in the graph of the right-hand poles of the other constructs and vice versa. Because of the essential bipolarity assumed in the elicitation of the grid, the two graphs are essentially the same with the arrows and poles reversed in one relative to the other.

It is very interesting to compare Figure 4 with the results of the INGRID clustering in Figure 3 and the FOCUS clustering in Figure 2. We can see that the same hierarchy of construct clusters has turned up: ((3,6,7,(4,5),1,2). Thus the ENTAIL analysis gives rise to the same basic clustering as did INGRID and FOCUS. Both the fundamental and empirical similarities are important in their own right since two of these programs are widely used for grid analysis and one would hope that any new technique would continue to provide at least the same basic analysis.

However, there is additional information in Figure 4 that goes beyond that available in Figures 2 and 3. This comes from the directed nature of the entailment links shown. There is equivalence only between LHP4 and LHP5—all the other relations are one-way only. To show the significance of this we have indicated the elements assigned to each pole. The asymmetry of the entailment relation may be seen by considering that from LHP6 to LHP3, for example. We see from the descriptions of the poles that he is saying that people who have an appreciation of life due to the circumstances of his wife's death also have a serious approach. However, the converse does not hold. From the element data in Figure 4 we can see the reason for this asymmetry. For example, from the elements assigned to LHP6 and LHP3 we can see that the reason for the entailment between them not being mutual is that element 7—the district nurse—is seen as having a serious approach to life but not so much related to the circumstances of his wife's death. In this case, only one element breaks down the equivalence. Thus the construct analysis produced by ENTAIL has reproduced the clusters shown by INGRID and FOCUS but it has also shown up new features of the data not evident in those distance-based and essentially symmetric forms of analysis.

It has thus been indicated that personal meanings can be extracted from the manner in which an individual orders elements in the world, that is observations, events, or objects. The repertory grid is a way of making explicit an individual's personal models of the world, and the analysis should be judged subjectively as to how it helps in this process. The methods of analysis are not merely mechanized ways to exhibit personal meaning in any static way, but rather must be used in an interactive, conversational mode to outline particular topics for consideration and discussion. This may be carried out either internally with oneself, with oneself through a computer program such as PEGASUS, or with another individual such as the therapist. This methodology has also been extended to explore how one can extract personal and community meaning in a group, either real using SOCIOGRIDS, or perceived using ARGUS (Shaw, 1980).

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