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A CONVERSATIONAL SKILLS APPROACH TO PERSONAL RECONSTRUCTION : LONGITUDINAL STUDIES USING THE REPERTORY GRID

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A CONVERSATIONAL SKILLS APPROACH TO PERSONAL RECONSTRUCTION

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Part 4

Interpersonal modelling

Chapter 4.1.

The aggregate grid

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4.1.5. Summary

4.1.1. Stages in the development of the aggregate grid procedure.

4.1.1.1. The preceding chapters, in focusing on developing interactive procedures, have examined the nature of a single user's interaction with a procedure. The task of this and the following chapter is to extend the rationale of these procedures to an interpersonal context, and to adapt procedures for use by two or more participant users. Such an adaptation would clearly lend itself to couples counselling, and it was with this context in mind that the aggregate grid procedure was devised. Essentially, the aggregate grid represents the collective modelling of a common domain. By aggregating constructs from two (or more) participants, changes in their functional properties for individual and aggregate domains may be observed. Development of the aggregate grid method in this chapter may be traced through three stages, each of which is summarised below.

4.1.1.2. Stage 1: The rationale of the aggregate grid.

Step (i) An outline of the nature of modelling transactions in relationships.

Step (ii) The development and pilot application of the aggregate grid method.

4.1.1.3. Stage 2: Defining transformations and outcomes.

Step (iii) An outline of aggregate grid outcomes.

Step (iv) A classification of the status of individual and aggregate grid domains.

Step (v) Development of Level 3 transformations.

4.1.1.4. <u>Stage 3: Developing reflective strategies.</u>

Step (vi) Application of aggregate grid procedure to explore the nature of Level 3 reflective strategies.

4.1.2. Stage 1: The rationale of the aggregate grid.

4.1.2.1. Research into the development of relationships in dating couples has led to the view that the process of research and counselling frequently merge (Rubin & Mitchell, 1976), and that methodological issues are raised when questionnaire surveys give rise to unintended outcomes in the relationships studied (e.g. increase in disclosure between respondents, shifts away from traditional views on sex-roles, etc). These considerations lead Rubin and Mitchell to view couples research as a counselling process focusing respondents' attention to issues in the relationship, encouraging the exchange of feelings between partners, and developing problem-solving skills to resolve conflicts. Such an activity is viewed by the authors as raising ethical issues:

> "Do we, as researchers, have the right to intervene in our respondents' relationships?.....Are the definitions that we help our participants to arrive at in fact accurate definitions?.....These questions.....have not generally been raised in connection with research on close relationships."
>
> Rubin & Mitchell (1976, p.22).

which may only be clarified by defining their role as mediating between respondents. As the development of procedures is intended to parallel this role, a consideration of the objectives of mediation is necessary.

4.1.2.2. The procedures that are developed in the following chapters seek to enhance the nature of the participants' shared model of their relationship by mediating in a specialised and restricted way (Fig.75). This entails that the procedures do not intervene into joint modelling activity, but engage the participant users in separate modelling activity which is then superimposed in a way that reveals only the functional consequences of each participant's responses to the other. This methodology may be contrasted with the 'double dyad grid' method (Ryle & Breen, 1972) which requires the joint construction of a dyad grid, and the prediction of the partners' responses in this grid. Instead,

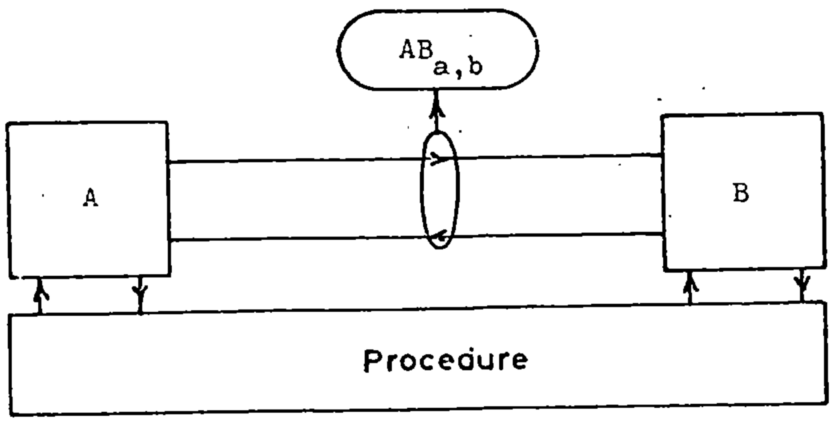


Figure 75.

separate interactions with the procedure are expected to facilitate the transaction of a shared model of self and partner ($AB_{a,b}$). To discuss the parameters of this procedure, the nature of this model and the conditions in which it is transacted require clarification.

4.1.2.3. Kelly (1955) argues that a similarity of attitude between two persons is neither a sufficient nor necessary condition for either of them to play a constructive role towards the other in a social encounter. Thus, Kelly's sociality corollary:

> "to the extent that one person construes the construction processes of another, he may play a role in a social process involving the other person."

Kelly (1955, p.95).

suggests that persons may enter into effective joint activity even though they disagree in their outlook, provided each is able to construe that a disagreement exists between them. Even the absence of this understanding does not prevent joint activity of some sort from occurring. For example, conflict may be viewed as a joint social activity in which absence of understanding is a precondition. Similarly, the understanding by one person of the construction processes of another need not be reciprocated, yet still joint social activity may ensue. Extending this example still further, suppose each person <u>assumes</u> an understanding of the other whilst grossly in error; each person applies an interpretation on behaviour within the social encounter which is at odds with the interpretation of the other, yet the relationship muddles along more or less harmoniously.

What then are the distinctive features of the modelling transaction? The most far-reaching contribution to an analysis of this process is to be found in Mead's interactionism, and Blumer's eloquent summarisation:

"Symbolic interaction involves interpretation, or ascertaining the meaning of the actions or remarks of the other person, and definition, or conveying indications to another person as to how he is to act.....The fitting together of lines of conduct is done through the dual process of definition and interpretation.....(which) .....operates both to sustain established patterns of joint conduct and to open them to transformation. .....the established patterns of group life just do not carry on by themselves but are dependent for their continuity on recurrent affirmative definition. Let the interpretations that sustain them be undermined or disrupted by change definitions from others and the patterns can quickly collapse.....In the flow of group life there are innumerable points at which the participants are <u>re</u>defining each other's acts. Redefinition imparts a formative character to human interaction, giving rise at this or that point to new objects, new conceptions, new relations, and new types of behaviour".

Blumer (1971, p.18).

The possibilities for effective interaction would then seem straightforward; providing I know whether or not I agree with another person, I can safely and constructively participate with him in a social encounter. But how may I be sure that I understand his views? How can I be sure he understands mine? In instances of disagreement, dilemmas of this sort are inevitable, and certainty in social encounters falters. Persons facing this dilemma begin to engage in a spiralling process:

"If communication is optimum, they <u>understand</u> that they differ on the interpretation of the act, and also <u>realise</u>

that they both understand that they differ in its interpretation......However, often in human affairs where there is a disagreement there is also a misunderstanding and failure of realization of misunderstanding".

Laing, Phillipson & Lee (1966, p.12-13).

Misunderstanding and failure of realisation lead to behaviour based on conflicting or contradictory assumptions, behaviour that jars, seems out of place, inconsistent or bizarre.

4.1.2.4. This is not the only area in which social encounters may be problematic. Laing et al point out that acting on one's own experience of the other introduces a second, and more profound, area of confusion:

"(Projection is) one of a class of actions whose primary object is not the other's experience of me, but my experience of the other.....If I cannot induce you to see me as I wish, I may act on my experience of you rather than your experience of me. I can invent your experience of me.....Another way of putting that is that one experiences the perceptual world in terms of one's phantasy system, without realising that one is doing this".

(p.15-17).

In summary, Laing and his colleagues identify two sources of confusion in social relationships, namely disjunctive interpretive systems (failures of understanding and/or of realisation), and the projection of phantasised constructions, confounding experience of self and other.

When either or both types of mismatch occur in established relationships, the reference frame through which the participants articulate their relationship is jeopardised. The former represents a failure to articulate the modelling transaction at appropriate levels, whilst the latter reflects the occlusion of a participant's model of his partner by his self-model. Thus, to enhance conversational skill in a two-person relationship requires the development of a procedure capable of :-

1) separately exteriorising each participant's model of self and partner;

2) identifying and displaying predicates central to each model;

3) identifying and displaying disjunctions between participants' modelling of self and partner;

4) identifying and displaying change in modelling contingent upon modelling transactions between participants.

4.1.2.5. Devising a procedure to achieve these objectives requires that modelling interactions with the procedure occur outside the reference frame of the relationship. If joint modelling activity were called for, the models each participant exteriorises would be confounded by the interpersonal reference frame the activity seeks to reveal. Consequently, a dominant partner may steer the modelling transaction towards his own objectives.

Consider this point within the framework of construct elicitation. It has been suggested that a more direct method of displaying interpersonal disjunctions might be to adopt one of the following grid procedures:-

(i) A and B individually produce a set of constructs, pool them and negotiate which of those in the combined set are relevant to interpersonal concerns.

(ii) A and B produce a set of constructs directly in negotiation.

(iii) A and B individually produce a set of constructs, and proceed to explain their constructs to the other in order that the other may come to apply them in a similar way.

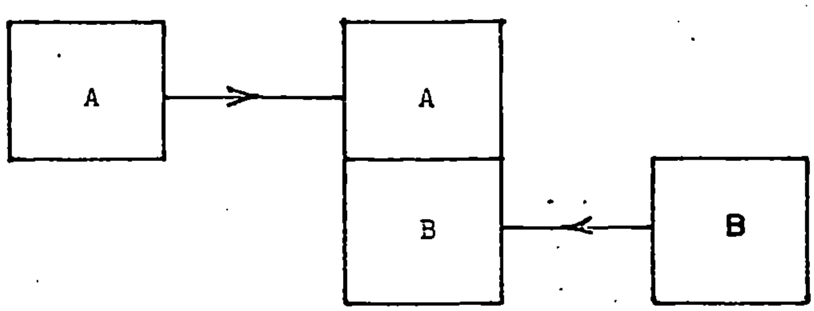
(iv) A and B individually produce a set of constructs, exchange them without explanation, and proceed to apply them as each anticipates the other would apply them.

Each of these procedures involves, at some stage, A and B being cognizant that their constructs will be subsequently or immediately made known to the other. The effect of this knowledge is quite clear, namely, that during the process of elicitation A and B are aware that the felt meanings they attempt to exteriorise will be evaluated and appraised by the other. Such an awareness may clearly bias and distort the nature of the modelling conversation towards those felt meanings that are anticipated as being consistent with the existing reference frame of the relationship. It becomes essential, then, to develop procedures that exteriorise and display modelling in such a way as to circumvent these restraints.

4.1.2.6. The methodology developed to enable participants to engage in separate modelling activity, and to superimpose this modelling activity without jeopardising its personal quality, may be termed the aggregate grid method.

Both participants produce a series of grids based on a common set of personal acquaintances with whom each meets fairly frequently, and with whom each maintains relationships held to be personally relevant and significant. In addition, each participant includes in this set the elements SELF and PARTNER. From these grids, three separate analyses are performed and displays derived:-

Individual grid (A) | Aggregate grid (A+B) | Individual grid (B)



However, the displays made available to each participant comprise only his or her predicates, classified according to their functional properties in the aggregate grid. Consequently, participants may observe the extent and form of their contribution to their shared frame of reference without necessarily revealing the content of their modelling activity to each other. Of course, they may choose to disclose this to each other, but the methodology does not insist that they do so.

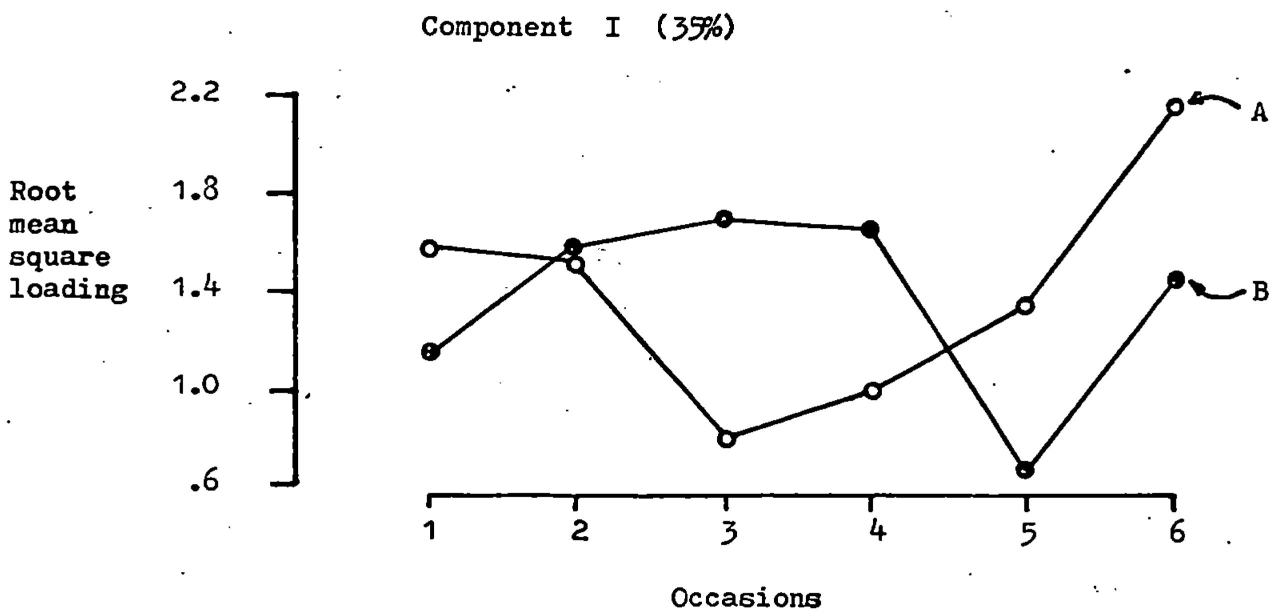
A preliminary application to the aggregate grid method to a series of six grids completed by two friends over a period of two months revealed that the method offered two forms of reflective feedback. Firstly, it enabled each participant to identify the coupling between their modelling activity and events in the relationship. Secondly, it enabled the participants to explore the interdependence between their responses to these events.

4.1.2.7. The pilot application comprised a series of six grids based on a fixed set of common elements including the elements SELF and PARTNER. On each of the six occasions, the two participants separately and simultaneously completed their grids. At the end of the series all constructs from both participants were pooled to form the aggregate grid and a single PCA solution was obtained. After identifying significant components by the method of representation, the variance of each component was simultaneously partitioned by computing root mean square loadings for each component, each participant, and each occasion. When these data were presented to the participants in graph form for their comments, a number of interesting points emerged. When only those components which were, at some stage in the series, salient components for both participants were plotted (Fig. 76), it became evident that during the series <u>both</u> participants shifted their attention to and from one class of predicates (component I) to another class of predicates (component III), and that these shifts always occurred for one participant (A) <u>prior</u> to the other (B). These two components were found to refer to a dimension along which A and B distinguished themselves from each other (component I), and a dimension by which they collectively distinguished two mutual friends (X and Y). When the participants were invited to comment on the shifts on occasions 4, 5 and 6, episodes with which they might have been associated were readily identified. In addition, it was found that A and B had discussed this episode with X at some length, and that this might account for B 'shadowing' A.

4.1.2.8. It became evident from this pilot application that the aggregate grid provided a method for summarising modelling activity, and that it might be developed to provide systematic prompts of the kind discussed in previous chapters. The aggregate may then yield information concerning:-

(i) the class or classes of predicates that participants collectively employ to define themselves and each other;

(ii) predicate classes that define the relationship exclusive to one or other participant;



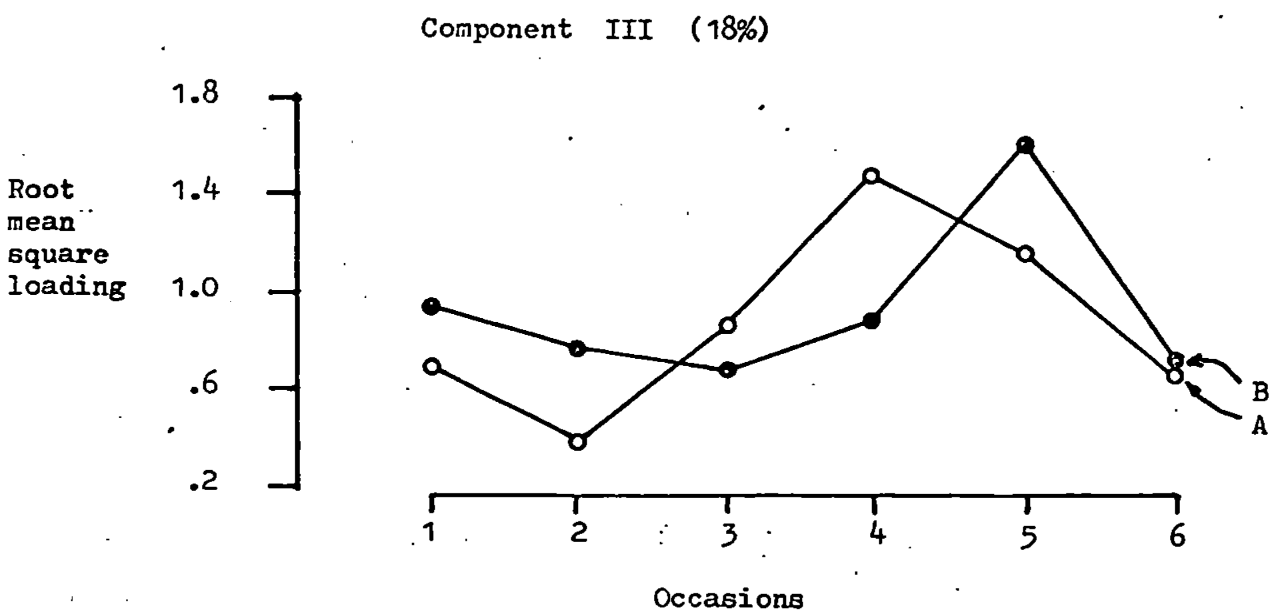


Figure 76 Aggregate component representation over a series of six grids.

(iii) changes in the salience of these predicate classes over a period of time;

(iv) the interdependence of changes in the salience of predicate classes between the participants.

4.1.3. Stage 2: Defining transformations and outcomes.

4.1.3.1. The information yielded by the aggregate grid method was considered to be compatible with the transformations developed in the core and reconstruction grid procedures. Deriving displays from aggregate grid analyses thus provided an additional dimension to the procedures discussed in previous chapters by mediating between the modelling activity of participant users (Fig. 77) in a way which reflected the frame of reference of their relationship. Thus, whilst separate interactions with the procedures produces personal records of modelling activity in the individual grids (IG) and personal displays (D_{ig}) based on appropriate transformations

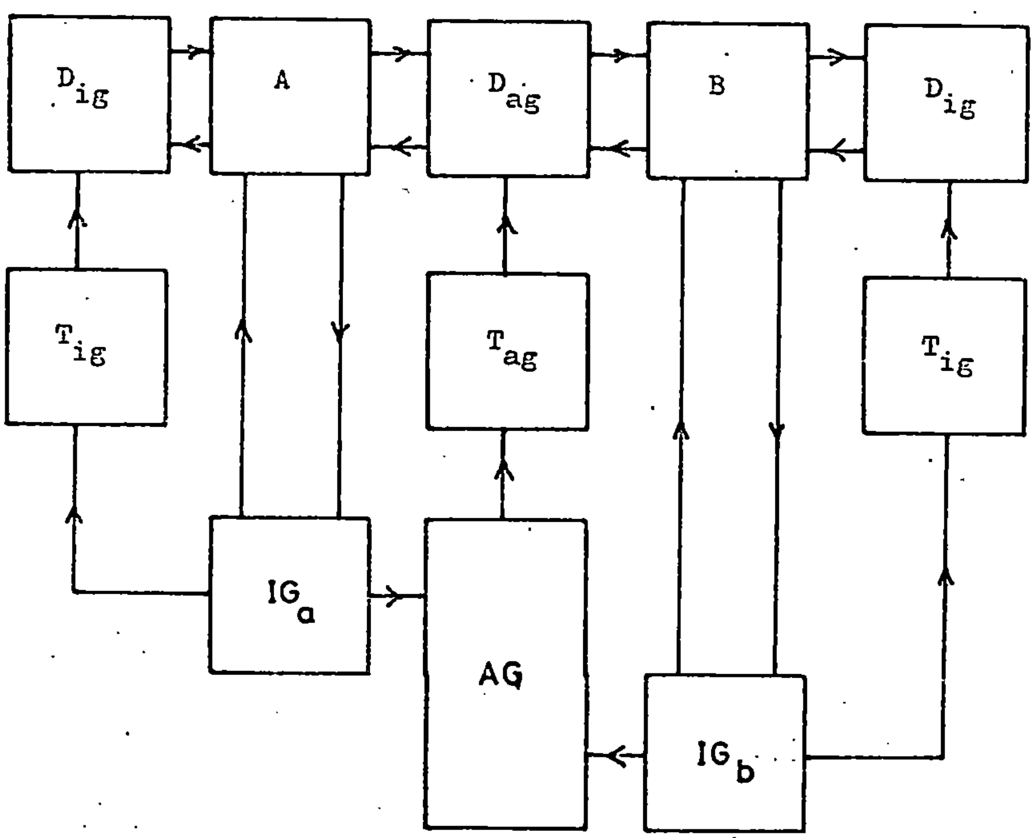


Figure 77.

(T_{ig}), the combination of these records in the aggregate grid (AG) give rise to transformations (T_{ag}) and displays (D_{ag}) based on the functional properties of construing by both participants in the relationship.

In fact, the transformations developed for each level of display in the core grid procedure may be applied to the aggregate grid, but with additional possibilities, namely that the functional properties of the same predicate may be composed in the context of the individual conversational domain (IG) or the aggregate conversational domain (AG). For example, the functional attribute of predicate centrality may be tested for a single construct in both IG and AG, giving rise to the four outcomes:-

		AG (A+B)	
		CORE	PERIPHERAL
IG(A)	CORE	1	2
	PERIPHERAL	3	4

each with the following rationale:-

<u>Outcome 1</u>: two possibilities arise for a matching of the individual and aggregate outcomes, namely (i) that B does not contribute to the class of predicates within AG that features A as a central element, indicating an instance of disjunction between A's and B's interpretive systems, or (ii) that B does contribute to the class

of predicates that features A as a central element, indicating an instance of conjunction between A's and B's interpretive systems.

Outcome 2: the sole possibility of this mismatch arises from B contributing to a class of predicates comprising constructs of A's which feature A as a central element, with the exception that B's constructs do not feature A as a central element. This outcome arises because PCA seeks patterns of variation amongst all elements rated on a set of constructs, irrespective of the origin of those constructs. Thus, if B produces constructs whose patterns of ratings are similar to A's constructs in every respect with the exception of element A, both sets of constructs will load strongly on a single component. However, constructs contributed by B will effectively reduce the centrality of element A on that component. This outcome would then indicate a specific disjunction between A's and B's interpretive systems.

Outcome 3: following the rationale of outcome 2, this mismatch arises from B contributing to a class of predicates comprising constructs of A's which do not feature A as a central element, with the exception that B's constructs feature A as a central element. This outcome also indicates a specific disjunction.

Outcome 4: following the rationale of outcome 1, two possibilities arise for outcome 4, namely (i) that B does not contribute to the class of predicates within AG that features A as an incidental element, indicating disjunction, or (ii) that B does contribute to that component featuring A as incidental, indicating conjunction.

These comparisons between IG and AG outcomes may be carried out at the three levels of display incorporated into the core grid procedure. In addition, reflective strategies may be based on disjunctive outcomes to encourage modelling of the shared reference frame of the participants. In the following sections an exploratory application of the aggregate grid with an unmarried couple is reported. In this study transformations and reflective strategies are developed to exhibit to the couple the feature of centrality of predication in their modelling activity. However, a number of procedural issues require clarification prior to this exercise.

4.1.3.2. Identifying significant components.

The method employed for isolating significant components from components attributable to error variance in individual grids may be readily applied in the analysis of aggregate grids. That is, constructs are assigned to those components on which they obtain the highest loading, and unrepresented components are discarded. Component loadings were chosen (rather than eigenvectors) for a single reason: eigenvectors on each component are normalised coefficients, reflecting the contribution of each construct to the total variance accounted for by each component, irrespective of the contribution of that component to the total variance of the grid. By contrast, loadings are derived from the product of construct eigenvectors and the magnitude of the component latent root (eigenvalue). Thus, loadings do not solely reflect the salience of a construct for a single component, they also reflect that construct's contribution to the total variability within the grid. In short, assigning a construct to a single most representative component is equivalent to indicating which of n-1 variates maximally accounts for that construct's variability, and may be justified by the assertion that knowledge of this construct's loading on the most representative variate leads to greater accuracy in reproducing original ratings than knowledge of loadings on any other single component;

> "Knowledge of our S's scores on the m principal components, together with knowledge of the coefficients defining each PC, would be sufficient to reproduce the S's scores on the original variables perfectly. Just as the PCs are defined as linear combinations of the original variables, so the original variables can be defined as linear combinations of the PCs. In fact, the coefficients which must be used to generate X_j in the equation
>
> $$X_j = C_{j,1}PC_1 + c_{j,2}PC_2 + \ldots\ldots + c_{j,m}PC_m$$
>
> are simply the weights j receives in the various linear compounds which define the PCs, that is $c_{j,k} = b_{j,k}$ for all K,j. Since we can reproduce the score made by each S on each original variable, we can, a fortiori, reproduce any measure or set of measures defined on the original variables".

Harris (1975, p.158).

Thus, analysis of the aggregate grid obtains construct definitions relating to the highest eigenvector on the highest eigenvalue which, combined with element eigenvectors on that component, enable maximal rating reproducibility whilst satisfying the procedural requirement of construct assignment without replacement.

4.1.3.3. Identification of core components.

Chapter 3.4. discussed two forms of centrality measure with distinct functions, namely, a discontinuous measure establishing a criterion for directing the user's attention to significant events (Level 3) and a continuous measure providing feedback for refining user discrimination of construing processes (Level 1). However, examination of the sample grid series reveals that in some cases the discontinuous 50% variance criterion for identifying core components (in which the element SELF must be located in the first 50% of a component's variance) may not be satisfied by any component in the solution. A solution to this problem is ready to hand, namely, to successively relax the variance threshold (to an upper limit) until at least one core component is identified. This procedure is acceptable, provided it is borne in mind that the likelihoods established for core constructs in Chapter 3.2. were derived from sample grids analysed according to the 50% variance criterion. The implications of a relaxed criterion for the computation of posterior probabilities may be summarised as follows:-

(a) the prior probability distributions for core constructs remain unchanged, since prior belief is based on the proportion of sample constructs satisfying the aggregate operational definition described in 3.2.3.

(b) relaxing the criterion to maintain the number of core constructs identified distorts the likelihood ratios associated with the transformation. In fact, as the threshold is relaxed, the likelihood associated with the classification 'core' should properly fall, and that associated with the classification 'peripheral' should rise. Maintaining a fixed likelihood ratio then leads to under-justified certainty for the classification 'core', and over-justified certainty for the classification 'peripheral'.

(c) under the 50% variance criterion 72.5% core constructs and 60.2% peripheral constructs were successfully identified in the test sample. Provided the ratio of these proportions is not modified under the relaxed criterion, the ratio of rates of change of posterior probabilities over successive observations will be a linear transformation of those obtained by the marginal procedures. The result will be that under the relaxed criterion core and peripheral classifications would be made with greater certainty after fewer observations.

4.1.3.4. <u>The status of principal components in individual and aggregate grids.</u>

Within any single grid, principal components analysis ensures that principal components satisfy two simultaneous conditions:-

(a) that each successive component represents a pattern of maximal variability contained in the residual variation;

(b) that each successive component is maximally orthogonal to preceding components.

In satisfying these conditions, any PCA solution is unique since it is tied to the observed variation in the sample grid. Consequently, components derived from separate grids are logically incommensurable. However, it is possible to derive estimates of component similarity between separately analysed grids when the same element sample is used, simply by comparing the ordering of element eigenvectors on all components in one grid with all components in the other. This procedure reveals components that are functionally equivalent, as may be seen in the correlations obtained for the Husband's grid (H) and the Wife's (W) grid in a second pilot study (Table 44).

	PC_1^W	PC_2^W	PC_3^W	PC_4^W
PC_1^H	.950**	.017	-.225	-.058
PC_2^H	.517	-.417	-.183	-.283
PC_3^H	.033	.550	-.433	-.017
PC_4^H	-.033	.550	.150	-.150
PC_5^H	-.017	-.350	-.783**	-.317

(N.B. **: .01 > p (one-tailed)).

TABLE 44 Spearman rho correlations between element eigenvectors for Husband's and Wife's significant components.

On the basis of these data we might tentatively assert a functional equivalence $PC_1^W \equiv PC_1^H$, and $PC_3^W \equiv PC_5^H$, irrespective of sign.

When both grids are combined to form the aggregate grid, the PCA solution once again is logically unique and incommensurable with the individual solutions. New and unique patterns of variation may be located in the aggregate grid, but it is clear that if both persons contribute similar patterns of ratings to the aggregate grid, these patterns will appear as dominant and will account for the greatest proportion of sample variation. Should one person contribute an exclusive pattern, this pattern is most likely to be absorbed into dominant patterns or discarded as error variance unless it is particularly dominant in the individual grid. In short, the aggregate PCA solution will tend to isolate areas of agreement and emphasis in higher-order components, whilst lower-order components will tend to be unshared or de-emphasised. This aspect of the aggregate PCA may be seen in Table 45, from which the following functional equivalences may be asserted:-

		PC_1^{WH}	PC_2^{WH}	PC_3^{WH}	PC_4^{WH}	PC_5^{WH}
Husband's PCA	PC_1^H	.983**	.133	-.033	-.083	-.067
	PC_2^H	.367	-.850**	.133	-.367	-.050
	PC_3^H	.133	.333	.617*	-.400	.100
	PC_4^H	-.167	.250	.267	.200	-.333**
	PC_5^H	-.050	-.133	-.567	-.867**	-.167
Wife's PCA	PC_1^W	.967**	-.133	-.017	-.050	-.100
	PC_2^W	-.067	.583	.567	.217	-.333
	PC_3^W	-.100	-.017	.267	.900**	.017
	PC_4^W	-.017	.050	-.117	.150	.517

(N.B. ** : $.01 > p$ (one-tailed); * : $.05 > p$ (one-tailed)).

TABLE 45 Spearman rho correlations between element eigenvectors for individual and aggregate grids.

$$PC_1^{WH} \equiv PC_1^H \equiv PC_1^W$$

$$PC_4^{WH} \equiv PC_5^H \equiv PC_3^W$$

both of which confirm the equivalences located in the individual grids comparison. Thus, PC_1^{WH} and PC_4^{WH} are those components which are shared and emphasised and which represent dominant patterns of variability in the aggregate grid.

However, it is evident that individual and unshared components emerge in the aggregate grid, namely,

$$PC_2^{WH} \equiv PC_2^{H}$$

$$PC_3^{WH} \equiv PC_3^{H}$$

$$PC_5^{WH} \equiv PC_4^{H}$$

and that PC_2^{W} and PC_4^{W} are lost entirely, and not represented by the aggregate analysis. It is quite clear that any patterns of variation that are under-emphasised in individual grids and unshared must compete with variation from shared and emphasised sources. The aggregate grid, as a result, does not display all possible constructions of the two individual grids combined, but only those patterns which are more likely to be shared between the two grids.

This may be summarised by the observation that 12 functionally equivalent constructs equally divided between two person's grids have as great an effect on the aggregate grid as 12 functionally equivalent constructs specific to one person's grid.

4.1.3.5. The illustrative case study in the following section seeks to develop reflective strategies compatible with Level 3 information arising from the aggregate grid. Level 3 transformations developed in preceding chapters are wholly appropriate for the aggregate, but additional comparisons are made available by the aggregate which require classification.

Firstly, the existing transformations for contrasting successive observations may be applied to both IG and AG analyses, obtaining two comparisons for each participant (Fig. 78a). Thus, posterior probabilities deriving from the application of Level 3 transforations to the first of a series of individual grids (IG_1^A and IG_1^B) may be compared (via the comparator symbol) with outcomes in a subsequent grid (IG_2^A and IG_2^B). In addition, however, the same transformations applied to the aggregate grid give rise to posterior probabilities <u>in the aggregate context</u> for A's constructs ($AG\ (A)\ _1$) and B's constructs ($AG\ (B)\ _1$), which may then be compared with the subsequent aggregate grid ($AG\ (A)\ _2$ and $AG\ (B)\ _2$). If A's constructs obtain disjunctive outcomes in the AG comparison whilst not obtaining disjunctive outcomes in the IG comparison, it may be observed that B's modelling activity has so changed the nature of the aggregate grid that the function of A's constructs in the aggregate domain has changed.

Secondly, having applied the transformations, comparisons may be made directly between outcomes for each construct in IG and AG analyses (Fig. 78b). Each participant may thus draw conclusions concerning the nature of their partner's contribution to the aggregate domain. The classes of IG-AG disjunction that may be observed have already been discussed (4.1.2.1.).

The case study that follows is a pilot application of these procedures focusing on the feature of <u>construct centrality</u>, with the objective of developing reflective strategies and displays for Level 3 information.

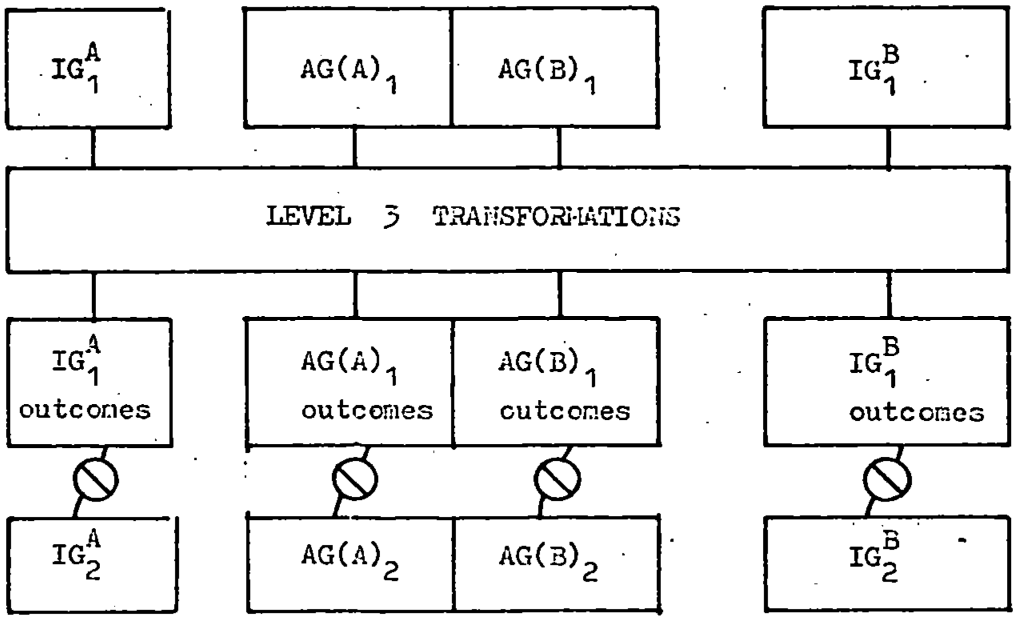


Figure 78a Successive comparisons.

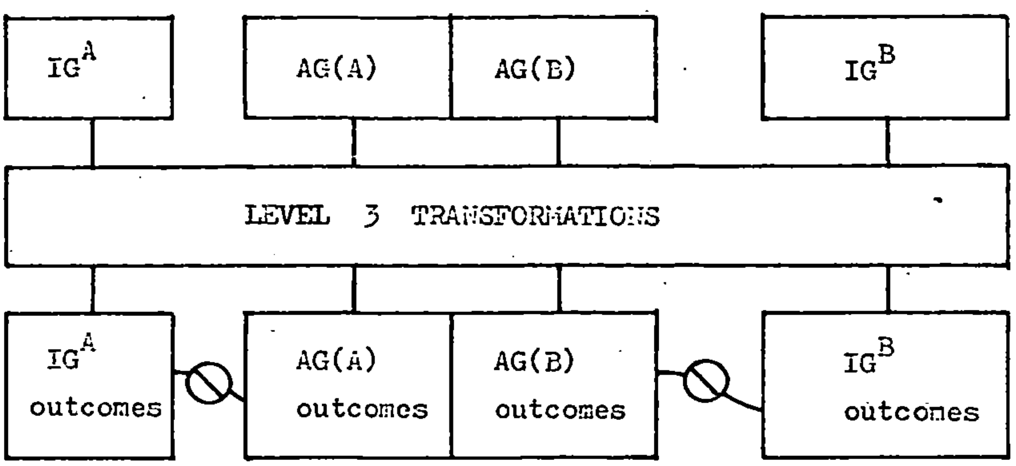


Figure 78b IG-AG outcome comparisons.

4.1.4. Stage 3: Developing reflective strategies.

4.1.4.1. A young unmarried couple Jack and Jill, volunteered to use the procedures for a period of two months. Over this period, they each completed five individual grids. Both of them had expressed at the outset that problems existed in their relationship, and hoped that the study might enable them to come to terms with each other. As it happened, the study coincided with a number of episodes in the relationship, culminating in a series of crises. Happily, Jack and Jill were reconciled and married some time later.

At the time of the study Jack and Jill had been living together for a year. Jill had been working as an office secretary for some time, but Jack had recently taken a job as a teacher. Because of Jack's new job they had moved into a new neighbourhood, and in a preliminary interview Jack expressed resentment for being separated from his friends and tied down to a domestic life with Jill.

> Jack: I feel cut off, really. Cut off and lonely. I don't seem to see any of my friends any more. (pause) What I get from our relationship isn't enough. I'm not bored with you, it's just, well, I'm bored with myself, at not being able to do anything except get up, go to work, come home, and go to sleep.

Jill had explained that in the last six months their relationship had often been at the point of breaking up, and suggested the cause to be Jack's infidelity;

Jill: You ran out on me, I know it was only for a day, but you ran out on me and dragged me through all that, for nothing. I mean, what did you get out of it? Nothing. You fell for some other chick hook, line and sinker, and all the time you didn't see she was using you. That's where the trouble is. I don't know whether I can ever trust you again.

Whilst Jill felt certain that this was putting a strain on the relationship, Jack asserted that their greatest problem was his isolation, both at work and at home.

Jack: It's this job really. It's alright for you. You meet tons of people, men especially and that makes me jealous. How do I know what you get up to all day long? I don't know anybody at this college. The students avoid me. Nobody on the staff talks to me. How else am I supposed to feel?

Jill seemed reluctant or unable to express her feelings to Jack, and as a result Jack blamed her for holding things back.

Jack: I find it difficult to get things out of you. You hide it all from me, and then say that you're doing it so as not to make me feel guilty.

Jill: I do tell you things, but you stop me. You don't listen. Remember that time I was trying to tell you what I saw happening at R's house the other night? You said you had gut-ache and rolled over and went to sleep.

Jack: Well I did! It wasn't an excuse. I felt terrible.

Jill: Yes, okay, I suppose so. But it's happened so many times before.

4.1.4.2. After producing a set of practice constructs on trial elements, Jill and Jack decided on a sample of names of close acquaintances with whom they both felt to have significant relationships. These names were recorded on numbered cards, and to the set were added the elements JACK and JILL. On each of the five occasions Jack and Jill each elicited four constructs by the Full Context method, and on the second and subsequent occasions proceeded to reapply all constructs from preceding occasions. Elements were ranked on constructs, and these rankings were recorded by E on grid forms.

Thus, on the fifth ocoasion, their grids each comprised 20 constructs, 4 elicited and 16 reapplied. However, over all 5 occasions Jack and Jill each produced 60 sets of element rankings (i.e. 4 + 8 + 12 + 16 + 20). The entire duration of the cycle, between the first and the fifth occasion was 60 days. However, the intervals between each occasion was irregular. The interval between the first and the second occasion, (1 day) was reduced to a minimum to give both Jack and Jill the opportumity to formulate in a short time 8 constructs to describe their relationships. Thereafter, the periods varied according to the frequency with which Jack and Jill met the people they had chosen as elements.

The sequence was then as follows:-

Day 1	Elicit 4 constructs
Day 2	Elicit 4 and reapply 4 constructs

Day 5	Elicit 4 and reapply 8 constructs
Day 28	Elicit 4 and reapply 12 constructs
Day 60	Elicit 4 and reapply 16 constructs

Although reflective strategies had not been sufficiently developed to provide the couple with feedback during the sessions, after the series was complete Level 3 transformations were applied to their individual and aggregate grids, and a set of simplified tabular displays assembled to exhibit the disjunction classes discussed in 4.1.2. Jack and Jill readily responded to the prompts that were derived from these displays and freely discussed events that had occurred over the intervening period. Posterior probabilities obtaining for both participants' constructs for IG and AG outcomes are listed in Appendix H.

4.1.4.3. Successive comparisons.

Significant changes in the functional properties of either participant's constructs may reflect alterations in the nature of their modelling of self and partner. Moreover, such changes may reveal the attempts by one or either participant to influence the collective definition of themselves that the participants come to formulate. To display these changes in function, significant disjunctions in construct outcomes over the 60 day period have been listed in Table 46. In addition to recording the degree of certainty attached to the classification of each construct (either core, C, or peripheral, P), the table records the source of the disjunction

(IG, AG, or both) and the rank positions of self and partner on each disjunctive construct. For example, on Day 28 Jill's construct TOLERANT reversed its function from peripheral to core to her self-definition. To what might this reversal of function be attributed? Putting questions of this kind to the participants will clarify the form that reflective strategies might take in the fully developed procedure.

Both participants readily respond to these queries. For example, it was suggested to Jill that her constructs TOLERANT v. COMPETITIVE and PUT YOU IN PLACE v. FREER had become central to her self-definition, and that shift was mirrored in both her own and Jack's grids:-

> Jill: What I know about Jack is that he can be warm and loving, but he always follows other people.....what other people say he should be.....I need him to give and take like me.....I've got to feel comfortable in a relationship, and I want to know what to expect. I mean, it's no good for me if I don't know from one day to the next what he's going to do.

It is evident that Jill is beginning to take issue with Jack in a way that she might not have previously, and to articulate the extent to which she can afford to be TOLERANT ("I need him to give and take like me") whilst retaining her sense of proportion by being able to PUT YOU IN PLACE when necessary ("I've got to feel comfortable in a relationship, and I want to know what to expect"). This ability to assert herself in a more effective way was frequently stressed in Jill's discussions with Jack:-

Day	Constructs	Source	Prior	Ob.	Self	Part.
	JILL					
28	C4 TOLERANT	IG/AG	P 95	C	1	6
	C7 PUT YOU IN PLACE	IG/AG	P68	C	2	6
	C8 PATIENT	IG/AG	C65	P	4	2
	JACK					
2	C4 SERIOUS	IG	P80	C	2	5
5	C1 REMOTE	AG	P90	C	1	6
	C7 INHIBITED	AG	P80	C	3	8
28	C5 DEPENDABLE	IG	P68	C	2	8
	C7 INHIBITED	IG	P90	C	2	8
	C12 CAUTIOUS	IG/AG	P80	C	1	9

TABLE 46 Significant disjunctions for Jack's and Jill's constructs.

Jill: I felt much better after that talk we had. I felt you understood me more, and I got a lot off my chest.....I probably upset you, in fact I know I did, but it had to be said.....you had to be told about this sex thing, and what I saw happening to you six months ago, because I got so depressed. You knew what I was going through for months and months but you didn't know why.

Jack: Yes, but now I feel guilty for doing it.

Jill: Well, I'm sorry that you do.....I can't help that. You're supposed to feel guilty, but I don't want you to.....It just can't be helped. When I was doing the grid I realised you had to be told what I felt.....that I'd been holding it back for so long, and it wasn't doing either of us any good.

Jack: O.K., but what could I do? I didn't know what to do about it,

Jill: Well, that's too bad.....

Similarly Jack was able to pursue the observed disjunctions on his constructs. For example, on the third occasion the constructs REMOTE v. PRESENT and INHIBITED v. OPEN both acquire an unexpected importance to Jack's self-definition:-

Jack: Everybody was telling me that I wasn't being myself, and what I was capable of but not doing. They all said I was pretending to be.....you know, like I am, and that inside me things were different. I suppose it got to the point where I saw that this could be right, and I thought it was everybody, including you that were holding me back. What I wanted was to let my inside out and see what differences it made. What I found was that people laughed at me.....or played with me, used me, you know. But then I was using other people too, but in a different way.....Flirting with other women made me feel good, you know, boosted my ego and made me feel important. But they weren't really important to me, you know what I mean? They were just.....just conquests, really.

Jack's flirtations may be seen as attempts to combat his sense of remoteness ("What I wanted was to let my inside out and see what differences it made") which were not successful in the terms that he anticipated ("What I found was that people laughed at me").

Similarly, viewing himself as CAUTIOUS (C12) had come to acquire greater importance in his and Jill's definition of Jack:-

> Jack: This relates to something I see mainly in myself, although I'm not sure where I stand. Some people are scared of taking risks with themselves because their ideas about themselves are so fragile. They're very good at concealing themselves.....they're people who could be but never are.....sometimes they blame people around them for not letting them be themselves. They can talk themselves out of anything, you know do a disappearing trick. The others seem reckless.....reckless to the point of carelessness. But at least they're honest.

Here it is plain that Jack discovers conflicting views of himself; he sees himself as INHIBITED, but desires to attain the goal of being CARELESS as being "reckless to the point of carelessness" also implies being "honest". Whilst recriminating Jill for her actions (CARELESS) he also acknowledges that Jill is the kind of person he wishes to be like. However, Jack also comes to employ the dimension DEPENDABLE v. UNRELIABLE to delineate himself (DEPENDABLE) from Jill (UNRELIABLE):-

> Jack: I didn't know you would do that. I knew you had made up your mind about Sally, and I knew you felt sorry for Bob.....but at the same time I thought Sally was too intellectual to get into cooking and housekeeping. I didn't think you could get on with her.....and get into

cooking that meal. I was out with Bob, wasn't I? Cutting wood all day, and walking in the fields. I was surprised to come back and find you getting on like that.....I didn't think you would go off to Jim like that. It was a complete surprise.....you didn't have anything in common with him.

Jill: I had no alternative. You'd disappeared with Joan. I didn't want to but I had to.

Jack: You didn't have to. You were only getting your own back on Joan.

Jill: No, I wasn't. Anyway, look what you're doing. You're saying I should have stayed at home all wifey, waiting for you to come home after you'd been out screwing Joan all day, aren't you? That's just it. You expect me to put up with your indecision.....Why should I?

The use of successive comparisons as a means to prompt further modelling activity by the couple appeared to enable the identification of conflicts and differences in their definitions of themselves and each other. It should be noted that this information was made available to both Jack and Jill at the same time, and frequently provoked discussion. However, it was considered essential to display successive comparison independently to each participant, enabling them to choose to discuss whatever concerned them. This consideration suggested that reflective strategies developed in the core grid procedure be employed in future, comprising displays which were assembled separately by each participant.

4.1.4.4. IG - AG comparisons.

A comparison of outcomes for each construct in the individual and aggregate domains may reflect the nature of each participant's contribution to collective definitions in the relationship. Thus, Jack may observe that constructs central to his self-definition in his own grid are peripheral to an aggregate definition of himself. On the basis of this observation he may speculate about the way in which Jill defines him that differs from his own views, and engage in a modelling transaction with Jill to ascertain and negotiate their differences.

It was thus of great interest to both Jack and Jill to note that no disjunctions obtained on Jill's constructs between any IG-AG analysis, (see Appendix H), whilst several large and consistent disjunctions obtained for Jack. This strongly suggested that over this period of 60 days the aggregate definition of Jill was not undergoing reformulation of any kind. To investigate whether this stability arose from Jack's reluctance to contribute to Jill's self-definition over this period, Fig. 79 plots the mean loadings of Jill's and Jack's constructs elicited on each occasion on the first AG component, namely that component that most positively identifies Jill. At the outset, it is clear that Jack contributed to Jill's self-definition, but that as time progresses his contributions declined. This decline, however, was not sufficient to suggest that Jack did not concur with Jill's definition of herself, but simply that his attention during construing was redirected to other attributes.

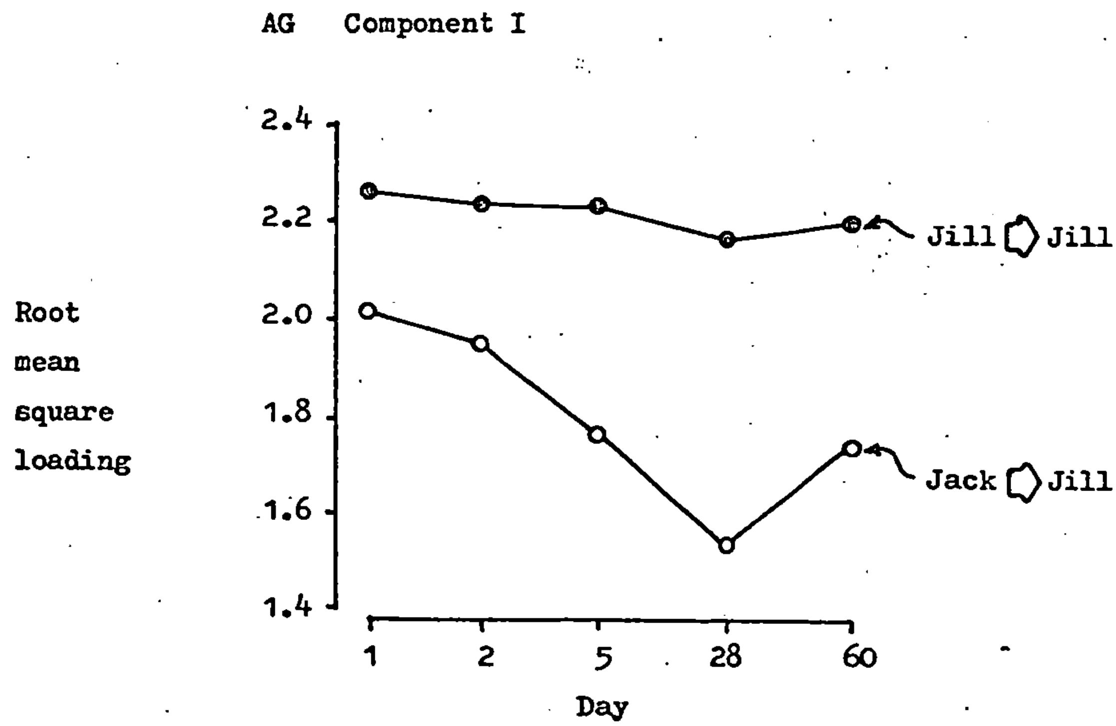


Figure 79 Relative contributions to Jill's self-definition.

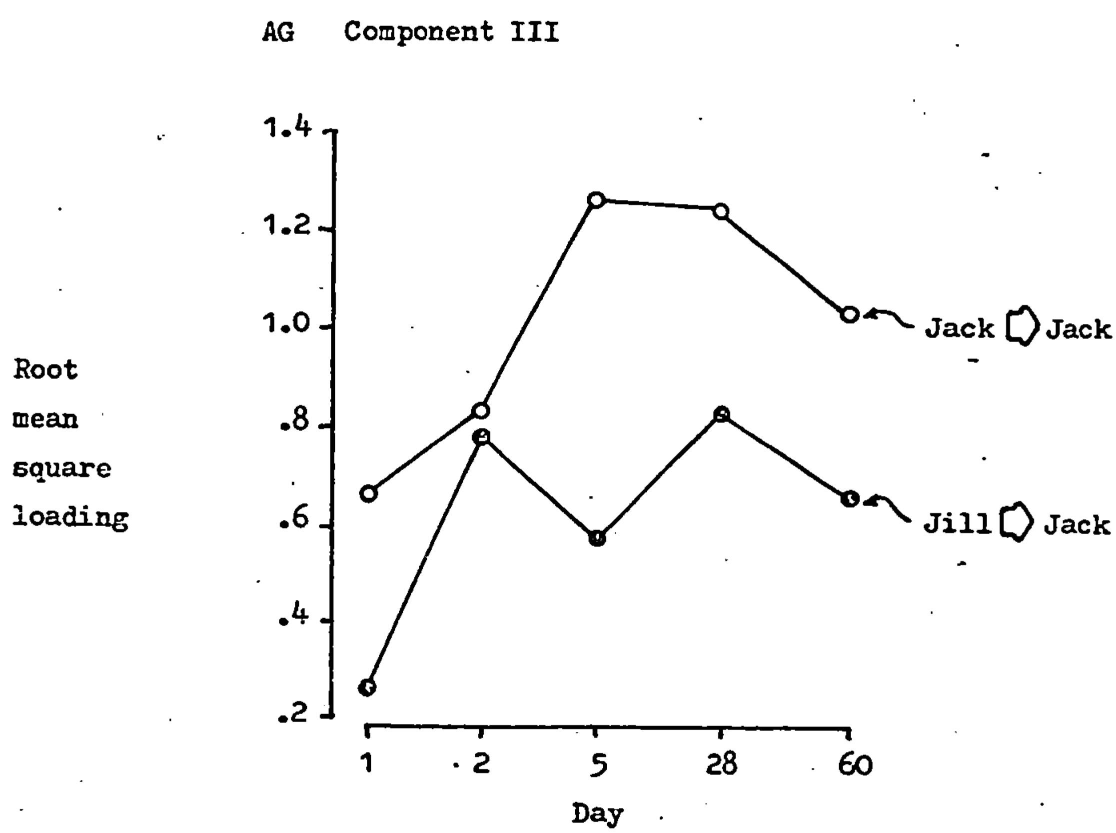


Figure 80 Relative contributions to Jack's self-definition.

What attributes was Jack focussing upon? The numerous disjunctions between constructs which he employed to define himself in his IG and which appear not to be self-defining in AG do suggest that Jack was attempting to operate upon his self-definition in the relationship. Additionally, patterns of predications which were core to Jack's self-definition in the AG analysis were frequently not core in his IG analysis. That disjunctions between Jack and Jill in their definition of Jack did arise was a feature of the relationship that Jack recognised:-

> Jack: The entire thing from start to finish was about me, I suppose.....about my adjustment to a permanent sexual scene with you. It was a reaction I was going through, and I suppose sex was at the centre of it all. You were just keeping up.....biding your time, waiting for it all to blow over.
>
> Jill: But I couldn't know it was going to blow over. We could have broken up for good.
>
> Jack: Yes, it was a test. I didn't intend it to be a test but that's the way it seems now.....I was trying to see what.....what difference other people could make to me, not just to screw lots of other women. Maybe it's quite natural.

The shift of Jack's attention towards self-defining attributes is strikingly evident in the couple's contribution to the third AG component, which most positively defined Jack (Fig. 80). By Day 5, Jack's constructs were contributing to his self-definition at almost the same level as his contributions to Jill's self-definition, a feature that was not reciprocated in Jill's construing. This development of concern for Jack's self-definition was also evident in the overall contribution of the couple's constructs to the first and third AG components (Fig. 81).

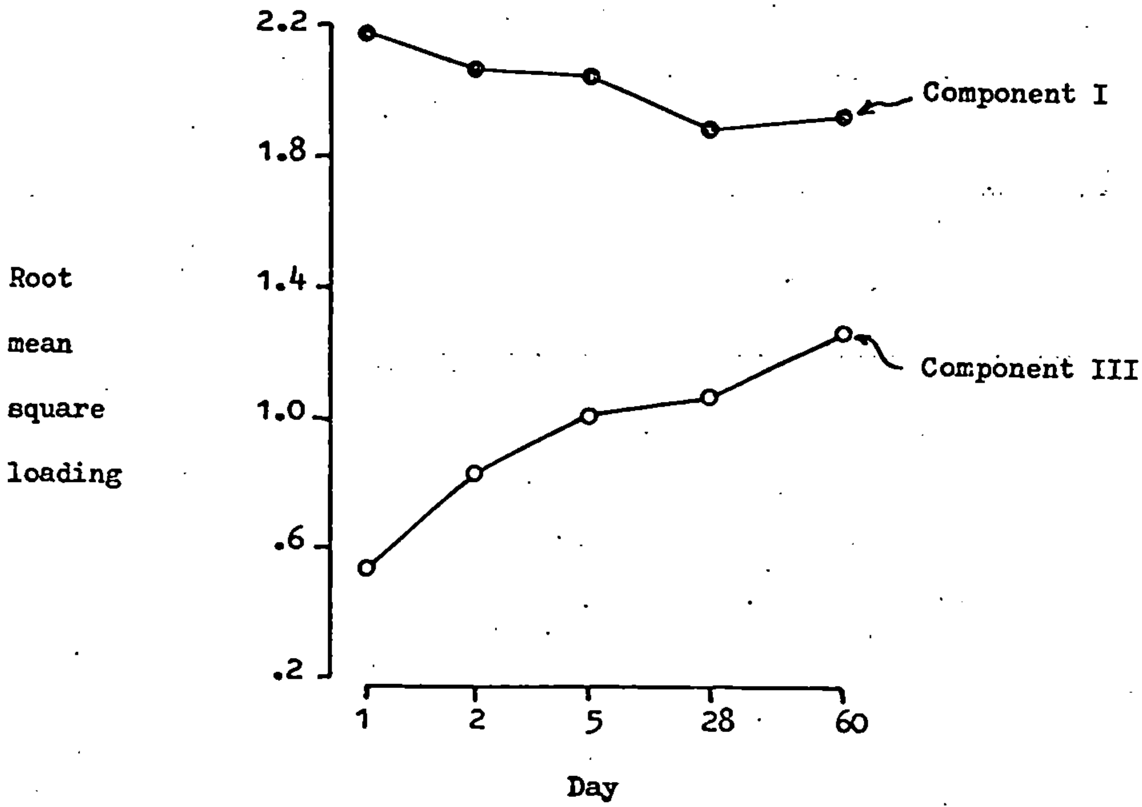


Figure 81 Relative contributions to AG components I and III.

Here it may be seen that a collective increase in attention to particular attributes provided an increasingly positive identification of Jack within the relationship.

A more detailed examination of the areas of disjunction with regard to Jack's self-definition is obtained by listing significant within-occasion discrepancies (Table 47). Although there were a number of transient disjunctions (e.g. C5, C13, C15) the three most striking for their consistency were the constructs GARBLED v. ARTICULATE and GUSHING v. ABSORBANT which Jack consistently employed as core constructs which were peripheral in the aggregate domain, and IMPRESSIONABLE v. DEVIOUS which Jack consistently employed as a peripheral construct but which was core to his self-definition in the aggregate domain. This last construct is evidently the keystone to the dispute between the couple, and Jill viewed events within the relationship as indicating Jack's gullibility;

> Jack: Well, something must have upset you, because you got all moody and bitchy.
>
> Jill: Yes of course it would! It was what you and Mary were up to. You talked to her all night without a word to me. After all, we had got through to each other the day before, hadn't we? You even said you knew what you did with other women.....And then you did it all over again. She had you wound round her little finger..... just to make me jealous. And you couldn't even see it.

Clearly, the predicate IMPRESSIONABLE was salient to Jill's view of Jack ("she had you wound round her little finger"), but Jack was slow to acknowledge how important this feature of his behaviour was to his relationship with Jill:

> Jack: Yes, well it showed me how I felt swallowed up by you. I mean you've got such a strong personality. You don't leave any room for me.....especially with your friends. I feel obliged to make friends with your friends.....I have to be the person you've made me out to be.

Jill: But aren't you forced to feel that?

Jack: Why?

Jill: Well, because your friends keep telling you what to think of me.

Similarly, Jack insisted that a central component of his problem is that his feelings were GARBLED and that he was unable to defend himself, whilst Jill readily contends this:-

Jack: Well, it didn't work out like either of us thought, did it? I mean I knew what was happening, what led up to it, what it was all about.....or I thought I did; that ghastly scene, I think it blew both of us out. You know what went wrong.....I'd blown it into something completely false, out of all proportion.....and I couldn't stop, it just ran away with me, and got bigger and bigger.

Jill: I know, but it was just as bad for me.....it was an accident. I literally can't stand Jim because he's so spineless and weak. What I like about you is that you can be strong when you want to be.....It's just that you let yourself get into the same state as Phillip and Mary.....always at odds with each other and never believing themselves. But I'm not pleased with myself for what I did.

Again, the couple were able to observe the ways in which their views of each other differed, and this immediately led them to engage in a modelling transaction with Jack's self-definition as its focus.

Day	Constructs		Day 1 IG	Day 1 AG	Day 2 IG	Day 2 AG	Day 5 IG	Day 5 AG	Day 28 IG	Day 28 AG	Day 60 IG	Day 60 AG
1	C3	GARBLED	C	P	C	P	C	P	C	P	C	P
2	C5	DEPENDABLE			C	P						
5	C9	GUSHING					C	P	C	P	C	P
	C10	IMPRESSIONABLE					P	C	P	C	P	C
28	C13	RIGHTEOUS							C	P		
	C15	SCAPEGOAT							P	C		
	C16	BITCHY									C	P
60	C19	IMPATIENT									C	P

TABLE 47 Significant IG-AG disjunctions on Jack's constructs.

4.1.4.5. This brief exploratory application of information, deriving from the aggregate grid method has served to identify a number of features of a reflective strategy appropriate to Level 3 displays:-

(i) although aggregate grid outcomes reflect areas of conjunction and disjunctions between the couples' views of each other, this information should properly be displayed to each participant independently. As was pointed out in 4.1.1.5. the objective of the aggregate grid is to exhibit the nature of the shared reference frame in the relationship by encouraging personal modelling of self and partner, and this may be confounded by processes within the relationship that it seeks to display.

(ii) one class of comparisons arising from the aggregate grid, namely successive comparisons, provide feedback concerning changes in function of predicates in the aggregate domain. Reflective strategies appropriate to these comparisons have been developed for individual grids in the core grid procedure, and consist of the assembly of displays mapping together predicted and observed outcomes. Discrepancies may be readily identified and provide directed prompts for further modelling activity.

(iii) a second class of comparisons, unique to the aggregate grid method, is also available, and consists of construct-by-construct comparisons of predicate function within the individual and aggregate conversational domains. Each participant observes these comparisons for his or her constructs alone, and differences of function between domains are attributable to the effect of constructs contributed by the partner to the aggregate domain. An appropriate reflective strategy would consist of assembling a display in which AG and IG outcomes are simultaneously classified, and disjunctions identified. These disjunctions may then provide directed prompts, namely speculations concerning the partner's contribution to the aggregate domain.

4.1.5. <u>Summary</u>.

4.1.5.1. This chapter has adapted procedures developed in preceding chapters for use in the context of couples counselling. The objective of this adaptation, namely the <u>aggregate grid</u>, is to enhance the nature of modelling transactions in relationship through separate, but mediated, interactions with each participant. The development of this procedure may be briefly summarised as six steps.

4.1.5.2. Step (i) outlined the role of procedures in couples counselling as mediating between participants by reflecting the functional consequences of their models of self and partner for each other. This role was operationally defined as entailing independent interactions with participants to enable each to exteriorise their modelling of self and partner, the identification of the functional properties of modelling predicates within their separate conversational domains, the superimposition of participants' models to reveal alterations in function of predicates in the collective conversational domain, and the identification of changes in predicate function contingent on events in the relationship.

4.1.5.3. Step (ii) developed the aggregate grid method for mediating between participants' modelling activity, and a pilot application of the method revealed four classes of information yielded by the method; (a) overlap and sharing of models of self and partner; (b) exclusive and disjunctive models of self and partner; (c) alterations over time in the salience of models of self and partner; (d) the interdependence of the alterations in (c) above in subsequent modelling activity by the participants.

4.1.5.4. Steps (iii) and (v) outlined classes of outcomes obtained by contrasting predicate function in individual and aggregate conversational domains, and step (iv) discussed the status of transformation outcomes deriving from the aggregate grid. It was concluded that significant components in the aggregate PCA solution may be identified by applying the representation method, that core components may be identified by the procedures developed in the core grid, that if necessary the core component criteria may be relaxed, and the consequences of doing so were enumerated. Finally, the incommensurability of aggregate and individual PCA solutions was discussed, but in the analysis of an example data set it was found that dominant patterns of variation were consistently located by the aggregate grid method.

4.1.5.5. Step (vi) applied the transformations and procedures so far developed to a case-study of an unmarried couple, to explore the form that Level 3 reflective strategies might take. It was concluded from this study that (a) displays deriving from the aggregate grid transformations should be separately presented to participants; (b) that successive aggregate grid outcome displays may be assembled by each participant in the manner developed in the core grid; (c) that a display combining individual and aggregate grid outcomes may be assembled by each participant to simultaneously classify the function of each of their predicates, and to identify disjunctions for further modelling activity.

Chapter 4.2.

The reciprocal insight grid

4.2.1. Modelling self and partner.

4.2.2. Primary modelling activities.

4.2.3. Secondary modelling activities.

4.2.4. Transformation procedures.

4.2.5. Ruth and Isaac; an illustrative case-study.

4.2.6. Evaluating the procedures.

4.2.7. Summary.

4.2.1. Modelling self and partner.

4.2.1.1. The aggregate grid procedure developed in the preceding chapter may now be incorporated into the algorithm of activities developed in Chapter 3.4. and formally tested in the context of the modelling transactions of a married couple. The complete algorithm will, however, be simplified to focus on a single feature of grid-based modelling conversations, namely predicate centrality, and the class of activities incorporated by the algorithm will be referred to as the reciprocal insight grid.

Predicate centrality in the reciprocal insight grid assumes an added dimension when centrality is defined as relevant to the modelling of self and partner. In an enduring relationship, a marriage for example, there is every reason to expect participants to have evolved a system of description defining their partner as well as, or separately from, themselves. These descriptions in such a relationship will not be merely casual characterisations of the partner, but will serve to regulate expectations of and behaviour directed towards the partner. It may be argued that constructs core to a relationship are not simply those that offer functional and durable referents for the definition of self, but are those that do so by articulating self against partner. The subject is not defining himself in isolation, nor in relation to a generalised other, but is defining himself in a central relationship with the particular other.

4.2.1.2. The reference frame of the relationship is formed by the interlocking interpretive systems of the participants. Constructions that are core to the maintenance of each participant's self-definition within the relationship will be those that articulate self in the context of the partner. Thus, constructs may be generally classified in four ways, according to the location of elements SELF (S), PARTNER (P) and particular others (A,B) on construct dimensions:-

(i) S - A - P; here SELF and PARTNER are delineated by their location at opposite poles.

(ii) SP - A - B; here SELF and PARTNER are identified with each other by their location at the same pole.

(iii) S - P - A; here SELF is delineated against an element other than PARTNER. Although a core construct for self-definition, it is not functional within the S-P relationships.

(iv) P - S - A; here PARTNER is delineated against an element other than SELF. Although a core construct for partner-definition, it is not functional within the S-P relationship.

These four classes define the range of functional definitions of self and partner, although only classes (i) and (ii) are functional in the context of the self-partner relationship. It is important to bear in mind that the criterion of functional equivalence between constructs is defined by the extent to which two or more constructs display similar element distributions along their dimensions. Thus, participants may each produce constructs which are functionally equivalent in all respects with the exception of the location of self and/or partner. Section 4.1.3. discussed this feature in more detail, and it was concluded there that one class of disjunctions may arise between participants as a result of both employing a similar construction which for one participant provides a core definition of SELF, whilst for the other does not provide a core definition of PARTNER, as in the following diagram:-

A's construct	(A)CDE	FGH	IJK	LMNO	PQRS(B)
B's construct	CDE	FGH	IJK(A)	LMNO	PQRS(B)

In this diagram, the two constructs would be taken to be functionally equivalent, as of the 19 elements. 18 are located at identical points on the two scales. However, A's construct is clearly SELF-PARTNER delineating (class i). B's construct is identical in every respect except that element A is located at the neutral mid-point of the scale. B's construct is, however, self-defining, but not in the context of B's relationship with A (class iii). Both A and B contribute a functionally equivalent construction to the aggregate domain, but differ in the importance each assigns to this construction for defining A. These constructs illustrate one of several classes of disjunction that may arise in the contribution of participants to the reference frame of their relationship.

4.2.1.3. As it is a variant of the insight grid, the reciprocal insight grid procedure closely follows the design outlined in

Chapter 3.4. There are a number of procedural differences, however, and these differences arise from the introduction of the aggregate grid (AG) described in Chapter 4.1. When two participants engage in simultaneous modelling activity, three analyses are thus obtained: (i) solutions arising from A's IG; (ii) solutions arising from B's IG and (iii) solutions arising from AG, or the combination of A's and B's IG.

The introduction of these additional analyses and their associated displays and reflective strategies entirely parallels the activities devised in the core grid procedure with one exception, namely that comparisons may be made between AG and IG solutions. The design of the procedure thus comprises two isomorphic classes of activity, the one reflecting a participant's private conversation, the other reflecting his conversation in the context of his partner's.

The design of the reciprocal insight grid procedure is summarised in Fig. 82, and comprises three transformation classes (T) giving rise to displays (D) at each of the three levels of modelling. As transformations are applied to both individual grids (IG) and aggregate grids (AG), displays are duplicated for each of these domains. The displays and reflective strategies are intended to encourage secondary modelling activity (M) at each level. Taking each level in turn, the transformations and displays may be summarised.

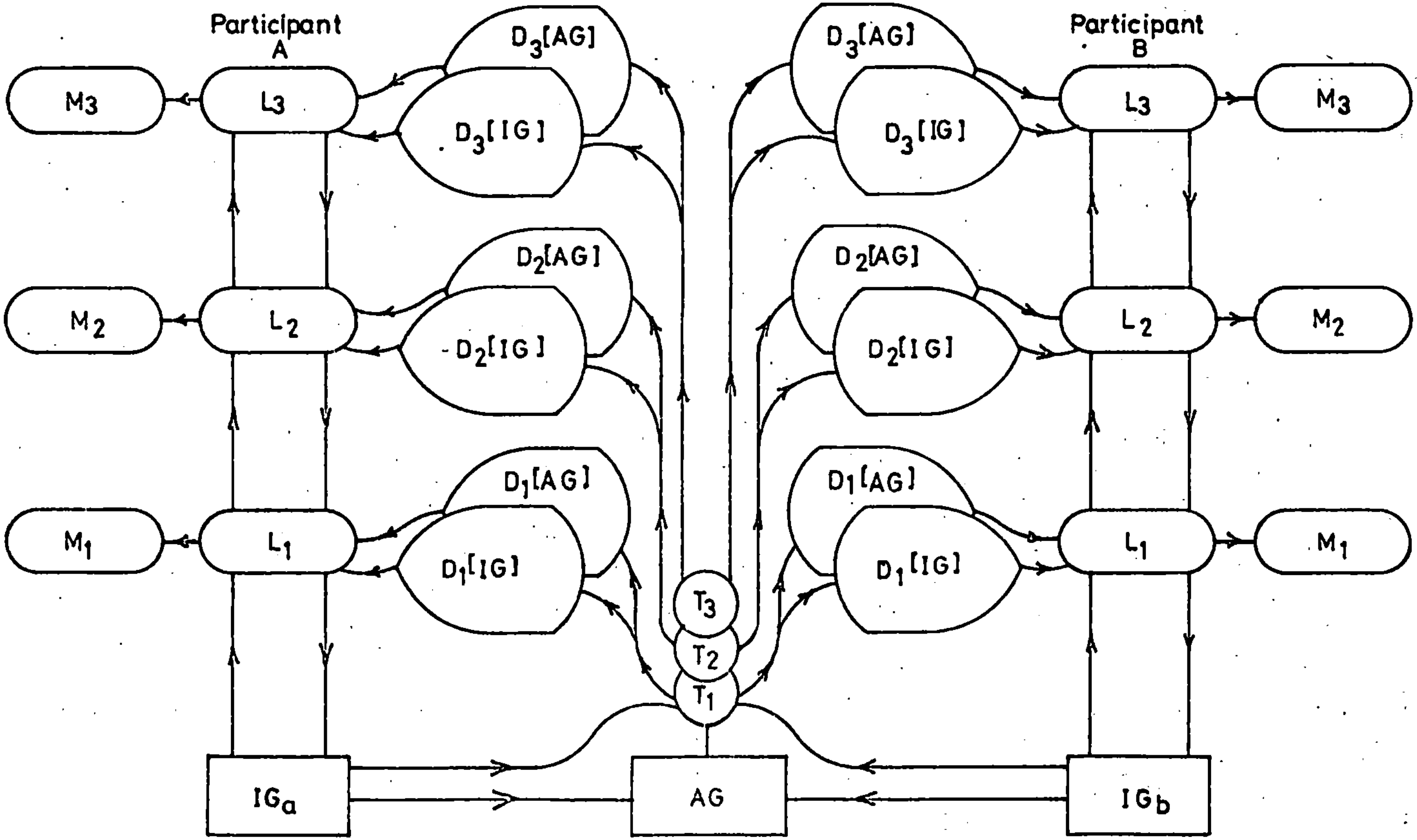


Figure 82 The reciprocal insight grid procedure

4.2.1.4. Level 1.

(i) Individual grid.

Transformation; derivation of PCA solution for IG, identification of significant components and computation of core construct score in 3.4.1.

Display; assembly of an array comprising two ordinal coordinates; participant's anticipated ordering of constructs, and constructs ordered by magnitude of core construct score in IG.

Reflective strategy; participant requested to anticipate ordering of constructs on basis of centrality; significant discrepancies in display are located and participant requested to furnish explanation for discrepancies.

(ii) Aggregate grid.

Transformation; derivation of PCA solution for AG, identification of significant components, computation of core construct scores for participant's subset of constructs.

Display; assembly of an array comprising two ordinal coordinates; participant's anticipated ordering of constructs in the context of partner's modelling, and constructs ordered by magnitude of core construct score in AG.

Reflective strategy; participant requested to anticipate ordering of constructs on basis of centrality in context of partner's modelling; significant discrepancies in display are located and participant requested to speculate as to nature of partner's modelling in AG.

4.2.1.5. Level 2.

(i) Individual grid.

Transformation; derivation of PCA solutions for IG, identification of significant components by application of the method of representation and elements central to significant components.

Display; assembly of component display comprising representative constructs for each significant component.

Reflective strategy; participant requested to furnish description of each component.

(ii) Aggregate grid.

Transformation; (a) derivation of PCA solution for AG, identification of significant components by method of representation and elements central to each component; (b) derivation of posterior probabilities for H_{cc} and H_{pc} for each construct in both IG and AG contexts.

Display; (a) assembly of AG component display comprising participant's subset of constructs; (b) assembly of an array comprising two nominal coordinates, namely centrality outcomes and associated posterior probabilities in IG and AG analyses.

Reflective strategy; (a) participant requested to furnish description of each AG component; (b) participant requested to identify discrepancies in AG-IG outcomes display, and to furnish explanations for discrepancies.

4.2.1.6. Level 3.

(i) Individual grid.

Transformation: derivation of IG PCA solution and classification of construct centrality outcomes in IG and derivation of posterior probabilities.

Display; assembly of array comprising two nominal coordinates, namely classification of constructs by density of belief deriving from previous observations, and classification of constructs by observed outcome.

Reflective strategy; participant requested to locate constructs exhibiting significant functional change, and to furnish explanation for this change.

(ii) Aggregate grid.

Transformation; derivation of AG PCA solution, classification of centrality outcomes in context of partner's modelling and derivation of posterior probabilities.

Display; assembly of array comprising two nominal coordinates, namely classification of participant's subset of constructs by their function in AG according to density of belief deriving from previous observations, and classification of constructs by observed function in AG.

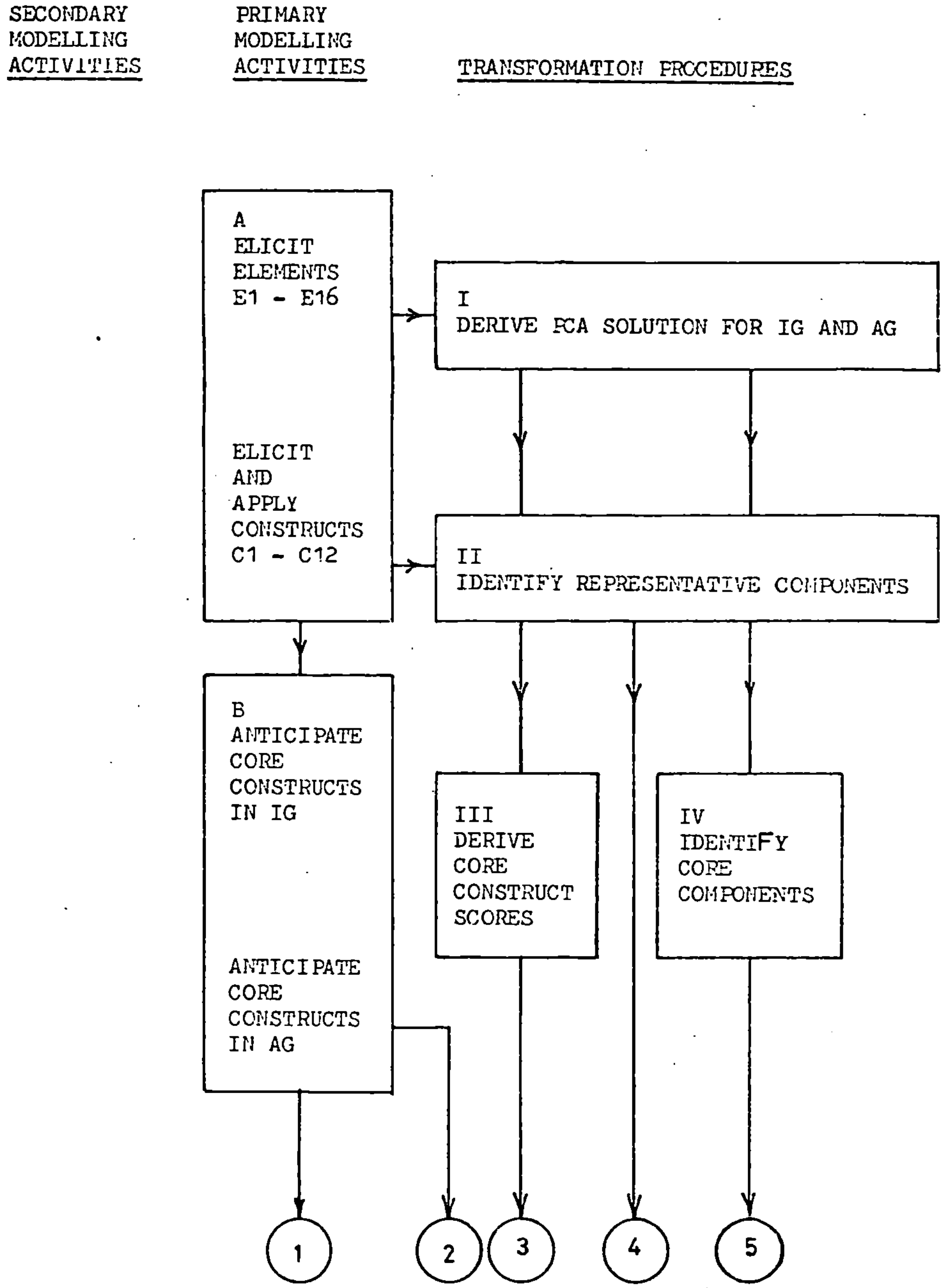
Reflective strategy; participant requested to locate constructs exhibiting significant functional change, and to furnish explanation for this change.

4.2.1.7. These three levels of activity were incorporated into the reciprocal insight grid procedure and applied in the context of a married couple over four sessions, each session lasting 3-4 hours as follows:-

SESSION 1	Production of grid Formulation of subjective predictions
SESSION 2	Feedback displays

SESSION 3	Identification of significant events Production of grid Formulation of subjective predictions
SESSION 4	Feedback displays

The algorithm of activities comprises three parallel sets of procedures, namely primary modelling activities, secondary modelling activities, and transformation procedures. Within each set of procedures, activities are organised as modules; seven modules (a to G) in the primary modelling activities, four modules (α to δ) in the secondary modelling activities, and five modules (I to V) in the transformation procedures. The sequencing and inter-relationships between modules is represented in Fig. 82. Before examining the performance of the procedures, details of each class of activities are reported in the following three sections.


SECONDARY MODELLING ACTIVITIES
PRIMARY MODELLING ACTIVITIES
TRANSFORMATION PROCEDURES
A
ELICIT ELEMENTS E1 - E16
ELICIT AND APPLY CONSTRUCTS C1 - C12
I
DERIVE PCA SOLUTION FOR IG AND AG
II
IDENTIFY REPRESENTATIVE COMPONENTS
B
ANTICIPATE CORE CONSTRUCTS IN IG
ANTICIPATE CORE CONSTRUCTS IN AG
III
DERIVE CORE CONSTRUCT SCORES
IV
IDENTIFY CORE COMPONENTS
1
2
3
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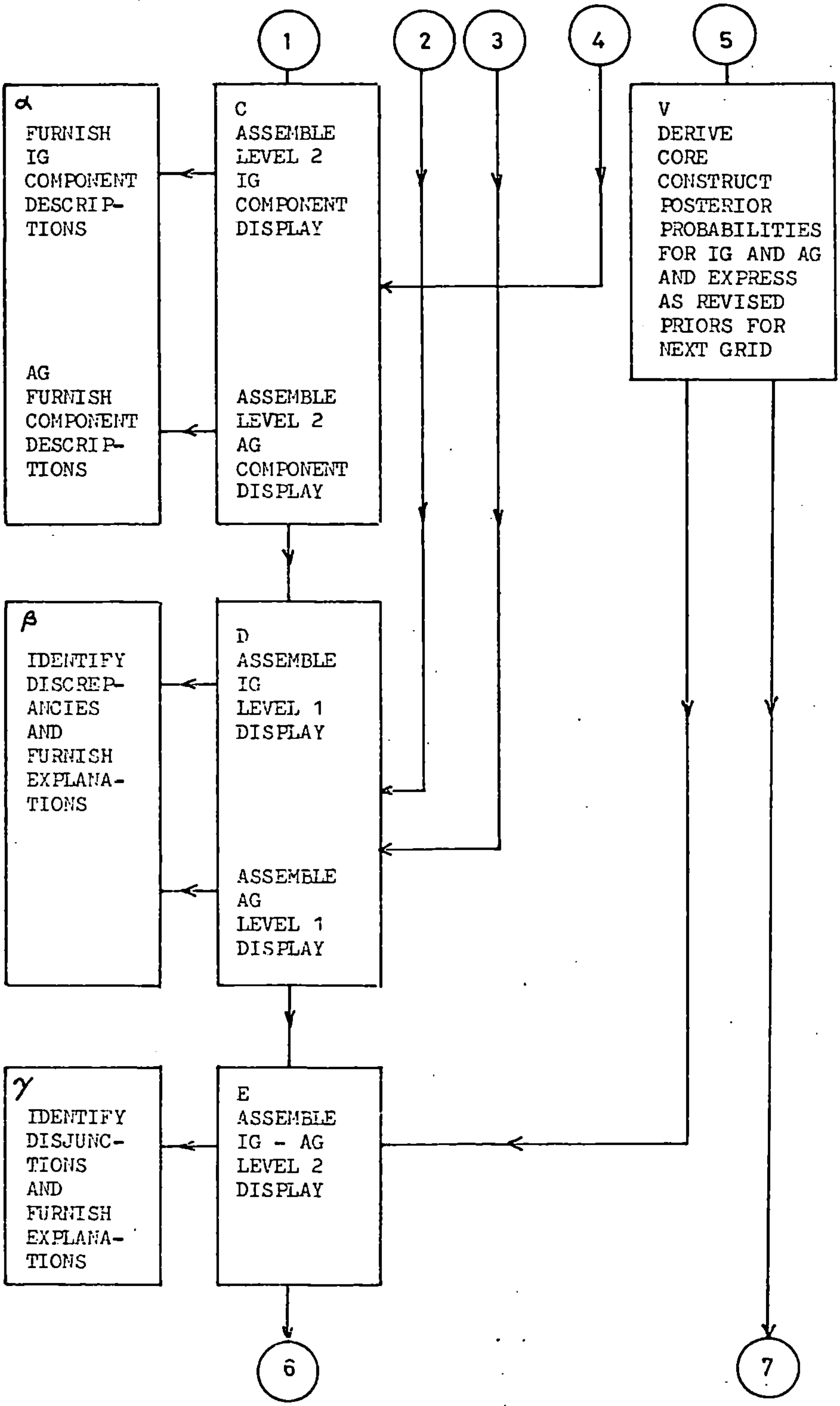

1
2
3
4
5
α FURNISH IG COMPONENT DESCRIP-TIONS
AG FURNISH COMPONENT DESCRIP-TIONS
C ASSEMBLE LEVEL 2 IG COMPONENT DISPLAY
ASSEMBLE LEVEL 2 AG COMPONENT DISPLAY
V DERIVE CORE CONSTRUCT POSTERIOR PROBABILITIES FOR IG AND AG AND EXPRESS AS REVISED PRIORS FOR NEXT GRID
β IDENTIFY DISCREP-ANCIES AND FURNISH EXPLANA-TIONS
D ASSEMBLE IG LEVEL 1 DISPLAY
ASSEMBLE AG LEVEL 1 DISPLAY
γ IDENTIFY DISJUNC-TIONS AND FURNISH EXPLANA-TIONS
E ASSEMBLE IG - AG LEVEL 2 DISPLAY
6
7

Cont/

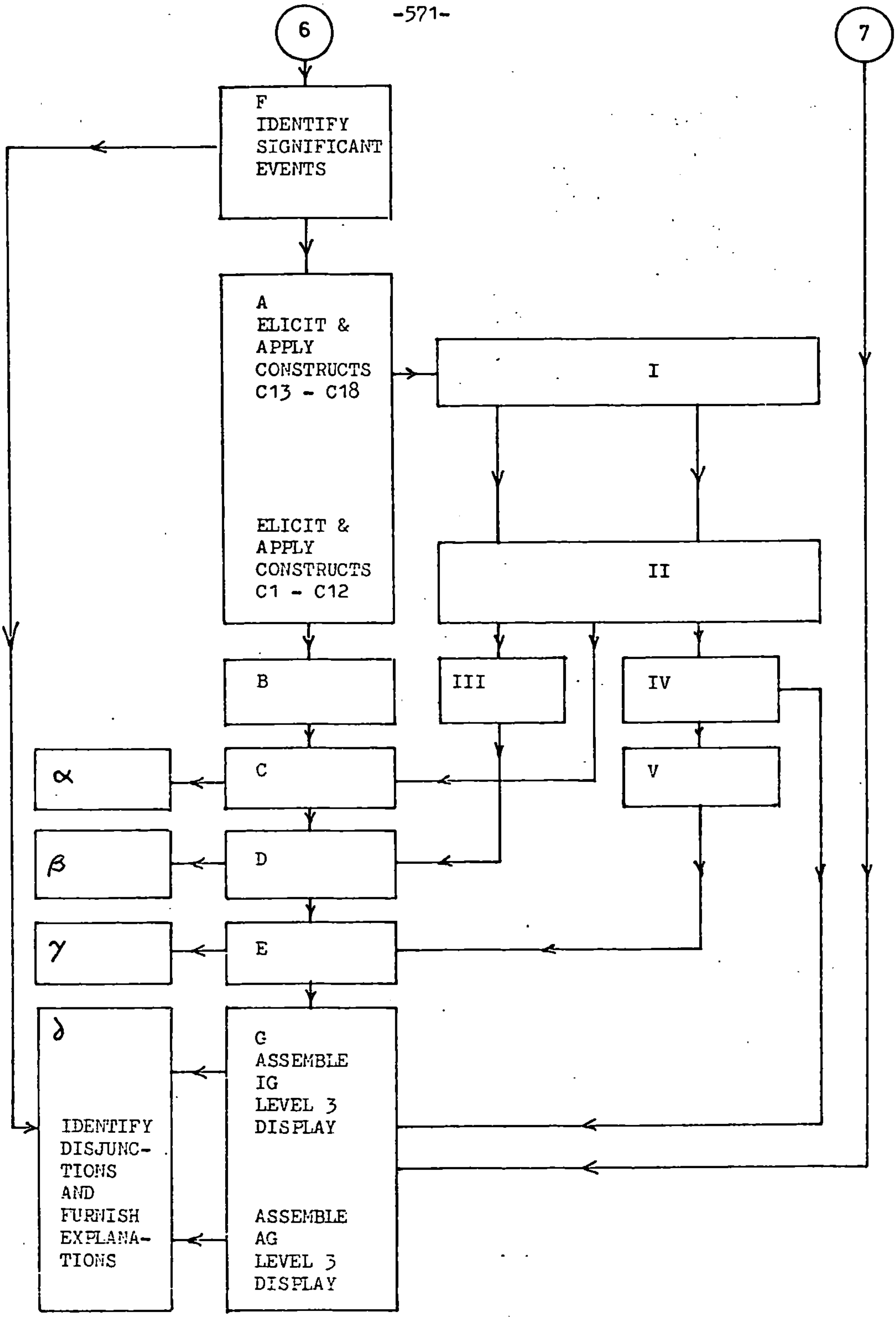


Figure 83 Reciprocal insight grid activities.

4.2.2. Primary modelling activities.

The following sections detail the instructions and activities of the reciprocal insight grid procedure as it was applied in the context of the married couple, Isaac and Ruth. Details of their responses are listed in Appendix I.

4.2.2.1. Module A; in two of the four sessions, the major modelling activity was the production of the repertory grids. Seated around a table, E introduced Ruth and Isaac to the grid activities in the following way:

> "The first exercise is an opportunity for you to express in your own words, and for your own use, your views of the important people in your life, including of course, yourself and your partner. To do this, you will first of all need to nominate the people whom you both consider to be important to yourselves and your partner and your relationship, and with whom you both meet fairly frequently. Please work together to produce a list of between 15 and 20 such persons, including on the list your own name and your partner's name. To maintain confidentiality, can you decide on pseudonyms for the people you choose. When you have done this will you number the names on your list. Now each take a set of blank cards, and write each name with its number on a separate card. Make sure you agree on the numbers assigned. You should each now have a complete set of 'person cards'".

Isaac and Ruth had no difficulty in nominating 16 persons, including themselves, and drew on their families, who lived nearby, and friends and neighbours to complete their list which was transferred to a pack of 6" x 4" cards. E then introduced them to the method for eliciting constructs with a number of practice element cards:-

> "The next stage is to formulate your views about these persons. To illustrate how this is done, I have prepared two practice sets of person cards on which are written the names of six well-known premiers; Indira Ghandi, Richard Nixon, Edward Heath, Charles de Gaulle, Idi Amin and Lyndon Johnson. Take the cards and arrange them face up on the table. Looking over the cards, can you find two premiers who are in some respect complete opposites? If you can, remove those cards from the others and place them in front of you, one on your right hand side and one on your left. Now take a blank construct card. You will notice that it is divided into two halves. First write number one at the top left hand corner. Now can you decide in what way the two premiers are different, what is it about each of them that you see as opposite? For example, you may think that one premier is right-wing, whilst the other is left-wing, or maybe that one is a hawk and the other a pacifist. When you have decided, note down in a word, phrase or sentence on the left half of the card the characteristics of the premier on your left, and on the right half the opposite characteristics of the premier on your right. Make sure you note down these characteristics in your own terms since this is not a test and no-one but you is going to read what you have written. However, it is important that you describe these characteristics fully and clearly for yourself, so that when you refer to this card again you will remember what you meant".

Isaac and Ruth, working on their own, simultaneously produced their first practice construct. After they had completed noting down their descriptions, they were introduced to the rating method:-

"The next step is to apply the idea you have formed to the other cards. You will see that I have arranged for each of you on the table a series of cards numbered from 1 on the left to 7 on the right. Imagine these seven cards represent a scale consisting of seven boxes. Now take your construct card and put it at the top over the numbered cards. The seven boxes now represent degrees of the characteristic you have named, running from box 1 which represents the most extreme example of your left-hand definition, to box 7 which represents the most extreme example of your right-hand definition. Taking the first of your premier cards, can you decide in which of the seven boxes that person best fits your construct scale. Remember that box number 4 represents a neutral or a non-applicable category, that you may have as many cards as you wish in any of the boxes and, if necessary, empty boxes".

Having arranged the elements on the construct dimension, Isaac and Ruth were then advised to check that their construct descriptions were still appropriate:-

"First make sure you are happy with your arrangement of the cards, moving any that you feel are wrongly placed. You may sometimes find that in arranging the cards on the scales, you slightly redefine the meaning of your constructs. Please check that your construct descriptions are appropriate, if necessary changing what you have written down to suit the meaning as you now see it. Finally take a blank grid form, write your name and date at the top, and note down in the first row, which corresponds to your first construct, the box numbers for each of the premiers cards".

Isaac and Ruth then went on to produce, rate and record two more practice constructs using the practice set of element cards.

After making sure that they understood the procedures, E introduced them to the main exercise:-

> "Now that you are familiar with the grid procedures, you are more or less on your own. Your task is to take the 16 person cards you have produced, a blank grid form, and each of you, on your own, formulate, rate and record ten constructs by following exactly the same steps that you used to produce your practice constructs. Always focus on the first idea that occurs to you when you produce constructs, but do try to look at the people you have named in as many different ways as possible. Remember that your construct descriptions are for your eyes only, and so try to be as honest with yourself as you can. If you get stuck, don't hesitate to ask questions. There is no hurry, so take as long as you wish on this exercise".

Completing ten constructs in this way took Isaac and Ruth about two hours. Finally, after completing ten constructs of their own devising, two additional whole-figure constructs were supplied: LIKE RUTH IN CHARACTER and LIKE ISAAC IN CHARACTER. Isaac and Ruth noted these on cards and rated them as for the previous ten constructs. The purpose of introducing these constructs was to provide a means for Isaac and Ruth to project their salient interpretations of themselves and each other onto a single dimension which might then provide a referent for assessing the contribution of other constructs to their self and partner definitions.

Similar procedures were involved in session three, with the exception that only 6 additional constructs were produced, followed by the re-application of the 12 constructs produced on the first session. The aim in both sessions was to sample construct dimensions that were salient to Isaac and Ruth in their modelling of themselves and their close acquaintances, rather than to induce them to elaborate less familiar or less habitual construct dimensions. The predicates produced in the grid may then be viewed as a base-line on which basis further modelling might proceed. In all, Isaac and Ruth each produced 30 element sorts, 12 of which were replications. In reapplying the 12 constructs, it was emphasised that Isaac and Ruth should respond in terms of their current interpretation of elements, rather than seek to reconstruct their original ratings.

4.2.2.2. Module B; following both grid production modules, Isaac and Ruth proceeded to formulate subjective anticipations concerning the outcomes of transformation procedures applied to their grid predicates. In contrast to the insight grid design outlined in 3.4., a single grid outcome was featured in the reciprocal insight grid, namely, peripheral vs. core constructs. However, this outcome was predicted for each construct in both the individual (IG) and the aggregate (AG) grid analyses. It is important to bear in mind that Isaac formulated predictions for his constructs alone, and Ruth for hers alone. Thus, each predicts the outcome for half of the constructs in the AG analysis, and for all of the constructs in each of their IG analysis.

These two exercises were introduced with the following instructions:

1. <u>IG Outcomes.</u>

"Take up your construct cards and lay them all on the table face up. From the cards pick out that construct which you think is most important to your definition of yourself <u>as you have described in your grid</u>. Place that card on the table to your left. Now from the remaining cards pick out the construct which you view as next most important to your definition of yourself, and place that to the right of the first. Continue until you have arranged all the cards in a row from the most important on the right to the least important on the left".

2. <u>AG Outcomes.</u>

"Take up all your construct cards and lay them face up on the table. Now imagine that your partner used each of your constructs to produce an arrangement of person cards similar to your own. Which construct would he/she find most important in his/her definition of you? Take out the card which you think would be most important to his/her definition of yourself, and place it on the table to your left. Now from the remaining cards pick out the construct which you think he/she would find next most important and place it to the right of the first. Continue until you have arranged all the cards in a row from the most important to the right to the least important on the left".

Each of the rankings produced by Isaac and Ruth were recorded by E on Prediction-Outcome forms.

4.2.2.3. <u>Module C</u>; each of the two feedback sessions began with the assembly of IG and AG Level 2 component displays, the former being completed by Isaac and Ruth working alone, the latter completed by their working in conjunction. The three displays were based on the principal components analysis of each IG and the AG (modules I and II), and comprised only those components that were identified as significant by the representation method. The three displays were assembled in response to the following instructions:-

> "The next activity is to construct a display which groups your constructs together according to their contribution to underlying ideas expressed in your grids. As each of you have produced several underlying ideas, we will consider each group in turn, from the most important to the least important. You will notice that I have arranged in front of you a series of cards numbered from 1 onwards, each of which represents a column to be filled by your construct cards. Take up your construct cards and I will read out the constructs to be located in the first column. The order in which I read out construct numbers is important, as the first construct is most representatative of the underlying idea and the last construct least representative. Make sure that the cards are arranged in the column with the most representative construct at the top".

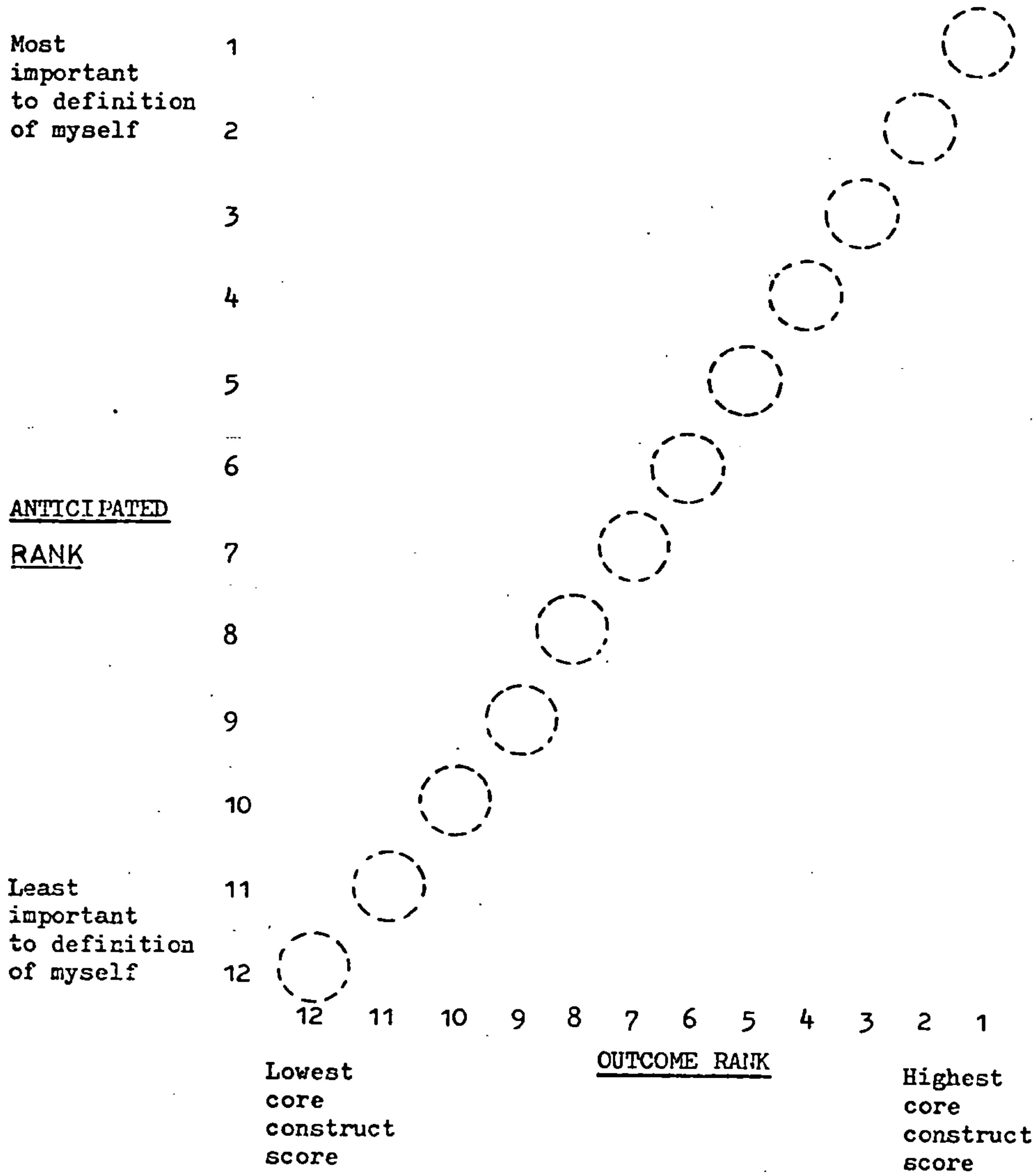
Thus, representative constructs for Isaac's and Ruth's first component were arranged in a column from the highest to the lowest loading. Constructs which obtained loadings of inconsistent sign were reversed, and where this occurred Isaac and Ruth were instructed to substitute a card with the construct description reversed. Having completed the first component column, salient element cards were arranged to either side:-

> "Now take up your person cards and arrange the following cards numbered.....to the left of the column. These cards are those persons who are best represented by the left-hand descriptions of the constructs in the first column. The following cards numbered.....should be placed on the right, as they are best represented by the right-hand descriptions of the constructs in the first column".

The display was complete when all construct cards had been located in the appropriate columns.

Element cards were then removed, and representative constructs and element displays for the remaining significant components assembled. Assembling the AG display entailed the same procedure, with the exception that both Isaac's and Ruth's constructs were incorporated into the component columns.

4.2.2.4. Module D; following the component displays Isaac and Ruth proceeded to assemble displays which incorporated their anticipated IG and AG outcomes formulated in module B in the preceding session, and observed outcomes derived from transformation procedures applied to their grids. The latter procedures entailed the derivation from each construct of a core construct score (module III) reflecting the extent to which each construct contributed overall to the self-definitions of Isaac and Ruth. These scores were ranked from the highest (core) to the lowest (peripheral) core construct score. The display took the form of a two dimensional array, one axis representing Isaac's or Ruth's anticipated rank ordering, the other axis the observed rank ordering:-



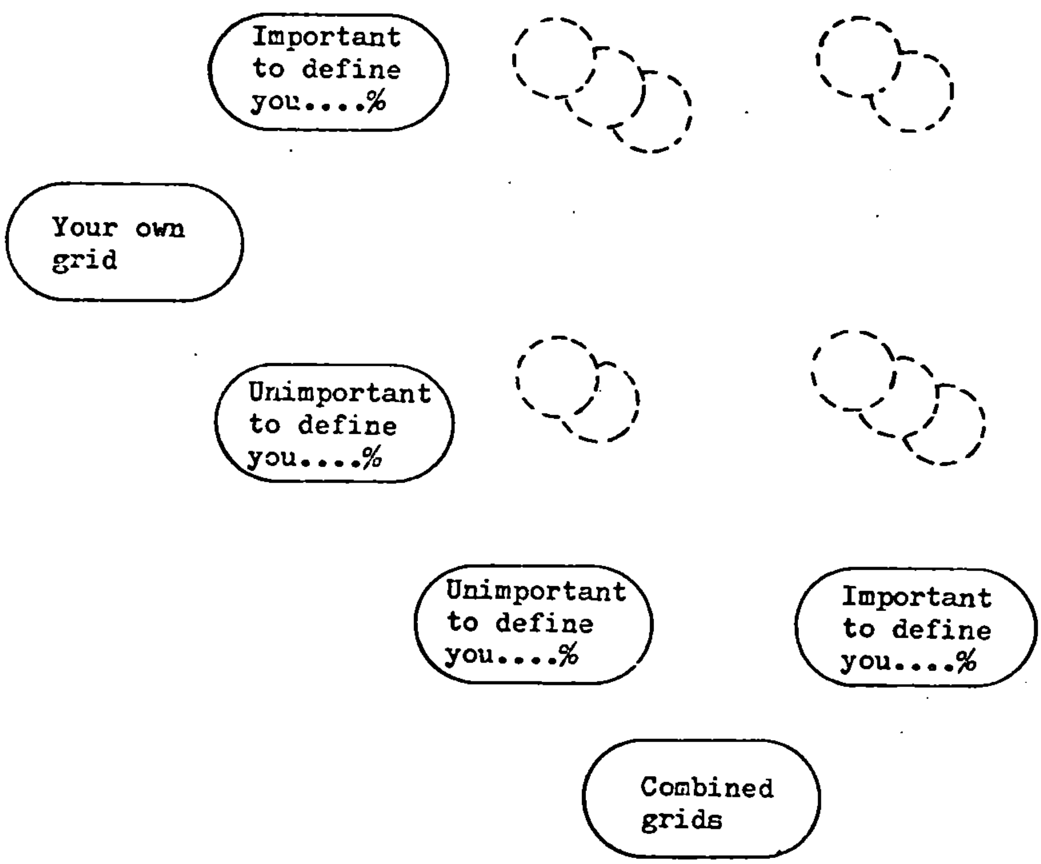
Isaac and Ruth each began to assemble their displays by locating their construct cards in the appropriate positions, in response to the following instructions:-

"The next display maps your estimates of the importance of your constructs to your definition of yourself against the observed importance of constructs in your grids. You will see that the numbered cards form a kind of table, in which your constructs may be placed. The column of numbers on the left represent the level of importance for your self-definition that you assigned to constructs. The line of numbers at the bottom represents the level of importance of constructs for your self-definition as defined by the table of numbers on your grid form. Your task is to locate each construct card on the appropriate row and column, as if you were playing bingo, as I call out your predicted level and the observed level of importance".

This procedure was repeated for the AG display, and care was taken to explain the difference between the two displays, namely that the AG display reflected the participants' predictions of the importance of their constructs to their self-definitions in the context of their partner's constructs.

4.2.2.5. <u>Module E</u>; incorporates a direct comparison of observed outcomes in the IG and AG analyses, and reflects areas of agreement and disagreement between participants. Each observed outcome is qualified by a value which reflects the degree of certainty associated with the classification of each construct as core or as peripheral (module IV) to participants' self-definitions, namely the posterior probability derived in transformation module V. When this probability is expressed as a percentage, it provides a readily meaningful qualification for IG-AG comparisons. Isaac and Ruth each assembled their own displays, in response to the following instructions:-

"The next display reflects the extent of agreement or disagreement between your own self-definition and your partner's definition of you. The analysis I have described permits the classification of your constructs according to their function in your own grid and in the combination of yours and your partner's grid. This classification is, however, tentative and so we have devised a way of representing the certainty with which each of your constructs are classified. I have arranged on the table a number of cards, which provide a tabular display".



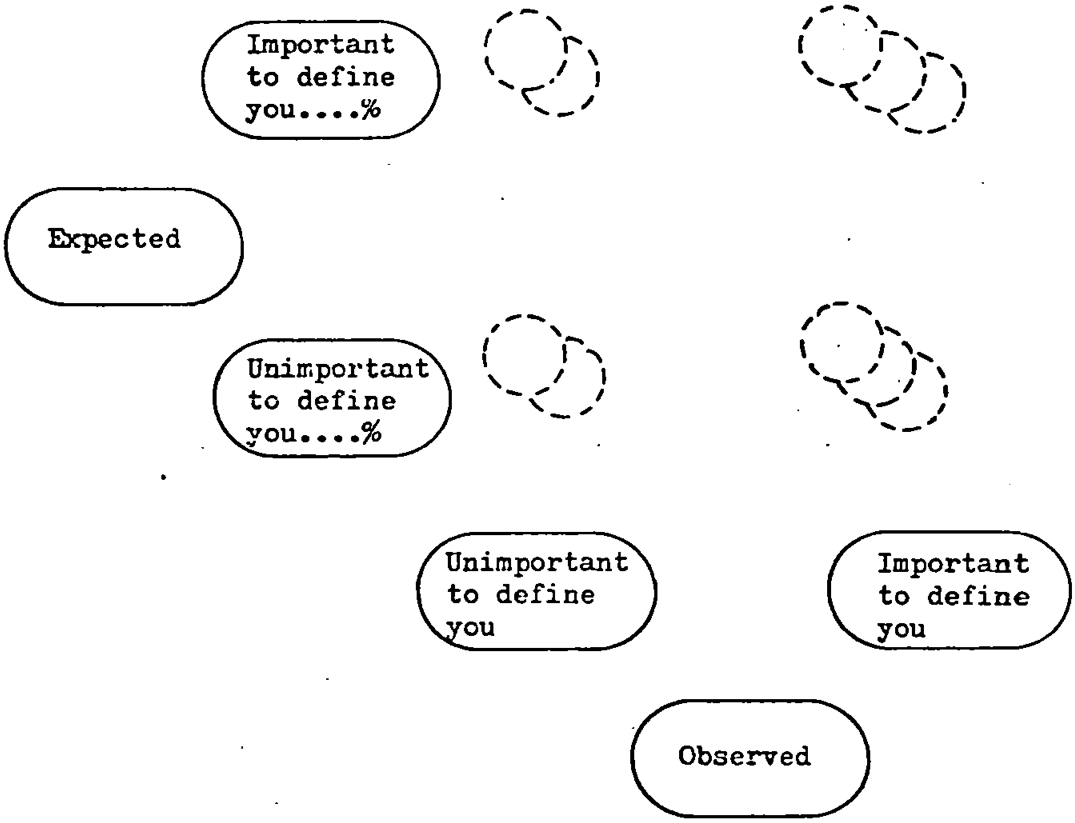
"You will see that the cards on the left classify your constructs by their importance in your own grid, whilst the cards on the bottom classify your constructs by their importance in the combined grid. Your task is to place each construct in one of the four boxes as I read out their numbers and their classifications".

4.2.2.6. <u>Module F</u>; appearing in the third session only, this module was concerned with providing a record of Isaac's and Ruth's perception of recent events as significant to their modelling of the persons in that element sample. To guide their identification of events, 'significant' was defined loosely as any event that might confirm or disconfirm their opinions of that person, and a construct-element was assembled to systematically direct their attention to each person in turn:-

> "Will you now try to remember if over the period since you produced your first grid you have experienced any significant event or interchange with the persons you have named; by significant is meant events that have led you either to change your opinion of the person concerned, or to become more certain of the opinion you originally held. To help you in this task first arrange all your constructs in numerical order as a column on the table on your left. Now take a blank Grid Form, and the first of your person cards. Place that person against each construct in turn and try to think if any event has confirmed or disconfirmed your view of that person in terms of that construct. If you can identify such an event, insert a '+' in the appropriate square on the Grid Form if that was confirmatory, a '-' if it was disconfirmatory, then leave it blank if no such event has occurred. After working down the column of constructs, take up the second person card and repeat the process until you have considered everybody in terms of every construct. When you have completed this task, take a sheet of blank paper and note down details of the events you have identified in your own words for future reference".

4.2.2.7. Module G; this final display incorporated the posterior probabilities associated with classifications derived for the 12 constructs in the first grid (module V) expressed as prior probabilities, and construct classifications deriving from the same 12 constructs in the second grid. The purpose of this display was to direct the participants' attention to constructs whose self-defining function had changed from being instrumental to to self-definition (core) or redundant (peripheral), and to employ these changing functions either to validate events identified as significant in module F, or to identify previously misperceived or omitted events which might account for changes in observed construct outcomes. Displays were assembled for both IG and AG outcomes for each participant in response to the following instructions:-

> "The purpose of the final display is to locate constructs which have changed their importance to your self-definition in your grids. Each construct was classified as important or not important on the basis of your first grid, and these classifications were expressed as expectations of classification of the same constructs when re-applied in your second grid. I have arranged on the table a number of cards which provide a tabular display of these expectations and observed outcomes".



"You will see that the cards on the left classify your constructs by their expected importance, whilst those at the bottom classify your constructs by their observed importance. Your task is to locate each of your constructs in one of the four boxes as I read out their numbers and their classifications".

The procedure was repeated for AG posterior or probabilities and outcomes.

4.2.3. Secondary modelling activities.

4.2.3.1. Module α ; deriving from the displays of module C, the activities of this module may be termed 'meta-construction', as this task involves identifying similarities and differences between individual and groups of constructs. Essentially, this activity is intended to focus the participants' attention to the groupings of constructs and elements obtained by the analyses of modules I and II:-

> "Now that the display comprises all your constructs, can you try to describe in your own terms what fundamental idea each column of cards conveys to you. To do this it is often useful to scan down all the construct descriptions on the left-hand side of each column, and then the right-hand descriptions. Also consider the differences between the constructs in separate columns, as this may cast light on the meaning of each column. Now take a blank card for each column and briefly describe in a sentence or phrase the meaning each group of constructs expresses".

The same procedure was repeated for the AG component display with the exception that, since Isaac's and Ruth's constructs were involved, they conferred and negotiated a satisfactory description of component meanings.

4.2.3.2. Module β ; the purpose of this module was to orient the participants to cues arising during construct elicitation by identifying discrepancies between anticipated and observed outcomes in module D, and to encourage additional modelling activity to account for these discrepancies:-

> "If your predictions concerning the importance of constructs to your self-definition had coincided completely with the observed importance of constructs, all of your cards would lie on a diagonal running from top-right to bottom-left of the display. Rather than concern ourselves with perfect accuracy, however, it is more useful to pick out particular constructs which display the greatest discrepancy, or greatest distance from the diagonal. A useful guideline here is to select those constructs that are discrepant by half the number of constructs from the diagonal, and remove all other construct cards. Now take a blank Query Form and note down the numbers of the discrepant constructs in the boxes provided on the left-hand margin. Consider each construct in turn. Can you think of any reason why you considered each construct at the time to be more/less important than it appears actually to be? If you can, jot down your explanations in the space provided adjacent to the construct's number on the Query Form. Now do the same for all other discrepant constructs".

The same procedure was repeated for the assembled AG display of module D, where it was emphasised that to increase accuracy of prediction it was essential for participants to anticipate the effect of their partner's constructs on the importance of their own constructs.

4.2.3.3. <u>Module γ</u>; the purpose of this module was to orient the participants to disjunctions existing between their definitions of each other and their definitions of themselves. In particular, emphasis was placed on constructs which obtained core (important to self) or peripheral (unimportant to self) classifications in IG analysis, and opposite classifications in the AG analysis. These classifications were derived from modules IV and V and assembled in the module E displays. Participant's attention was focussed on these disjunctions in module E display:-

> "If both you and your partner were in complete agreement over a definition of you, all of your construct cards would fall into either top-right or bottom-left boxes of the display. That is, those constructs which you considered important in your own grids would be corroborated in your partner's constructs in the combined grid, and constructs you considered less important would also emerge as less important in the combined grid. But if your partner were to disagree on the importance of some of your constructs, these would not be corroborated and would be assigned to either the top-left or bottom-right boxes in the display. Now take a blank Query Form and note down all the numbers of the discrepant constructs in the boxes provided on the left-hand margin. Consider each construct in turn. What are the consequences of your partner ordering each of those constructs as more/less important to you than you do yourself? Jot down your views of the consequences in the space provided adjacent to each construct's number on the Query Form. Now do the same for all other discrepant constructs".

4.2.3.4. <u>Module ∂</u>; the purpose of this module was to orient the participants to unexpected changes in the self-defining function of constructs replicated in the second grid. Expected functions are based on posterior probabilities derived in modules IV and V applied to the first grid, and outcomes on module IV applied to the second grid. These data were assembled and displayed in module G. The participants' task was to identify changes of construct function and to employ these as directed prompts in locating significant inter-personal events to add to Module F:-

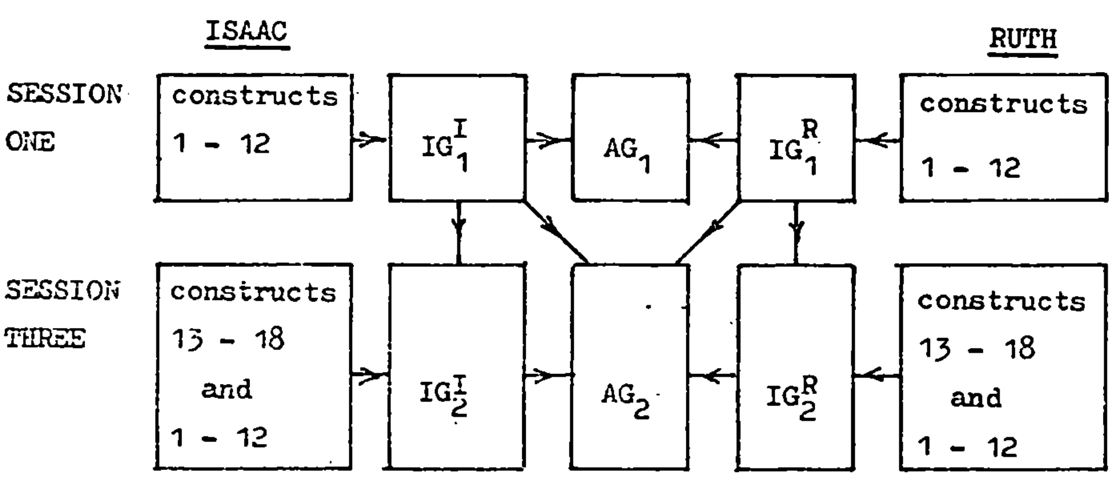
> "If your usage of the first 12 constructs had not changed in any way in your second grid, then all those constructs which were important to you then would be so now, and all those which were unimportant to you would be unimportant to you now. All your constructs would then fall in the top-right and bottom-left boxes of the display. If, however, events had occurred to change your usage of some constructs, these constructs would be assigned to the top-left box if they have become less important to you, and the bottom-right box if they have become more important. Now take a blank Query Form and note down the numbers of the constructs in these boxes in the space provided. Consider each construct in turn. Can you think of any recent event which might have resulted in the changes of function you have identified? If you can, make a brief note of it in the space provided adjacent to each construct's number on the Query Form. Now do the same for all other discrepant constructs".

This procedure was repeated for the AG display, in which it was emphasised that changes in construct function might be attributable to changes in the partner's grid as well as in the own, and thus explanations must incorporate possible events perceived by partner but not by self.

4.2.4. Transformation procedures.

All transformation and analysis procedures involved in the reciprocal insight grid have been reported in earlier chapters, but with the introduction of the aggregate grid, it is useful here to summarise the procedures.

4.2.4.1. Module I; the numerical content of the grid forms obtained in module A in the first and third sessions were processed by the program PREFAN (Slater, 1974), solutions are listed in Appendix H. This program locates an ordered series of components or sources of variation in the grids from the largest to the smallest, until all variance is exhausted. All constructs are represented on each latent variate by their loadings and similarly for elements. This component analysis is performed three times after the two grid production sessions on Isaac's, Ruth's and their combined grids. Moreover, subsequent analysis of grids produced on the third occasion is cumulative, incorporating all construct sorts up to and including those produced on that occasion. The scheme of grid analysis is then as follows:-



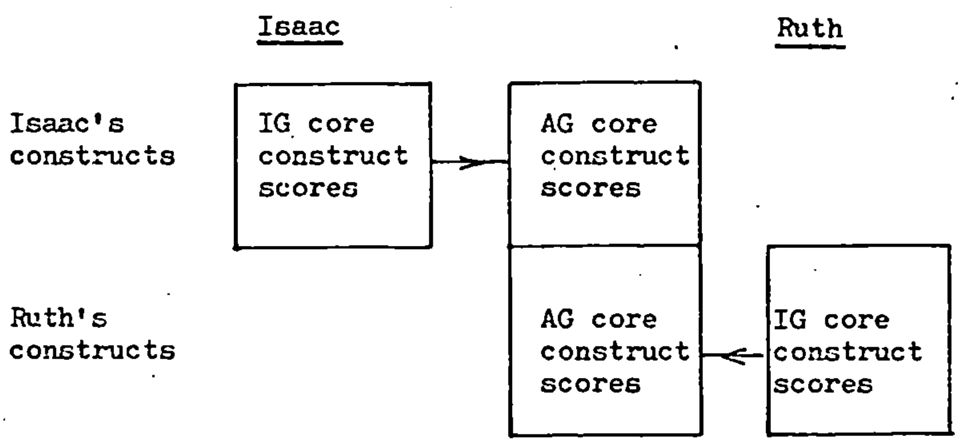
The number of components listed to exhaust the total variance of the grids was as follows:-

$$IG_1^{I,R} = 12 \quad (\text{where } n_c = 12),$$

$$AG_1,\ IG_2^{I,R},\ AG_2 = 15 \quad (\text{where } n_c - 1 = 15).$$

4.2.4.2. Module II; from the component listings of each grid, significant components were identified by locating for each construct the highest loading, irrespective of sign, over all components. That is, components are selected that best represent the variance contributed by each construct. An equivalent procedure would be to trace the amount of variation accounted for by extracting each component from each construct, and to note the greatest reduction in residual variation. These methods are logically compatible, and enable constructs to be assigned to the minimal number of components without replacement. Non-represented components may then be discarded as error variance, and the procedure rarely discards more than 20% of total variation as error. The listings obtained by this procedure may be directly employed in the component display of module C, and were derived in both IG analysis and AG analysis.

4.2.4.3. Module III; in order to produce continuous data concerning the relevance of constructs to self-definition, the core construct score was obtained for all constructs as described in 3.4. Having identified significant components in module II, the eigenvectors of the element SELF were listed for each component. This, of course, reflects the meaningfulness of each component as a description of SELF; if the eigenvector is large, SELF accounts for a large proportion of the component variation, and is thus sytematically located towards the extremes of constructs representative of that component. All construct eigenvectors on that component are then multiplied by the SELF eigenvector, obtaining higher products for highly representative constructs and low products for unrepresentative constructs. The products then reflect the extent to which constructs contribute to the self-definition offered by that component. This process is repeated for each of the significant components in turn, and the products summed for each construct in the grid. The final sum reflects the overall relevance of each construct to the participant's self-definition, and these sums may be ranked from the highest (core) to the lowest (peripheral). These sums, termed the core construct score, were obtained for each construct in both the IG and the AG analyses for each participant, as in the following diagram:-



Once ranked-ordered, these scores were employed in the displays of module D.

4.2.4.4. Module IV; for the purpose of classifying outcomes into discontinuous classes for the application of the probabilistic model of Bayes' theorem, core constructs and central elements were identified in the IG and AG analyses following the operational steps described in 3.2. Having identified significant components, element eigenvectors were squared to achieve normalisation, ordered from the largest vector to the smallest, and cumulatively summed irrespective of sign. Those elements which contributed to the first 50% of the variation on each significant component were denoted as 'central'. That is, they were elements which were most defined by each component. Those components, then, in which the element SELF is central by this definition may be considered 'core components', since SELF is one of those elements maximally defined. All constructs representative of that component may, ipso facto, be termed core constructs. These operations do not yield transformations for direct use, but are instead qualified by the procedures of module V. However, these operations are applied both to the IG and AG analyses. It is important to note that in the AG analysis the centrality of two elements, namely Isaac and Ruth is important. Thus, AG components are examined for the centrality of either elements ISAAC or RUTH. Components may hence be termed 'core to Isaac', 'core to Ruth', 'core for Isaac and Ruth', or 'peripheral for both Isaac and Ruth'. In addition, eigenvectors for these two elements may be identically signed, indicating whether as a core component it serves to identify Isaac with Ruth or to delineate Isaac from Ruth.

4.2.4.5. Module V; finally, the constructs classified by module IV as core or peripheral are qualified in terms of the certainty with which these classifications may be made. This is achieved by applying Bayes' theorem employing the terms identified in Chapter 3.2. for core constructs, namely:-

(a) prior probabilities of outcomes,

$$p(H_{cc}) = 0.359$$

$$p(H_{pc}) = 0.641$$

(b) likelihoods associated with procedures for identifying core and peripheral constructs,

$$p(D_{cc}/H_{cc}) = 0.725$$

$$p(D_{cc}/H_{pc}) = 0.398$$

$$p(D_{pc}/H_{cc}) = 0.275$$

$$p(D_{pc}/H_{pc}) = 0.602$$

Posterior probabilities ($p(H_i/D_k)$) associated with observed outcomes are obtained for each construct by inserting those terms which are applicable into Bayes' theorem. The probabilities obtained may then be expressed as prior probabilities of construct outcomes for the subsequent grids, and these priors are employed in modules E and G. It is important to note that the probabilities listed above are identical for both IG and AG outcomes. Each construct, however, may obtain different posterior probabilities in the IG and AG analyses if their self-definitive function differs between the two domains.

4.2.5. Ruth and Isaac: An illustrative case-study.

4.2.5.1. To examine the modelling activity in which the couple, Isaac and Ruth, engaged, the coupling between primary and secondary modelling in the following modules will be reported:-

(i) Module C Level 2 component displays and Module α component descriptions;

(ii) Module D Level 1 displays and Module β prompts and explanations;

(iii) Module E IG-AG Level 2 and Module γ prompts and explanations;

(iv) Module F identification of significant events, Module G Level 3 displays and Module δ prompts and explanations.

As a preamble to the case-study, Isaac and Ruth had been married nine years and had two young children. Isaac and Ruth first met as students at university, and at the time of the study Isaac was a teacher whilst Ruth devoted all her time at home with the children. Both expressed curiosity in the procedures, but on the other hand had some misgivings as to its effect on their relationship. Some time, therefore, was spent in discussion of the likely results of the methods prior to the exercises, and it was stressed that complete confidentiality was to be observed throughout, and that each of them should retain all confidential materials, and not be required to reveal or discuss them with their partner.

The focus of Isaac's and Ruth's concern appears to be their relationships with their relatives, many of whom lived in the same neighbourhood. The sessions spanned a three-month period, over which period Isaac and Ruth met all the persons nominated in their element sample. In addition they noted brief character sketches of the elements, extracts of which are summarised in Appendix I. A point of interest emerging from these characterisations was Ruth's emphasis on the dominant-submissive and intellectual aspects of her relationships and Isaac's emphasis on depth of character, and social attitudes.

4.2.5.2. Module C; Level 2 component displays.

To illustrate the assembled Level 2 component displays, the IG and AG displays for Isaac's and Ruth's first 12 constructs are shown in Figs. 84a, 84b and 84c.

(i) Individual grid displays.

Examining the individual grid analyses first, it was evident that Isaac obtained 4 significant components whilst Ruth obtained 3, and their attention was directed to the figures that denoted component 'salience' (namely, the percent variance accounted for by each component). Isaac was then able to observe that his first component alone accounted for half of his predications, whilst his second, third and fourth components were markedly less salient.

In contrast, Ruth's first two components were both fairly salient (41% and 35%). Thus, although Isaac refers to four themes in his grid, only one was emphasised, whilst Ruth gave almost equal emphasis to two themes.

Isaac's and Ruth's attention was also directed to distinctions that were made between persons by each theme, and in particular whether they or their partner figured as central to these distinctions. For example, Isaac observed that his first component was anchored on the distinction he had constructed between Ruth on the one hand, and his brother, his father, and Joan's husband on the other. Although he was approx imately located at the same pole as Ruth, he was not central to that distinction. In contrast, Ruth's first two themes succeeded in first polarising Isaac and Paul from Isaac's sister-in-law and secondly Jack's wife and herself from Isaac's brother. Ruth, it appears, had constructed separate dimensions for describing herself and Isaac.

A third noteworthy feature in Isaac's analysis was that his second and third components obtained anchoring elements that accounted for half the component variance at one pole only. This was taken to indicate that these distinctions were essentially one-sided; whilst he was certain that his mother and Jack were both DEEP DOWN STRONG AS A PERSON, he could not assert with certainty any other person in particular was DEEP DOWN WEAK AS A PERSON. Similarly, whilst he might commit himself to the statement that Ruth's father, her mother and his father were NOT PHYSICALLY ATTRACTIVE, no-one was particularly PHYSICALLY ATTRACTIVE.

First Component (41%)

ISAAC*	TENSE	RELAXED	ISAAC'S SISTER-IN-LAW*
PAUL*	LIKE ISAAC	NOT LIKE ISAAC	
PAUL'S WIFE	OUTGOING, SPARKLING	WITHDRAWN	ISAAC'S MOTHER
	INTELLECTUAL	NON-INTELLECTUAL	
	DOMINANT	SUBMISSIVE	RUTH'S FATHER
	DISCONTENTED WITH JUST DOMESTICITY	HAPPY WITH DOMESTICITY ALONE	

Second Component (35%)

JACK'S* WIFE	I THINK I CAN TELL WHAT THEY'RE FEELING	DON'T KNOW WHAT THEY'RE FEELING	ISAAC'S* BROTHER
RUTH*	LIKE RUTH	NOT LIKE RUTH	JOAN'S HUSBAND
JACK	HAPPY AND CONTENTED IN GENERAL	DISCONTENTED	ISAAC'S BROTHER-IN-LAW
	PLACID	EXCITABLE	
	CONCERNED ABOUT PEOPLE FOR THEIR OWN SAKE	CONCERNED ABOUT WHAT PEOPLE THINK OF HIM/HER	

Third Component (8%)

RUTH'S* FATHER	APPRECIATES NATURE	DOESN'T APPRECIATE NATURE	ISAAC'S* SISTER-IN-LAW
JOAN'S* HUSBAND			ISAAC'S SISTER
RUTH'S MOTHER			PAUL'S WIFE

(N.B. * indicates central element)

Figure 84a Ruth's first module C IG component display (84%).

First Component (50%)

RUTH*	WARM & LOVING	COLD & DISTANT	ISAAC'S* BROTHER
PAUL'S WIFE	PERSON I LOVE BECAUSE OF THE PERSON HE/SHE IS	PERSON I DON'T LOVE BECAUSE OF THE PERSON HE/SHE IS	ISAAC'S* FATHER
ISAAC	PROGRESSIVE IN SOCIAL ATTITUDES	REACTIONARY IN SOCIAL ATTITUDES	JOAN'S* HUSBAND
	CULTURALLY SOPHIS-TICATED	CUTURALLY NAIVE	
	INTELLIGENT	UNINTELLIGENT	
	LIKE RUTH	NOT LIKE RUTH	
	LIKE ISAAC	NOT LIKE ISAAC	
	LIVELY & STIMULATING	PASSIVE AND NOT STIMULATING	

Second Component (16%)

ISAAC'S* MOTHER	DEEP DOWN STRONG AS A PERSON	DEEP DOWN WEAK AS A PERSON	ISAAC'S BROTHER
JACK*			PAUL
RUTH			PAUL'S WIFE

Third Component (13%)

JOAN'S HUSBAND	PHYSICALLY ATTRACTIVE	NOT PHYSICALLY ATTRACTIVE	RUTH'S* FATHER
ISAAC'S SISTER-IN-LAW			ISAAC'S* FATHER
ISAAC'S BROTHER			RUTH'S* MOTHER

CONT/

Fourth Component (8%)

JACK*	GENUINELY FEELS FOR NATURE	REALLY RATHER A TOWNY	ISAAC'S* MOTHER
JOAN'S* HUSBAND	PERSON I DON'T LOVE AT ALL BECAUSE OF THE RELATIONSHIP HE/ SHE DOES NOT HAVE TO ME	PERSON I LOVE BECAUSE OF THE RELATIONSHIP HE/SHE HAS TO ME	ISAAC'S BROTHER
RUTH'S FATHER			ISAAC'S SISTER

(N.B. * indicates central element)

Figure 84b Isaac's first module C IG component display (87%).

First Component (40%)

ISAAC*	(I) WARM & LOVING	COLD & DISTANT	ISAAC'S* BROTHER
RUTH*	(I) PERSON I LOVE BECAUSE OF THE PERSON HE/SHE IS	PERSON I DON'T LOVE BECAUSE OF THE PERSON HE/SHE IS	ISAAC'S* FATHER
JACK'S WIFE	(I) LIKE ISAAC	NOT LIKE ISAAC	JOAN'S* HUSBAND
	(I) PROGRESSIVE IN SOCIAL ATTITUDES	REACTIONARY IN SOCIAL ATTITUDES	
	(R) INTELLECTUAL	NON-INTELLECTUAL	
	(R) CONCERNED ABOUT PEOPLE FOR THEIR OWN SAKE	CONCERNED ABOUT WHAT PEOPLE THINK OF HIM/HER	
	(R) HAPPY & CONTENTED IN GENERAL	DISCONTENTED	
	(I) INTELLIGENT	UNINTELLIGENT	
	(I) LIKE RUTH	NOT LIKE RUTH	
	(I) CULTURALLY SOPHISTICATED	CULTURALLY NAIVE	
	(R) OUTGOING, SPARKLING	WITHDRAWN	
	(R) I THINK I CAN TELL WHAT THEY'RE FEELING	DON'T KNOW WHAT THEY'RE FEELING	
	(R) LIKE ISAAC	NOT LIKE ISAAC	
	(I) LIVELY & STIMULATING	PASSIVE AND NOT STIMULATING	
	(I) GENUINELY FEELS FOR NATURE	REALLY RATHER A TOWNY	

CONT/

Second Component (25%)

JACK*	(R) HAPPY WITH DOMESTICITY ALONE	DISCONTENTED WITH JUST DOMESTICITY	PAUL*
ISAAC'S* MOTHER	(R) RELAXED	TENSE	ISAAC'S* BROTHER
RUTH*	(R) SUBMISSIVE	DOMINANT	PAUL'S WIFE
	(R) LIKE RUTH	NOT LIKE RUTH	
	(R) PLACID	EXCITABLE	

Third Component (9%)

ISAAC'S* SISTER	(I) PERSON I LOVE BECAUSE OF THE RELATIONSHIP HE/SHE HAS TO ME	PERSON I DON'T LOVE BECAUSE OF THE RELATIONSHIP HE/SHE HAS TO ME	RUTH'S* FATHER
ISAAC'S SISTER-IN-LAW	(I) PHYSICALLY ATTRACTIVE	NOT PHYSICALLY ATTRACTIVE	RUTH'S* MOTHER
ISAAC'S BROTHER			ISAAC'S FATHER
	(R) DOESN'T APPRECIATE NATURE	APPRECIATES NATURE	

(N.B. * indicates central element).

Figure 84c First module C AG display (74%).

Having pointed out these features of the distinctions conveyed in the displays, the participants were directed to note the constructs which constituted these distinctions, in particular the first two or three major components. Isaac, for example, observed that his most salient distinction grouped together PEOPLE I LOVE with PROGRESSIVE IN SOCIAL ATTITUDES, CULTURALLY SOPHISTICATED, LIVELY & STIMULATING, and INTELLIGENT, conveying a marked intellectual tone in his construction of himself and Ruth. His second component, comprising the construct DEEP DOWN STRONG AS A PERSON contrasts with this, however, but is only weakly represented.

Ruth's first component parallels Isaac's in its emphasis on intellect, and characterises persons like Isaac, TENSE, OUTGOING, SPARKLING, INTELLECTUAL, DOMINANT, and DISCONTENTED with DOMESTICITY. However, Ruth does not seem to employ this dimension to describe herself. Instead, her self-definition is formed by a dimension of persons similar to herself in that she THINKS I CAN TELL WHAT THEY'RE FEELING, who are HAPPY & CONTENTED IN GENERAL, PLACID and CONCERNED ABOUT PEOPLE FOR THEIR OWN SAKE.

In summary, there is some evidence for a disjunction of views between Isaac and Ruth, in that whilst Isaac construes himself and Ruth in intellectual terms, Ruth chooses not to do so herself, emphasising instead her placid, easy going nature. This rift, between Isaac's view of Ruth as intellectual and her own reluctance to view herself in those terms, assumes some importance as later activities will demonstrate.

Isaac and Ruth did not find elaborating descriptions for these components an easy task, but settled for the following:-

Isaac:	I	"warm and progressive"
	II	"calm, cool, strength of character"
	III	"body beautiful"
	IV	"boring, reactionary relations"

Ruth:	I	"extraverted with career interests"
	II	"easy going, concerned for others"
	III	"close to the earth"

Here we may note Ruth's equation of "career interests" with DISCONTENTED WITH JUST DOMESTICITY and INTELLECTUAL, and Isaac's conflicting comment "warm and progressive" reflecting the functional equivalence of WARM & LOVING and PROGRESSIVE IN SOCIAL ATTITUDES.

(ii) Aggregate grid display.

Examining the AG display provoked a number of interesting observations. Firstly, it was noted that the first component served to identify Isaac with Ruth and to delineate both from Isaac's brother, father, and Joan's husband. The second component, however, featured Ruth as one of five central elements. It then appeared that Ruth was defined by both components, and Isaac by the first alone.

Moreover, it was observed that the first component comprised nearly equal numbers of constructs from both participants (Ruth, 6; Isaac, 9) in contrast to the second component (Ruth, 5; Isaac, 1), and that this suggested the latter to be a more salient concern for Ruth than for Isaac. This second component reflects a definition of Ruth as HAPPY WITH DOMESTICITY ALONE, RELAXED, SUBMISSIVE, PLACID, DEEP DOWN STRONG AS A PERSON, a definition which incorporates constructs that were not particularly definitive of Ruth in her own grid analysis.

Similarly, the first component includes a number of Ruth's constructs in the joint definition of Ruth and Isaac which are not definitive of Ruth in her own grid analysis; for example, INTELLECTUAL and OUTGOING, SPARKLING. These outcomes again suggest a disjunction between Ruth's self definition and her collective definition within the relationship.

4.2.5.3. Module D; Level 1 displays.

Sessions two and four began with the assembly of a display that plotted the participants' ranking of constructs in terms of their 'importance to self-definition' (module B) against the observed importance of constructs as defined by their core constructs score (module III). Each participant assembled two displays on their own, namely anticipated and observed outcomes in their IG and AG analysis. Participants then isolated criterially discrepant constructs (i.e. those obtaining a rank error $\geqslant n/2$) and proceeded to formulate explanations for these discrepancies. Tables 48, 49, 50 and 51 depict the prompt charts that were obtained for both participants for IG and AG analysis on the two occasions.

Isaac and Ruth reported that they did not find this task easy, and whilst they noted a number of insights, they experienced some difficulty in recording the nature of these insights. As a result, Isaac's and Ruth's recorded observations do not fully convey the nature of the secondary modelling activity. However, a number of features are noteworthy in both the IG and AG displays.

(i) <u>Individual grid displays</u>.

Firstly, both Isaac and Ruth consistently underestimate or over-estimate the importance of particular constructs to their self-definition. In Isaac's IG display (Table 48) this is revealed by his over estimation of the importance of PROGRESSIVE SOCIAL ATTITUDES in his first grid and his underestimation of it in the second. Whilst this construct <u>decreases</u> in importance to his self-definition, Isaac views it as <u>increasingly</u> important, a discrepancy which he believes to be associated with members of his family:-

> "I thought my interest in politics and ideology had waned, but perhaps it has not.....it's to do with a family crisis, I am drawn towards disliked, reactionary members of the family. This probably resulted in social attitudes not being so important at that time, but having been important for so long, maybe I wasn't aware they were not so important at that time".

Constructs	SESSION TWO MODULES B	D	B-D	β	SESSION FOUR MODULES B	D	B-D	β
1 WARM & LOVING	2	7	- 5		1	9	- 8	
2 INTELLIGENT	5	3	+ 2		9	14	- 5	
3 PHYSICALLY ATTRACTIVE	7	9	- 2		17	13	+ 4	
4 PROGRESSIVE ATTITUDES	9	1	+ 8	?	2	16	-14	?
5 FEELS FOR NATURE	8	6	+ 2		12	6	+ 6	
6 PERSON I LOVE AS A PERSON	11	2	+ 9	?	3	4	- 1	
7 PERSON I LOVE FOR THE RELATIONSHIP	12	12	0		15	18	- 3	
8 DEEP DOWN STRONG AS A PERSON	3	10	- 7	?	8	2	+ 6	
9 LIVELY & STIMULATING	4	8	- 4		6	1	+ 5	
10 CULTURALLY SOPHISTICATED	10	5	+ 5		14	17	- 3	
11 LIKE RUTH	6	4	+ 2		11	5	+ 6	
12 LIKE ISAAC	1	11	-10	?	10	7	+ 3	
13 STRAIGHTFORWARD					18	12	+ 6	
14 PATHETIC & DULL					16	11	+ 5	
15 RELAXED					13	15	- 2	
16 SENSE OF HUMOUR					5	8	- 1	
17 BACHANALLIAN					7	8	- 1	
18 SERIOUS					4	3	+ 1	

TABLE 48 Module D IG prompt chart for Isaac.

Constructs	SESSION TWO MODULES B	D	B-D	β	SESSION FOUR MODULES B	D	B-D	β
1 CONCERNED ABOUT PEOPLE	4	9	- 5		5	11	- 6	
2 INTELLECTUAL	11	1	+10	?	7	17	-10	?
3 HAPPY WITH DOMESTICITY	3	5	- 2		4	6	- 2	
4 APPRECIATES NATURE	6	7	- 1		8	7	+ 1	
5 RELAXED	10	11	- 1		10	1	+ 9	?
6 PLACID	5	6	- 1		11	2	+ 9	?
7 CAN TELL WHAT THEY'RE FEELING	12	3	+ 9	?	3	4	- 1	
8 OUTGOING, SPARKLING	7	10	- 3		13	13	0	
9 DOMINANT	9	12	- 3		12	8	+ 4	
10 HAPPY & CONTENTED	2	4	- 2		2	5	- 3	
11 LIKE RUTH	1	2	- 1		1	3	- 2	
12 LIKE ISAAC	8	8	0		6	14	- 8	?
13 KIND & LOVING					9	12	- 3	
14 ENJOYS CRUDE HUMOUR					18	10	+ 8	?
15 LEFTISH					17	18	- 1	
16 CREATIVE					16	15	+ 1	
17 PUTS ON A FRONT					15	9	+ 6	
18 MAKES ME FEEL AT EASE					14	16	- 2	

TABLE 49 Module D IG prompt chart for Ruth.

Similarly, in Ruth's IG display (Table 49) construct INTELLECTUAL decreases in importance to her self-definition whilst first she underestimates and then overestimates its importance:-

> "I didn't think this was important when considering myself on my own, but it is important to me when I compare myself with others.....it is important to me when I compare myself with Isaac, but not with other people.....I have thought more about the similarity between us not just the differences."

In both of these cases, the participants fail to detect important changes in their self-modelling. In particular, Ruth reported that at the outset the construct INTELLECTUAL v. NON-INTELLECTUAL was a means of delineating herself from Isaac, in that she viewed herself as intellectually inferior to him. The modelling activities had, however, changed her views concerning this dimension, not in the sense that she now viewed herself as an intellectual equal to Isaac, but that the contrast ceased to be salient to her self-definition; she was beginning to think "more about the similarities between us and not just the differences". This is clearly related to her view of Isaac as intellectually dominant and herself as submissive, especially in the company of Isaac's intellectual friends. Allied to this, her expressed wish to become involved in activities outside the home, perhaps to take a part-time job, reflected the difficulty she experienced in viewing herself as competent in other than domestic activities.

(ii) Aggregate grid displays.

To what extent was this definition of Ruth constructed by herself or was it a function of her relationship with Isaac? It is useful here to note Isaac's consistent overestimation of the importance to his collective self-definition of his construct INTELLIGENT v. UNINTELLIGENT in his AG display, (Table 50).

Similarly Ruth consistently overestimates the importance of her construct CONCERNED ABOUT PEOPLE FOR THEIR OWN SAKE v. CONCERNED ABOUT WHAT PEOPLE THINK OF HIM/HER, and underestimates the importance of OUTGOING, SPARKLING v. WITHDRAWN, (Table 51). These discrepancies suggest that whilst Ruth seeks to reduce the importance of dimensions reflecting intellectual ability (OUTGOING, SPARKLING, and INTELLIGENT) to her aggregate self-definition, Isaac continues to emphasise them in describing himself and Ruth. The following section describes these disjunctions in more detail.

4.2.5.4. Module E; Level 2 IG-AG displays.

In assembling the IG-AG outcomes displays, the participants were directly confronted with disjunctions in their contributions to definitions of themselves and their partner. Thus, in furnishing, or attempting to furnish, accounts of these disjunctions, each was, by necessity, construing the construction processes of the other. They were then able to locate areas of self-experience to which each attributed differing degrees of importance, Tables 52 and 53 list disjunctive and conjunctive outcomes for Ruth's

Constructs	SESSION TWO MODULES B	D	B-D	β	SESSION FOUR MODULES B	D	B-D	β
1 WARM & LOVING	4	6	- 2		3	1	+ 2	
2 INTELLIGENT	3	9	- 6	?	4	14	-10	?
3 PHYSICALLY ATTRACTIVE	7	11	- 4		16	17	- 1	
4 PROGRESSIVE ATTITUDES	6	4	+ 2		6	13	- 7	
5 FEELS FOR NATURE	9	10	- 1		12	12	0	
6 PERSON I LOVE AS A PERSON	11	3	+ 8	?	10	3	+ 7	
7 PERSON I LOVE FOR THE RELATIONSHIP	12	12	0		17	18	- 1	
8 DEEP DOWN STRONG AS A PERSON	8	5	+ 3		9	7	+ 2	
9 LIVELY & STIMULATING	2	1	+ 1		5	2	+ 3	
10 CULTURALLY SOPHISTICATED	5	8	- 3		2	11	- 9	?
11 LIKE RUTH	10	2	+ 8	?	15	8	+ 9	?
12 LIKE ISAAC	1	7	- 6	?	1	10	- 9	?
13 STRAIGHTFORWARD					18	15	+ 3	
14 PATHETIC & DULL					7	9	- 2	
15 RELAXED					13	16	- 3	
16 SENSE OF HUMOUR					11	6	+ 5	
17 BACHANALLIAN					14	4	+10	?
18 SERIOUS					8	5	+ 3	

TABLE 50 Module D AG prompt chart for Isaac.

Constructs	SESSION TWO MODULES B	D	B-D	β	SESSION FOUR MODULES B	D	B-D	β
1 CONCERNED ABOUT PEOPLE	2	12	-10	?	3	14	-11	?
2 INTELLECTUAL	8	4	+ 4		9	11	- 2	
3 HAPPY WITH DOMESTICITY	12	9	+ 3		11	8	+ 3	
4 APPRECIATES NATURE	10	8	+ 2		10	1	+ 9	?
5 RELAXED	5	10	- 5		12	5	+ 7	
6 PLACID	4	11	- 7	?	15	13	+ 2	
7 CAN TELL WHAT THEY'RE FEELING	6	6	0		4	10	- 6	
8 OUTGOING, SPARKLING	7	1	+ 6	?	13	2	+11	?
9 DOMINANT	11	9	+ 2		16	4	+12	?
10 HAPPY & CONTENTED	3	7	- 4		7	3	+ 4	
11 LIKE RUTH	1	3	- 2		1	6	- 5	
12 LIKE ISAAC	9	2	+ 7	?	6	7	- 1	
13 KIND & LOVING					2	17	-15	?
14 ENJOYS CRUDE HUMOUR					18	15	+ 3	
15 LEFTISH					17	12	+ 5	
16 CREATIVE					14	16	- 2	
17 PUTS ON A FRONT					8	18	-10	?
18 MAKES ME FEEL AT EASE					5	9	- 4	

TABLE 51 Module D AG prompt chart for Ruth.

and Isaac's constructs, and it was evident that on particular constructs different functions obtained between the individual and aggregate grid analyses. These constructs were, for Ruth in particular, associated with areas of construing previously observed, namely her reluctance to base her self-definition on dimensions such as INTELLECTUAL v. NON-INTELLECTUAL, HAPPY WITH DOMESTICITY ALONE v. DISCONTENTED WITH JUST DOMESTICITY, RELAXED v. TENSE, OUTGOING, SPARKLING v. WITHDRAWN and DOMINANT v. SUBMISSIVE (see Table 52. Ruth observes:-

> "I don't think intellectuality is very important to me. I feel other things are more important. This is a construct which shows up a difference between Isaac and me. He obviously doesn't agree with me. Perhaps I am more aware of the conflict I feel between domesticity and other interests outside the home. When I rate myself on these scales I tend to compare myself with Isaac, so I only rate myself as average, whereas Isaac tends to compare me with other people and so I come out higher on these things. He often says I underestimate myself. I tend not to think of myself as like Isaac in character. I concentrate on the differences, whereas Isaac concentrates on the similarities".

It was evident that Ruth experienced conflicting standards for herself in that whenever she employed Isaac as a referent she felt overshadowed and this undermined her confidence. In other company, however, she found greater confidence, and this encouraged her to pursue outside interests. This sense of Ruth's self-definition being overdetermined by Isaac's contributions is also reflected in the session four display, where the constructs ENJOY

Constructs	SESSION TWO IG_1^R	AG_1	γ	SESSION FOUR IG_2^R	AG_2	γ
1 CONCERNED ABOUT PEOPLE	C	C		P	P	
2 INTELLECTUAL	P	C	?	P	P	
3 HAPPY WITH DOMESTICITY	P	C	?	P	C	?
4 APPRECIATES NATURE	P	P		C	C	
5 RELAXED	P	C	?	C	C	
6 PLACID	C	C		C	C	
7 CAN TELL WHAT THEY'RE FEELING	C	C		P	P	
8 OUTGOING, SPARKLING	P	C	?	P	P	
9 DOMINANT	P	C	?	P	P	
10 HAPPY & CONTENTED	C	C		P	P	
11 LIKE RUTH	C	C		C	C	
12 LIKE ISAAC	P	C	?	P	P	
13 KIND & LOVING				P	P	
14 ENJOYS CRUDE HUMOUR				P	C	?
15 LEFTISH				P	P	
16 CREATIVE				P	P	
17 PUTS ON A FRONT				C	C	
18 MAKES ME FEEL AT EASE				P	P	

(N.B. C = core outcome; P = peripheral outcome).

TABLE 52 Module E prompt chart for Ruth.

Constructs	SESSION TWO IG_1^I	AG_1	γ	SESSION FOUR IG_2^I	AG_2	γ
1 WARM & LOVING	C	C		C	C	
2 INTELLIGENT	C	C		C	C	
3 PHYSICALLY ATTRACTIVE	P	P		C	P	?
4 PROGRESSIVE ATTITUDES	C	C		C	C	
5 FEELS FOR NATURE	P	C	?	C	C	
6 PERSON I LOVE AS A PERSON	C	C		C	C	
7 PERSON I LOVE FOR THE RELATIONSHIP	P	P		P	P	
8 DEEP DOWN STRONG AS A PERSON	P	P		C	P	?
9 LIVELY & STIMULATING	C	C		C	C	
10 CULTURALLY SOPHISTICATED	C	C		C	C	
11 LIKE RUTH	C	C		C	C	
12 LIKE ISAAC	C	C		C	C	
13 STRAIGHTFORWARD				C	P	?
14 PATHETIC & DULL				C	C	
15 RELAXED				C	P	?
16 SENSE OF HUMOUR				C	P	?
17 BACHANALLIAN				C	C	
18 SERIOUS				C	C	

(N.B. C = core outcome; P = peripheral outcome).

TABLE 53 Module E prompt chart for Isaac.

CRUDE HUMOUR and again HAPPY WITH DOMESTICITY ALONE emerge as core collective constructs but are de-emphasised in Ruth's own grid:-

> "Humour plays a more important part in Isaac's life than in mine, with the consequence that I occasionally get fed up with it. Also, I see the conflict between my domesticity and outside interests. I feel I am different from other people in my grid, whom Isaac would rate highly on this".

In contrast to Ruth, disjunctions concerning Isaac's self-definition centres primarily on his perception of his work-role and Ruth's perception of him at home (Table 53). In commenting on the importance he attaches to the constructs STRAIGHTFORWARD, DEEP DOWN STRONG AS A PERSON, RELAXED and SENSE OF HUMOUR, Isaac notes:-

> "(DEEP DOWN STRONG AS A PERSON) Most important. Perhaps I have worried about what I perceive as a lack in myself, whereas Ruth does not do so. (STRAIGHTFORWARD, RELAXED) Influence of work. Some people I perceive at work to be obsessed by the need to manipulate others for their own political ends, hence I perceive myself in that kind of context. Ruth does not need to take that kind of shit at home. Bringing home the work shit I find tense-making, and worry about that. Maybe Ruth doesn't see it quite that badly. (SENSE OF HUMOUR) Mr. Silly. Humour makes relationships fun and covers up or releases tension. Maybe tied in with STRAIGHTFORWARD and RELAXED?"

4.2.5.5. Module G; Level 3 displays.

Session three began with the listing of interpersonal events perceived as significant by the participants in module F. These events, together with the predicted and observed outcomes are listed in Tables 54 and 55. Each event has been identified by the person in whose company it occurred, and qualified as to whether it confirmed (+) or disconfirmed (-) opinions concerning that person. Outcomes and prompts for Ruth's constructs are listed for both IG and AG analyses (Table 54); Isaac, however, obtained no prompts from the AG analysis since outcomes were consistent with predictions (Table 55).

It was notable first that many disjunctions between predicted and observed outcomes coincided with events that had been previously identified in module F. Ruth and Isaac note two major family events in their descriptions, namely a visit from Isaac's sister and brother-in-law who live overseas, and Ruth's father and mother who were moving house to their neighbourhood. These events brought both participants into interaction with members of their family whom either they avoided or from whom they were physically separated. In particular, Ruth's constructs CONCERNED ABOUT PEOPLE, I THINK I CAN TELL WHAT THEY'RE FEELING and HAPPY & CONTENTED IN GENERAL emerged as peripheral in her IG analysis (Table 54) which she associated with her relationship with Isaac's brother:-

"These three constructs were originally thought of with Isaac's brother in mind, as being very different from

> me.....but now my feelings have softened and I don't feel the difference is so great. I think my relationship has improved with Isaac's brother, and I'm not so antagonistic".

The same constructs also changed their function to peripheral to her self-definition in the AG analysis:-

> "Since events have changed both Isaac's and my relationship to his brother, this has meant that my position on these constructs has become less extreme".

Constructs which have become core for Ruth's self-definition, APPRECIATES NATURE and RELAXED, seem to be associated with establishing a relationship with Jack and his wife, "in a close discussion evening, where we got to know them better", who are seen as having "opted out of the rat-race.....in favour of a peaceful life in the countryside enjoying their garden".

Similarly, Isaac observed that the construct DEEP DOWN STRONG AS A PERSON was increasingly important to him, (Table 55), especially following his sister's visit:-

> "I have clarified my own position on this construct, due to my sister's visit. I think it will lead to more confidence in my relationships generally, and a more relaxed relationship with Ruth in particular..... my sister.....perhaps she has a hard-rock core of confidence.....but there's just a chance it's an act".

		Module F	Modules (IG) G ∂	Modules (AG) G ∂
1	CONCERNED ABOUT PEOPLE	ISAAC'S MOTHER (+) PAUL (+): ISAAC'S BROTHER-IN-LAW	C P ?	C P ?
2	INTELLECTUAL	ISAAC (+)	P P	C P
3	HAPPY WITH DOMESTICITY		P P	C C
4	APPRECIATES NATURE	RUTH'S FATHER (+) JACK (+)	P C ?	P C ?
5	RELAXED		P C ?	C C
6	PLACID		C C	C C
7	I THINK I CAN TELL WHAT THEY'RE FEELING	RUTH'S MOTHER (+) ISAAC'S BROTHER-IN-LAW (-) ISAAC'S SISTER (-)	C P ?	C P ?
8	OUTGOING, SPARKLING	RUTH'S FATHER (-)	P P	C P ?
9	DOMINANT	RUTH'S MOTHER (+)	P P	C P ?
10	HAPPY & CONTENTED	JACK'S WIFE (-)	C P	C P ?
11	LIKE RUTH		C C	C C
12	LIKE ISAAC		P P	C P ?

(N.B. + = confirming event; P = peripheral outcome;
- = disconfirming event; C = core outcome;
? = query prompt).

TABLE 54 Module G prompt chart for Ruth.

		Module F	Modules (IG) G	∂
1	WARM & LOVING	ISAAC'S BROTHER-IN-LAW (-); ISAAC'S SISTER (+)	C C	
2	INTELLIGENT		C C	
3	PHYSICALLY ATTRACTIVE		P C	?
4	PROGRESSIVE SOCIAL ATTITUDES		C C	
5	FEELS FOR NATURE	RUTH'S FATHER (+); RUTH'S MOTHER (+)	P C	?
6	PERSON I LOVE AS A PERSON	ISAAC'S BROTHER-IN-LAW (-); ISAAC'S BROTHER (+) ISAAC'S SISTER (+)	C C	
7	PERSON I LOVE FOR THE RELATIONSHIP		P P	
8	DEEP DOWN STRONG AS A PERSON	ISAAC'S SISTER (-)	P C	?
9	LIVELY & STIMULATING	ISAAC'S BROTHER-IN-LAW	C C	
10	CULTURALLY SOPHISTICATED		C C	
11	LIKE RUTH		C C	
12	LIKE ISAAC		C C	

(N.B. + = confirming event; P = peripheral outcome;

- = disconfirming event; C = core outcome;

? = query prompt).

TABLE 55 Module G prompt chart for Isaac.

In summary, the directed prompts arising from the module G display appeared to correspond to events previously identified as producing changes in self and partner modelling. Other prompts, not ostensibly associated with these events, seemed to involve less secondary modelling activity. For example, when Isaac's attention was directed to the core function of the construct PHYSICALLY ATTRACTIVE, he cast around and answered:-

> "Recent hot weather and consequent public deshabille has drawn my attention to this construct".

Clearly, much more may be associated with this change of relevance to Isaac's self-definition but would have required additional prompting beyond the immediate scope of this procedure.

4.2.6. Evaluating the procedures

4.2.6.1. It is evident that the procedures described in this chapter have a number of drawbacks, for example a need in some cases for prompts of greater potency, a need for simplified, possibly self-administered transformation procedures, and a need for cooperative modelling activities. However, the procedures may be examined in terms of criteria derived from the rationale of the reciprocal insight grid. This examination focuses on three areas; (i) outcomes of primary modelling activities in the repertory grid, (ii) outcomes of secondary modelling activities, and (iii) participants' subjective reports on the activities.

4.2.6.2. Outcomes of primary modelling activities.

Although the grid exercises revealed a variety of underlying themes to Isaac's and Ruth's modelling of their eelationships, the final AG solution (a PCA of all element sorts produced throughout the study) revealed only two components as exclusively defining the couple. These two components differed in their function, however, the first being descriptive of Isaac and the second of Ruth;

ISAAC DEFINING ATTRIBUTES (AG Component I)

KIND & LOVING CONCERNED FOR PEOPLE PROGRESSIVE SOCIAL ATTITUDES CULTURALLY SOPHISTICATED ESTEEMED & INTERESTING	⇦ ISAAC vs.	ISAAC'S BROTHER ISAAC'S FATHER ISAAC'S SISTER-IN-LAW

RUTH DEFINING ATTRIBUTES (AG Component II)

HAPPY WITH DOMESTICITY		RUTH		
RELAXED		JACK		ISAAC'S
STRAIGHTFORWARD	⇦	ISAAC'S	vs.	BROTHER
PLACID		MOTHER		
SUBMISSIVE				

These dimensions reflect the collective definitions of Isaac and Ruth within the relationship. In assessing the outcomes of primary modelling the following predictions derive from the rationale of reciprocal insight grid procedures:-

(a) That for both participants the modelling of self and partner becomes increasingly distinctive as they become aware of the functional properties of self- and partner-relevant predicates;

(b) That both participants display an increase in the frequency of interpersonal modelling conversations, which will be reflected in the increasing salience of partner-relevant predicates;

(c) That both partidpants display an increase in the specificity of self- and partner-relevant predicates.

These procedures had the following rationales and tests:-

(a) In discussing the role of introjection and projection in conversational competence (1.1.5.3.) it was pointed out that the constructions of self and significant others may be based on distortions of social feedback. In particular, one consequence of introjection and projection is the loss of distinctiveness of self- and other-constructions. As Laing et al note "if I cannot induce you to see me as I wish, I may act on my experience of you rather than your experience of me" (1966, p.15). If the reciprocal insight grid achieves its objective of increasing participants' ability to identify functional features of self- and partner-relevant predicates, one consequence would be an increase in the distinctiveness of these predicates. To test this the whole-figure constructs LIKE SELF IN CHARACTER and LIKE PARTNER IN CHARACTER, assumed to provide a context for the projection of salient interpretations, were examined to discover whether they display an increase in independence between the first and second test occasions.

(b) If the reciprocal insight grid promotes interpersonal modelling between the participants a shift should be observed away from self-relevant predicates towards partner-relevant predicates. This follows from the prediction above, namely thay a loss of distinctiveness of personal models is a result of distortions of social feedback and failures of realisation. As information concerning partner's constructions becomes available in the relationship participants attention should focus on modifying partner constructions. This was tested by examining the salience of the first 6 constructs elicited on the first occasion and the 6 elicited on the second occasion for the first two AG components. An increase in partner-relevant predication would be displayed by an increase in the magnitude of loadings of constructs from the second occasion on the partner-defining component.

(c) Finally, another consequence of the first prediction is that as self and partner models become more distinct the two central components should display greater specificity. That is, these components should acquire greater precision and implicative potential, and polarise self and partner models. This was tested by examining the loadings of the two whole-figure constructs on central components on the two occasions. An increase in specificity would be exhibited by increases in the magnitude of the loadings of the LIKE SELF constructs on self-relevant components, and LIKE PARTNER on partner-relevant components, since their salient interpretations should approximate more closely to these underlying variates.

Firstly, as Figure 85a shows the constructs LIKE SELF and LIKE PARTNER display a significant increase in independence for Isaac (r_1= .687, r_2= -.139; z= -2.51, p= .006, one-tailed) but a significant <u>decrease</u> in independence for Ruth (r_1= -.172, r_2= .761; z= 2.99, p= .001, one-tailed). Moreover, it is clear that for Isaac LIKE SELF and LIKE PARTNER are significantly related at the outset (r_1= .687, df= 15, $p<.005$) whilst for Ruth the two constructs are significantly related <u>after</u> the procedures (r_2= .761, df= 15, $p<.005$). Thus the findings for Ruth contraindicate the predictions concerning distinctiveness of self and partner models.

Secondly, Figure 85b depicts the salience of elicited constructs for the first two components for each occasion. Here it is evident that both participants increase the attention given during modelling to partner-relevant predicates. Both Ruth and Isaac relax their emphasis on self-defining attributes, although in neither case is this effect significant (Ruth, Mann-Whitney U(6/6)= 9; Isaac, U(6/6)=

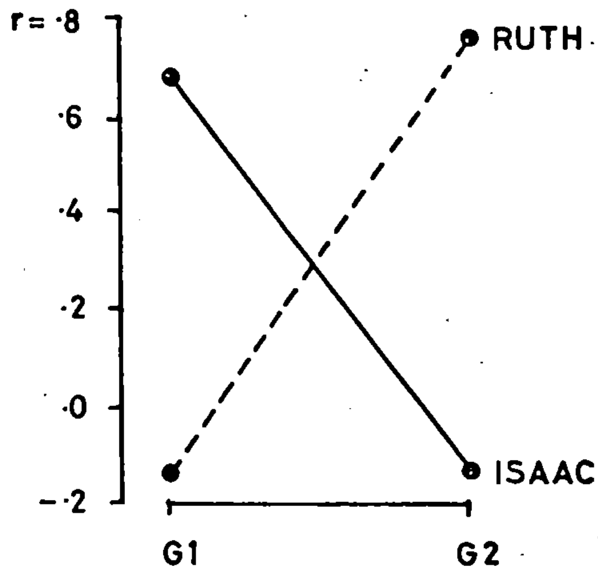


Figure 85a Correlations between LIKE SELF and LIKE PARTNER constructs for both participants on the two occasions.

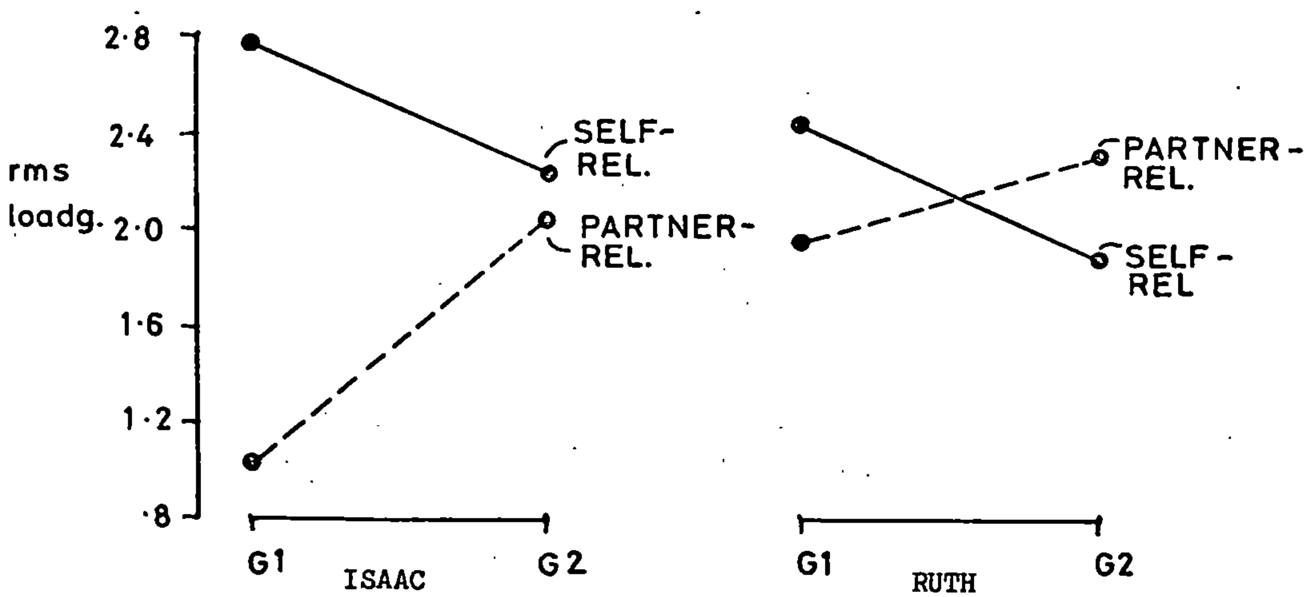


Figure 85b Construct salience for both participants on central AG components.

10). Both participants increase their emphasis instead on partner-defining predicates, although this effect is significant for Isaac only (Ruth, U(6/6)=13; Isaac, U(6/6)=6, p=.032, one-tailed). This differential emphasis is, however, more marked on the first occasion (Component I, U(6/6)=6, p=.032, one-tailed; Component II, U(6/6)=7, p=.047, one-tailed) than on the second (Component I, U(6/6)=13; Component II, U(6/6)=15. The most marked observation is that Isaac appears to formulate self-relevant predicates on the first occasion almost to the exclusion of partner-relevant predicates (U(6/6)=0, p=.001, one-tailed).

Thirdly, Figures 86 and 87 depict the loadings obtained by the two whole-figure constructs on each component on the two occasions. It was predicted that increasing specificity of self-defining and partner defining attributes would be evident from increases in the loadings of the constructs LIKE SELF and LIKE PARTNER on their respective components. Neither participant displayed the former outcome. In fact, the construct LIKE SELF obtained a significant <u>decrement</u> on self-relevant predicates for Isaac (z=-2.734, p=.003), and a near significant decrement for Ruth (z=-1.459, p=.072). Similarly, Isaac shows a <u>decrement</u>, though not significant, in the loading of the LIKE RUTH construct on partner-relevant predicates (z = -.975, p = .165). Although Ruth displays a small increment in the loading of the construct LIKE ISAAC on partner-relevant predicates, this effect is not significant (z = .131, p = .448). Contrary to predictions, the LIKE SELF construct displays a significant <u>increment</u> on partner-relevant predicates for Isaac (z = 2.547, p = .005), and a non-significant increment for Ruth (z = 1.234, p = .109). One comparison is consistent with the prediction, however, in that the construct LIKE ISAAC does display a significant decrement

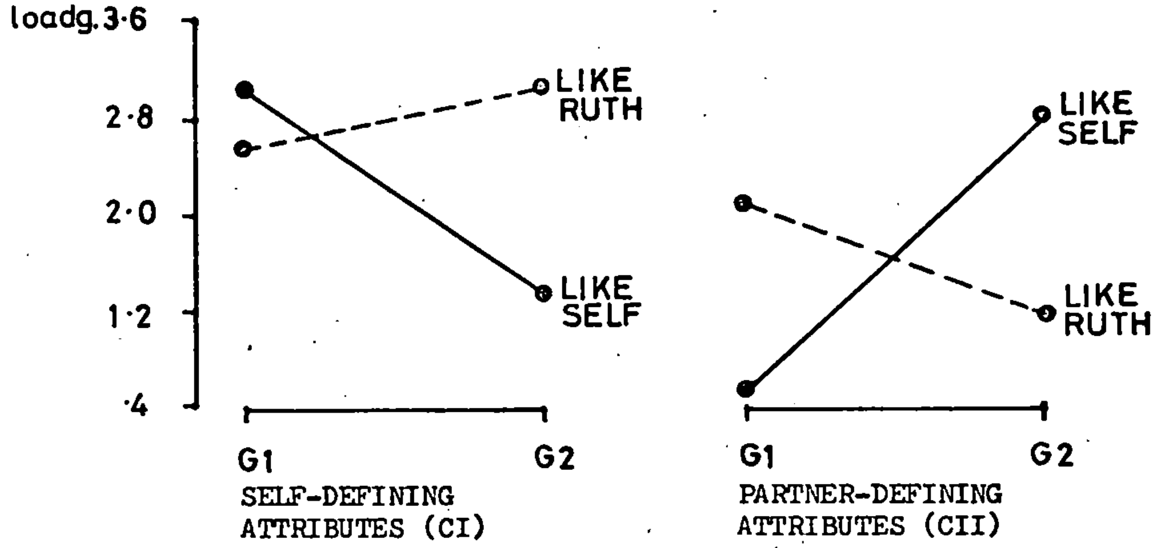


Figure 86 Loadings of ISAAC'S whole-figure constructs on central components.

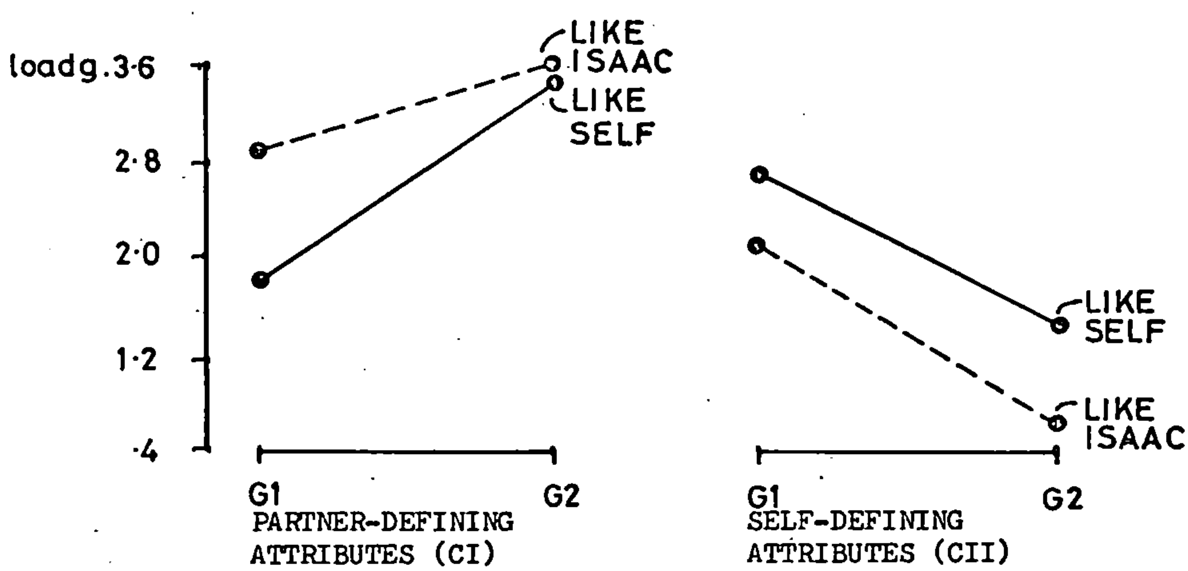


Figure 87 Loadings of RUTH'S whole-figure constructs on central components.

on self-defining predicates for Ruth ($z= -1.772$, $p=.038$). Even here, this effect is not corroborated by Isaac, since he shows a slight, but nonsignificant increase in the loading of the construct LIKE RUTH on self-relevant attributes ($z = .362$, $p=.359$).

These findings required further explanation. Firstly, it was evident that Isaac began by identifying Ruth with himself but following the procedures was able to markedly differentiate himself from Ruth. The reverse was the case for Ruth. Secondly, the findings suggest that Ruth attempts to identify herself in terms she previously employed to define Isaac. Thirdly, Isaac appears to reciprocate this shift in Ruth's self-definition. Fourthly, Isaac appears himself to be shifting <u>his</u> self-definition towards those terms that he previously employed to define Ruth. Finally, both participants appear to have focussed their attention to partner-relevant attributes.

Some indication of the processes occurring here was available from other sources. Ruth, for example, observed that Isaac tended to look for similarities between himself and herself, and often stated that she undervalued her intellectual abilities and "cultural sophistication". The effect of the exchanges prompted by the procedures might then have been to direct Ruth to perceive positive intellectual qualities in herself:

> "I didn't think this was important when considering myself on my own, but it is important to me when comparing myself with others...since having the feedback I have thought more about the similarities between us and not just the differences".

and for Isaac to appreciate her need to view herself in terms other than HAPPY WITH DOMESTICITY ALONE. That this shift was reciprocated by Isaac indicates that those attributes normally associated with Isaac have become central to the couple's definition of Ruth. It is noteworthy that Ruth succeeded in securing a professional part-time job soon after the study, suggesting that this shift in Ruth's self definition was not transient. Secondly, Isaac appeared to be attempting to conceptualise himself in terms of those capacities that he normally associated with Ruth. Thus he sees himself as capable of assuming Ruth's supportive role in the family (HAPPY WITH DOMESTICITY, RELAXED, STRAIGHT-FORWARD, etc.).

Finally, the extent to which each participant's constructs alter in their functional properties through the series of interactions with the procedures also suggests that both Isaac and Ruth attempted to re-model their definition of Ruth, but that Isaac's attempts to re-model his own definition were not supported by Ruth. Table 56 depicts the rank correlations between core construct scores obtained for both participant's constructs in the final cumulative AG analysis. Core construct scores for SELF defining constructs had already been computed for both participants. This procedure was repeated, utilising eigen-vectors for the element PARTNER for each participant's constructs. As a result, each construct was scored for centrality in two ways: a score representing centrality to a SELF-definition, and a score representing centrality to a PARTNER-definition. These scores were obtained for constructs applied in both grids then rank and Spearman rho correlations obtained. The correlations indicated that both participants altered the functional properties of constructs to define themselves on the second occasion (Ruth, rho=.07; Isaac, rho=-.03), although Isaac and Ruth differed in the extent to which they redefined their partner. Whilst Ruth employs an almost unchanged set of constructs to define Isaac (rho=.49), Isaac's definition of Ruth on the third occasion had altered considerably (rho = -.622).

	Central to definition of RUTH	Central to definition of ISAAC
Ruth's constructs	.070	.490
Isaac's constructs	-.622*	-.028

(Note * indicates .05 > p, one-tailed)

TABLE 56 Rank correlations between core construct scores in the first and second grids.

These data enable inferences to be made about the nature of the couple's modelling activity over the series of interactions with procedures. The conclusion to be drawn is that Isaac and Ruth sought to reverse their roles in the relationship, Isaac to become less intellectually dominant and more domestically supportive, and Ruth to become more independent and confident in her intellectual abilities. Only one set of evaluative criteria, namely the increase in salience of partner-relevant constructs were met. However, it is clear that constructive change did occur, and that the evaluative criteria may be inappropriate. In a previous study (Chapter 3.4.) it was pointed out that evaluative criteria established independently did not make allowances for variations in the goals and strategies employed by the participants.

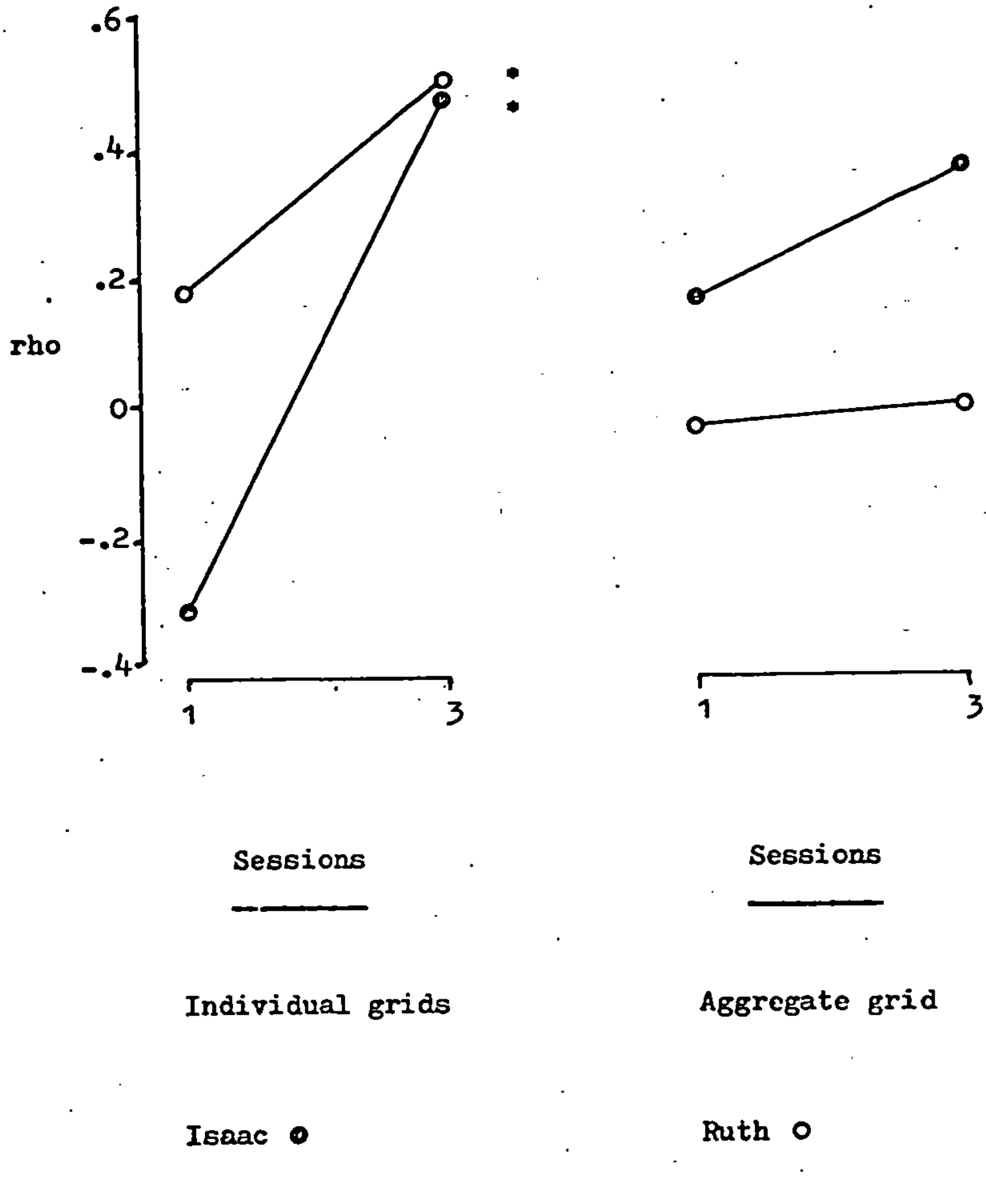
4.2.6.3. Outcomes of secondary modelling activities.

The case-study reported in the preceding section indicated the nature of secondary modelling that the displays and reflective strategies provoked. Whilst the couple's responses to the displays provided qualitative data concerning their effect, with the exception of the Level 1 displays, quantification of this data was not possible. However, it was clear that the Level 2 component display, in clarifying the couple's modelling of thenselves, enabled Isaac and Ruth to experiment with their self-definition in a way that might otherwise not have been possible. Ruth's increasing self-confidence in her intellectual abilities, and Isaac's understanding of her tranditional domestic role may both be attributed to the clarification offered by these displays. Moreover, the role played by the family events and Isaac's career in the relationship appeared to be clarified as a consequence of the Level 3 displays.

Modelling at Level 1 was, however, quantifiable in that the couple attempted to classify the functional properties of their constructs in the individual and aggregate domains. The success of the procedures to encourage the development of discriminative control over modelling might then be inferred from the gains in predictive accuracy of Level 1 outcomes. However, the inferences that may be drawn in this case are limited by the form of learning that takes place in this activity. Chapter 3.4. pointed out that gains in predictive accuracy may be associated with the distinctive features of constructs as they are recorded in the grid matrix rather than with distinctive features of the thoughts and feelings conveyed by the constructs. Although it cannot be asserted that learning of the latter kind necessarily follows from the former, we may enquire as to the extent to which the couple achieved predictive accuracy of Level 1 classifications.

The couple independently formulated predictions concerning the centrality of their constructs to the self-definition in both individual and aggregate conversational domains. Figure 88 depicts the correlations between their anticipated rank orderings of constructs in terms of their core construct scores in the IG and AG analyses.

Applying Fisher's z transformation to the rank correlations and estimating the standard error of rho, it is evident that only Isaac shows a significant improvement in identifying functional features in the IG context (Isaac, z= 1.86; p=.031 Ruth, z=.796). However, both participants achieve significant levels of correlation by the third session (Ruth, r_s=.472, $p < .05$; Isaac, r_s=.428, $p < .05$). Neither participant shows a substantial gain in identifying functional features in the AG context (Ruth, z=. 164 Isaac, z=. 552) nor do they attain any substantial correlation (Ruth, r_s = -.022; Isaac, r_s = .364). It is important to note that learning the ordering of construct outcomes in the first analysis does not facilitate predictive accuracy of outcomes in the second grid; both Ruth's and Isaac's constructs undergo changes in relevance to their self-definitions, (Ruth, rho = .07; Isaac, rho = -.622). Thus, any improvement in predictive accuracy must reflect the development of the ability to evaluate construct dimensions in their relevance to self-definitions at the time of their



(Note: * denotes .05 > p, one-tailed).

Figure 88 Level 1 predictive accuracy in individual and aggregate grids.

production.

It is apparent that Isaac and Ruth are less able to evaluate the way in which their constructs contribute to a shared definition of themselves on the third session. Unless each participant is fully able to anticipate their partner's modelling activities, accuracy in predicting AG outcomes is unlikely to be achieved. It is therefore noteworthy that Isaac attains a higher level of accuracy than Ruth; this may reflect Isaac's ability to sympathetically respond to Ruth's attempts to re-model her self-definition. As he realises Ruth is attempting to define herself in similar terms to his own self-definition, he is more able to anticipate Ruth's view of him.

In summary, qualitative evidence of the results of the procedures for secondary modelling is available in the case-study report. In addition, within the limitations discussed in Chapter 3.4., quantitative data on gains in predictive accuracy of Level 1 outcomes do indicate the development by the couple of the ability to distinguish the functional properties of predicates in the individual grids. Similar gains did not obtain for outcomes in the aggregate grids, although Isaac did display greater accuracy than Ruth. These findings are consistent with the previous observations that Isaac was able to reciprocate Ruth's attempts to re-model her self-definition.

4.2.6.4. Participants' reports on the activities.

It became clear in the discussions of Chapter 3.5. that the evaluation of conversational procedures cannot be achieved unless the assumption of identity between participant and procedural objectives is satisfied. That is, criteria for evaluating procedures are appropriate only if they approximate to the purposes of the user in interacting with them. If the criteria do not approximate to user objectives the procedures may erroneously be considered inadequate. To estimate the couple's purposes, they were interviewed by E after the four sessions were completed, regarding the outcomes of the study as they perceived them.

Ruth felt that the exercises helped her "sort out what I felt about people", and gave her "courage to face up to the bad things I thought about them". She remarked that she had found greater understanding in her relationship with Isaac, and felt flattered by his confidence in her stamina and resilience She found that "talking about my feelings came easier", and whilst in the past was frightened by Isaac's moods, now found she could withstand them and find the confidence to express her feelings about him. Isaac felt he had reflected a great deal on himself, and thought that his views were now more realistic. He reported increased confidence in his own work which had some time previously been at a low ebb and that he now knew where he stood with Ruth. Both Ruth and Isaac reported greater thoughtfulness about each other, and a greater extent of self-disclosure to each other. Ruth said that she "did not know what to expect from the study, so what had happened was a bonus". It had, she said "given me a marvellous feeling of the depth of people.....being able to see people in depth and finding them interesting". In remarking on the procedures, Isaac criticised the use of computer programs and wondered whether simpler operations might not have sufficed. However, both Isaac and Ruth appreciated the unobtrusive nature of the procedures and suggested that more potent prompts might be less appreciated by people who were "slow to open up". Whilst neither member was able to explicitly specify their objectives in the interactions, they both felt that the outcomes were entirely satisfactory.

4.2.7. Summary.

4.2.7.1. The task of this chapter has been to incorporate the aggregate grid method, developed for two or more participant users in the preceding chapter, into the algorithm of activities developed in Part 3. To do so, some simplification of the procedures was necessary, and only transformations and displays relevant to the feature of predicate centrality were employed. The procedure, the reciprocal insight grid, was devised for use in a couple's counselling context, and its application in a single case-study is reported.

4.2.7.2. Comprehensive transformations, displays and reflective strategies were developed compatible with this context, and details of the instructions and activities reported. In addition, methods for evaluating modelling activity promoted by the procedures were formulated, and it was evident that the couple studied engaged in modelling with a clear purpose, namely, to attempt to reverse the roles they had come to assume for themselves within the relationship, and focus on applying to themselves attributes previously associated with their partner.

Chapter 4.3.

Summary

4.3.1. Implications for internal modelling conversations.

4.3.2. Implications for interpersonal modelling conversations.

4.3.1. <u>Implications for internal modelling conversations.</u>

4.3.1.1. The procedures developed in Part 4 may be summarised in terms of the model of conversations as a device enabling two or more participants to exteriorise their models of themselves and each other in a way that permits them to operate on the reference frame of their relationship. This is achieved by interposing between the participants a class of procedures that act collectively as a cognitive reflector, and mediator of each participant's modelling of their partner (Fig. 89). Mediation, however, takes a special and restricted form. Rather than convey the content of reciprocal modelling between participants, the procedures display the function of each model for a common domain of reference, namely, the aggregate grid. Each participant interacts separately with the displays, providing a context in which internal modelling of self and partner may occur. Within this definition the procedures developed and applied in Chapter 4.1. and 4.2. are only partly successful. Their limitations may be divided into two classes: (i) limitations in their capability to promote internal modelling; (ii) limitations in their capability to promote interpersonal modelling.

4.3.1.2. In summarising the individual case-studies of Part 3, Chapter 3.5. noted a number of features of user interactions with procedures that were observed in the reciprocal insight grid study. For example, prompts at a specific level of display frequently led to a modelling activity at several levels, outcomes at each level occasionally appeared incompatible and the complexity of the transformations often led users to view them as arbitrary. However,

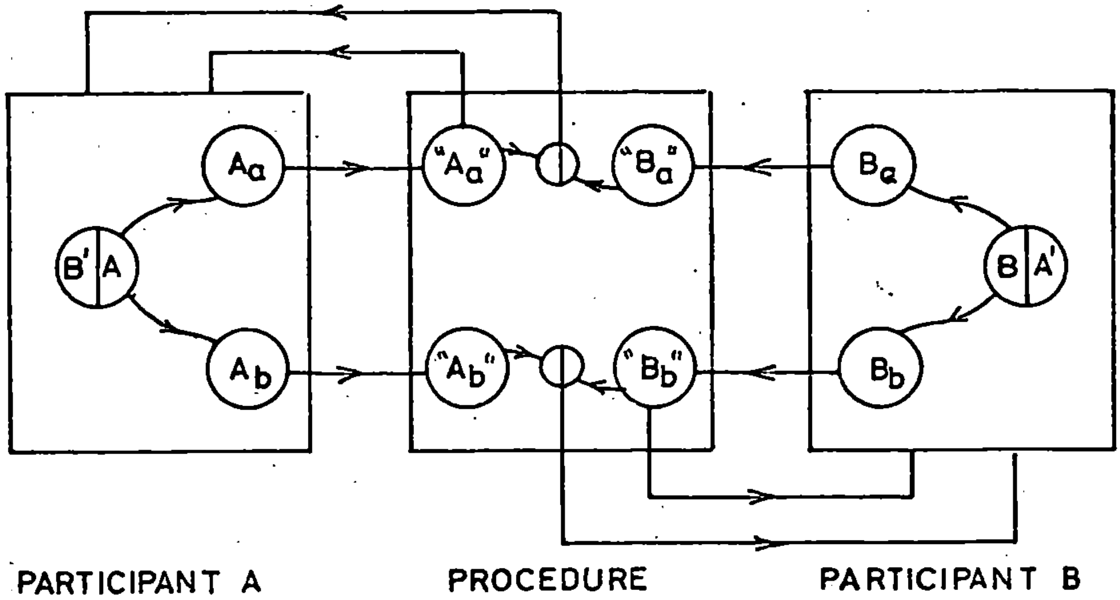


Figure 89.

a number of additional limitations to internal modelling were observed in this study which require discussion.

Firstly, both participants found secondary modelling in response to the Level 2 component displays difficult to achieve. Whilst they were requested to comment on the functional properties of classes of predicates identified in these displays, their responses were invariably to denote the classes by formulating superordinate constructs which subsumed the individual members of each class. For example, Isaac denoted the class of constructs comprising WARM & LOVING, PROGRESSIVE IN SOCIAL ATTITUDES, CULTURALLY SOPHISTICATED, INTELLIGENT, etc., as "warm and progressive". That is, the participants did not compare and contrast classes of predicates by denoting them within a second-level metalanguage, and instead replaced them with constructs of greater generality at the same level of discourse. A systematic procedure for guiding comparisons between classes in these displays thus appears desirable, and may be modelled on repertory grid procedure. That is, classes of predicates may form elements in a higher-order grid, and constructs produced to distinguish between them.

4.3.1.3. Secondly, identifying significant recent events fequently 'set' participants to engage in particular forms of secondary modelling in reply to Level 3 prompts. For example, having noted events concerning their relatives, Isaac and Ruth were predisposed to respond to prompts by accounting for observed changes in their modelling of self and partner by exclusive reference to these events. Discrepancies which could not be attributed to this source.frequently obtained reduced secondary modelling (for example, Isaac's response to the construct PHYSICALLY ATTRACTIVE). Two considerations follow from these observations: (i) the identification of significant events in advance of Level 3 displays may be eliminated. The problem may reappear, however, in that Participants' responses to Level 3 displays on one occasion may influence their responses to subsequent displays; (ii) prompts of greater potency or persistence may be devised. This would require that the procedure recognise the <u>need</u> for additional prompting, perhaps by classifying user responses. The paraphrasing of feedback information, repetition of observations, extent of exploration and implications of responses for self-modelling are possible parameters of such a classification. These considerations may be viewed as aspects of the supportive function of procedures, discussed in Chapter 3.5.

4.3.1.4. Thirdly, participants remarked that the means devised for recording their responses to prompts at all levels were frequently inadequate to convey the thoughts and feelings provoked by the prompts. Methods for representing primary modelling activity have already been discussed (Chapter 1.2.) and it was concluded that the repertory grid technique was appropriate as it enabled systematic predication within a conversational domain. Owing to the indeterminate nature of the conversational domain of secondary modelling, systematic predication in response to prompts was not considered feasible at that time. A possible adaptation to the procedure to enable systematic secondary modelling is to utilise the prompts to demarcate a secondary domain, and to formulate constructs within that domain. For example, in the previous case-study Ruth noted that a number of her constructs had altered their function in her grids, constructs which:

> "were originally thought of with Isaac's brother in mind.....but now my feelings have softened.....I think my relationship has improved with Isaac's brother, and I'm not so antagonistic".

Ruth has clearly identified the domain of secondary modelling (her relationship with Isaac's brother) and might have proceeded to elaborate additional constructs within that domain. She may, for example, produce constructs from selected triads of elements (e.g. ISAAC, RUTH, ISAAC'S BROTHER) until the thoughts and feelings embodied in the statements "my feelings have softened", and "my relationship has improved" had been systematically elaborated. Further development of the procedures may then seek to devise methods to reflect the implications of primary modelling activity back onto the record of that activity, and thus modify and elaborate it.

The effects on the conversational domain of predicates deriving from secondary modelling may then be asserted, and may become the source of additional prompts. Channelling secondary modelling to operate on the primary domain parallels the elaborative options included in the DEMON computer program for eliciting repertory grids (Thomas, 1975), and enables the user to develop his modelling within a single frame of reference.

4.3.2. Implications for interpersonal modelling.

4.3.2.1. Applying the procedures in an interpersonal context raises a number of considerations concerning their role in couples counselling. In particular, one of the design specifications of procedures, namely their supportive function, was difficult to achieve. In a counselling interview, the counsellor employs diverse cues to infer the state of readiness of the client to receive particular classes of prompt. To simulate this process a procedure must first have available a repertoire of categories denoting "user states", secondly the means to identify those states, and thirdly, transformations and displays compatible with each state identified. In the case-study reported in the previous chapter a number of observations may be made in relation to the supportive function of procedures.

4.3.2.2. Firstly, although the procedures were intended to mediate between participants' modelling conversations, the couple were simultaneously involved in the activities and consequently frequently engaged in interpersonal modelling conversations. For example, Isaac and Ruth might discuss together their feelings towards particular persons. Whilst the procedures did not require conversations of this kind, it was anticipated that they would provoke modelling transactions between the couple. One policy of the procedure was thus to provide each participant with the choice of what to disclose and what to hold back from discussion by maintaining independent interactions with the procedures. However, it became evident that the effectiveness of the procedures was limited by this policy, and that modelling activity might be considerably extended by providing unobtrusive guidance for interpersonal modelling conversations. One aspect of the procedures that the couple agreed should be preserved was that primary modelling be conducted privately, with no commitment to exchange or reveal predications thus formulated. Many secondary modelling activities involving the aggregate grid, however, appeared to demand that participants reveal their modelling of themselves and their partner. For example, in demonstrating to each participant the manner in which their constructs functioned differently in the individual and aggregate domains, the couple felt that they could formulate explanations only by enquiring as to the nature of their partner's construing.

4.3.2.3. Secondly, it was often the case that participants sought assistance from their partner when engaged in secondary modelling activity. As E perceived his role to be a source of information rather than to provide additional prompts, each participant occasionally assumed a supportive role for their partner. By commenting on their partner's displays, making suggestions, summarising their partner's reflections, and generally assisting their partner's introspective activities, the couple began to develop the capacity to counsel each other. This was viewed as a constructive outcome of the inadequacies of the procedures, and could not be achieved in the individual interactions discussed in Part 3. As participants may readily be able to identify and anticipate states of readiness of their partners, the supportive function might be better achieved by participants than by the procedures. Thus, whilst the objective of procedures in the individual context was to develop in the user the role of self-counsellor, in the interpersonal context the objective properly becomes the development of co-counselling capacities of the couple.

4.3.2.4. Thirdly, the measures developed to assess the outcomes of modelling activity by the couple revealed that each responded to the self-definition of their partner by attempting to apply those attributes to themselves. For example, Ruth evidently attempted to construe herself as intellectually competent, whilst Isaac sought to view himself as able to become domestically supportive. Whilst Isaac responded to Ruth's attempts to alter her self-definition, by simultaneously redefining Ruth, Ruth did not reciprocate Isaac's attempts to redefine himself. This finding clearly has implications for the nature of the couple's relationship, but was not made available to them at the time. This reciprocal aspect of modelling may be displayed only by demonstrating the functions of predicates for defining partner in the aggregate grid. For example, to draw Ruth's attention to the discrepancy between her own and Isaac's modelling of Isaac requires information contrasting her own and Isaac's constructs to define Isaac, in addition to contrasting her own and Isaac's constructs to define herself. This dual process is represented in Fig. 90, where scheme (a) displays to each participant the extent of agreement or disagreement in the collective definition of self, and scheme (b) agreement or disagreement in the collective definition of partner.

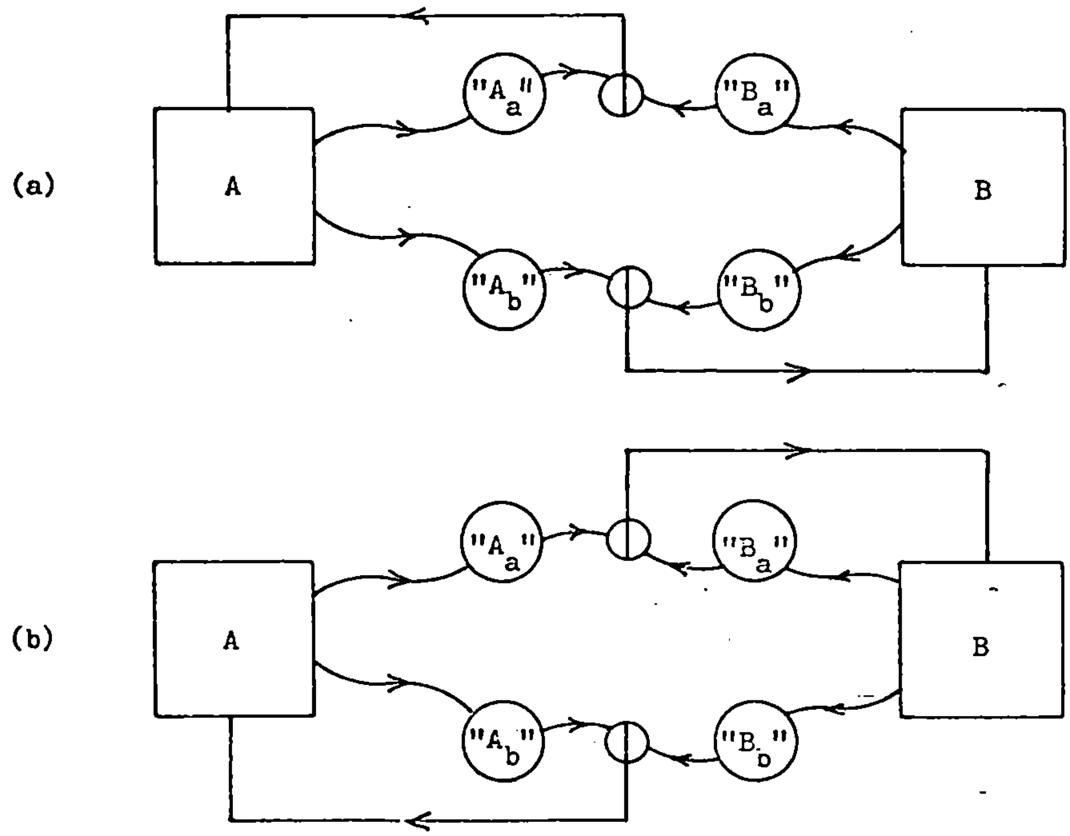


Figure 90.

4.3.2.5. In summary, these comments on procedures reflect the difficulties of simulating the activities of the counsellor with an interactive algorithm. At many points during the interactions E was required to fulfil functions which were not readily translatable into a set of operations. The extent to which E was required to intervene indicated the shortcomings of the procedures. The incompleteness of the procedures as autonomous algorithms suggests that at their current stage of development computerisation will achieve very little, save to enable on-line response-sensitive feedback. As a program of activities, to be administered by a participant experimenter or counsellor, however, the procedures do achieve satisfactory outcomes. The following discussions seek to clarify the possibilities and implications of these and similar procedures for modelling conversations.

Part 5

Conclusion

Chapter 5.1.

The rationale and outcomes of conversational procedures.

5.1.1. Conversational mechanisms.

5.1.1.1. A science of persons. The two themes developed in parallel in this thesis may now be summarised. The first theme, a model of conversational process, focused on essential inter- and intra-personal mechanisms associated with conversation as a social activity. The second theme attempted to translate the first into a modus agendi for enhancing specific forms of conversation by constructing a number of conversational procedures. The following chapters trace the development and application of these procedures and assess their implications for conversational practice in applied settings, with special reference to psychological counselling. Figure 91 summarises this scheme, and depicts the structure of the research undertaken.

The epistomological status of the two themes is grounded in the assumption that conversational methods are derived from a science of persons. Such a science, according to Harré and Secord (1972), has the following central features:-

(i) that any explanation of social phenomena depends to a greater extent on the view that a person acts as an agent directing his own behaviour than on the view that a person is an object responding to the push and pull of environmental forces;

(ii) that such explanations depend to a greater extent on the precision of meaning obtained by examining the actor's accounts of his own behaviour than in the standard of accuracy of measurement familiar to physical sciences;

(iii) that the actor's justification for his accounts of conversational episodes leads to the discovery of the manner in which the actor monitors his own behaviour.

The conversational methods developed in this thesis closely conform to the ethogenic analysis of episodes favoured by Harré and Secord with the exception that the locus of the utility of explanation obtained by such an analysis is with the actor rather than with the observer. That is, the objective of the thesis was to develop procedures whereby actors may modify their accounts towards greater veridicality rather than to examine, from an objective standpoint, the explanatory properties of such accounts. Within this framework, however, the logic of the negotiation of accounts has been closely followed. Indeed, the methodological problems encountered by ethogenists in managing such a negotiation become central concerns to conversational methods. For Harré and Secord:-

> "A negotiation consists in the pooling of viewpoints, and the subsequent correction of accounts...(either because) in the course of reflection upon his own actions a person may come to form the opinion that some action which at first consideration seemed not to be done for a reason could be explained and a reason for it given...(or because) a person may also be persuaded that his account should be changed even if derived from a monitoring commontary...The standard situation of negotiation is typified by a "family therapy session", such

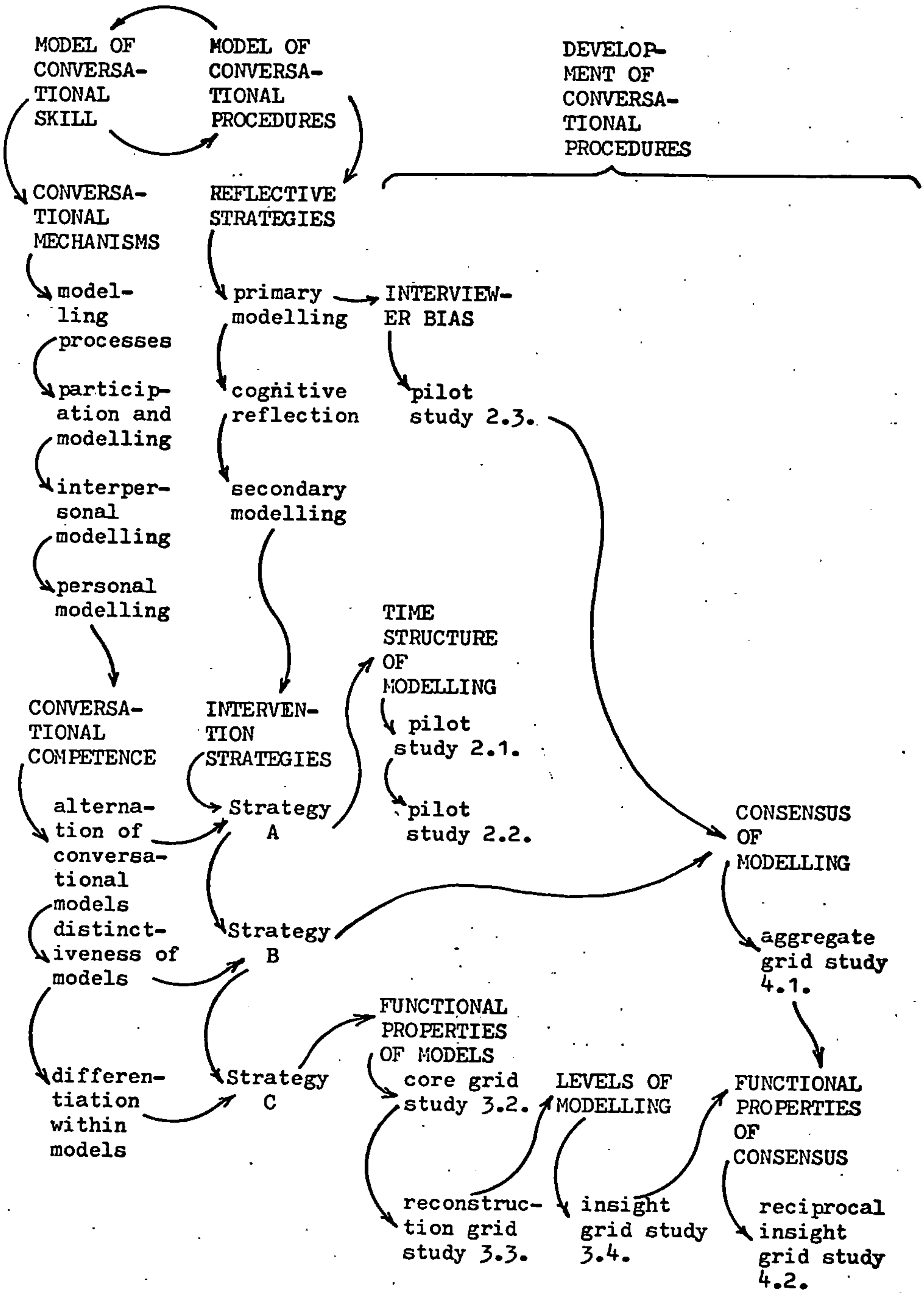


Figure 91. The research scheme.

as a man and wife discussing their relationship with the help of a marriage guidance counsellor. The counsellor's job is not just to act as a referee but to enter into the relationship as negotiator of accounts."

Harré & Secord (1972, p.235-7).

The conversational processes and procedures developed in this thesis thus focus on the role of negotiation in modifying the actor's capacity to account for his behaviour. The following sections summarise extrapolations from the epistemological base provided by Harré and Secord to describe the specific conversational mechanisms involved in the negotiation of accounts.

5.1.1.2. Modelling in conversations.

The opening chapters developed the notion of conversational competence by analysing conversational processes. This analysis drew on the contributions from diverse sources - the social behaviourism of Argyle and Kendon, the rationalistic interactionism of Mead, and the perspectives on therapeutic encounters provided by Lacan, Laing and Rogers collectively established the foundation of a model of conversational process. These perspectives drew attention to a fundamental feature of human relationships that shaped and directed the subsequent studies, namely that process and outcome in conversations are mediated by the conversant's capacity to form an internal representation, or cognitive model, of the interactions in which he engages. Empirical support for the notion that behavioural outcomes are mediated by self-awareness and self-modelling are to be found in studies of cognitive dissonance and self-perception (Bem, 1967; 1972), causal ascription for success and failure and achievement motivation (Weiner, 1974), and cognitive misattribution and emotional arousal (Schachter and Singer, 1962; Valins, 1966).

5.1.1.3. The distinctiveness of models.

The construction and maintenance of cognitive models of interactions enables the conversant to participate in social relationships by providing an interpretive frame of reference within which his own experience and behaviour, as well as the behaviour of others, is made intelligible. Reference frames were considered as a collection of inter-related models which, for simplicity, were partitioned into the minimal duality of self and other.

The utility of this distinction is supported on other than epistemological grounds, in that a failure to construct distinctive models of self and significant others leads to the disruption of interpersonal conversations. Empirical support for the utility of self-other distinctiveness is provided in studies of marital breakdown (Laing, Phillipson & Lee, 1966), and studies of mis-attributions to self and the negative placebo effect (Valins & Nisbett, 1972).

5.1.1.4. Interpersonal modelling.

The element of interpersonal veridicality in modelling associated with the "Negotiation of accounts" emphasised by Harré and Secord was introduced by distinguishing participative conversations from modelling conversations. In the former, the conversant was said to act on the basis of an established interpretive model. In the latter, models were said to be constructed or revised to minimise interpretive disjunctions between conversants either by explicit reference to modelling activity, or by implicit verbal or nonverbal communication. Empirical support for this distinction is provided in studies of "report/command" communications in therapeutic relationships (Bateson & Ruesch, 1951), and the relationship-defining manoeuvres and paradoxes described by Haley (1963).

5.1.1.5. Personal modelling.

An additional distinction was drawn between interpersonal modelling conversations engaged in by two or more persons, and modelling conversations internal to a person. Whilst the former were said to give rise to "consensual definitions" (Mead, 1964), internal conversations were viewed as the medium through which a conversant effected changes in his construction of self and significant others. This distinction gave gave rise to the following fundamental considerations:-

(i) The nature of conversations and individuals; to clarify the status of internal conversations it was necessary to specify three distinctive features of conversational events, namely, the partition of at least two initially asynchronous individuals, reciprocally contingent coupling between individuals, and self-reference (Pask, 1975). In separating individuation from biological identity it becomes equally as possible to partition processes internal to a single person into two asynchronous "psychological" individuals as to describe the process of the "de-individuation" of the individual within a group (Wicklund, 1975; Festinger, Pepitone & Newcomb, 1952).

(ii) The primacy of the internal conversation; the consensual definitions of conversants arrived at through explicit or implicit modelling conversations are logically distinct from those internal modelling processes which give rise to the conversant's conceptions of self and other. Consensual definitions achieve their effect only through self-monitoring by the individual (Harré & Secord, 1972).

(iii) The nature of self-awareness; internal conversations conform to recent formulations of objective self-awareness (Duval & Wicklund, 1972; Wicklund, 1975) in which attention is directed towards self as a social object for the purposes of social comparison (Festinger, 1954). Empirical support for this information-processing view of Mead's original notion of "self-interactions" is provided in studies of self-awareness and self-esteem (Ickes, Wicklund & Ferris, 1973), self-attribution (Wicklund & Duval, 1973), and dissonance reduction (Wicklund & Duval, 1971).

5.1.1.6. Conversational competence.

These theoretically and empirically justifiable distinctions between various conversational mechanisms enabled a tentative account of conversational competence to be outlined, featuring three performance characteristics, namely, the alternation of modes of self-awareness, the distinctiveness of models of self and other, and the capacity for perceptual differentiation within models. These performance characteristics were highlighted by examining them in relation to the breakdown of competence in the states of anxiety (Kelly, 1955; Tillich. 1952), guilt (Kelly, 1955), threat (Landfield, 1951), denial (Keen, 1972), projection and introjection (Laing, Phillipson & Lee, 1966), misinvolvement (Goffman, 1971) and hostility (Kelly, 1955; Mischel, 1964).

5.1.2. The design of conversational procedures.

5.1.2.1. Strategies for intervening into modelling processes.

The analysis of conversational competence suggested that procedures designed to enhance competence converge on three major aspects of modelling conversations. Each aspect, however, entailed a distinct methodological strategy.

(i) Strategy A; The alternation of conversational modes.

An effective strategy A procedure would be required to (a) monitor the development of frames of reference in ongoing conversations; (b) intervene at critical moments to display conversational states to the participants, (c) provide conditions whereby participants may redirect the development of the conversation, and (d) develop the capacity to regulate transitions between modelling and participative conversational modes. Such a procedure would entail an analysis resembling that for enigmatic episodes (Harré & Secord, 1972), revealing the generative rules that govern conversational processes.

(ii) Strategy B; The distinctiveness of models of self and others.

An effective strategy B procedure would be required to (a) sample the conjoint personal and social environment of two or more participants, (b) reveal the functional properties of their self-identity systems (Norris & Mahklouf-Norris, 1976, Mahklouf-Norris & Jones, 1971), (c) display disjunctions and consensus in participants' modelling of themselves in order to (d) develop veridical perceptions of self and others.

(iii) Strategy C; The perceptual differentiation of models.

An effective strategy C procedure would be required to (a) sample the personal and social environment of a single participant, to (b) reveal the functional properties of modelling within this domain, (c) display cues associated with specific modelling processes, and (d) develop perceptual specificity (Gibson, 1969) in the utilisation of social feedback in constructing models. This procedure would resemble Kelley's (1967) covariance model of causal ascription.

Stated in these terms, the procedures implied by all three strategies were viewed as "enabling interventions" (Benjamin, 1974), paralleling psychological counselling in which a therapist engages a client or clients in an interpersonal relationship for the intended purpose of changing the client in certain ways through "social influence" (Carson, 1973). The locus of effect of the therapist's social influence is not simply the client's behaviour (which may be modified by the impersonal props of the behaviour therapist) but "the templates by means of which he orders and construes his experiences; his cognitive map or image of the universe, including of course his self and his notions of his proper relation to the rest of it" (Carson, 1973, p.161). As maladaptive conversational processes are, for Carson, behaviours designed to increase the match between a non-veridical self-system and the social feedback the client receives, the therapist's task is "to conduct himself in his interactions with his client in such a way as to fail to provide confirmatory and complementary feedback in response to the disorder-maintaining behaviours of the client, while at the same time providing the client with an experience that is sufficiently positive to maintain him in treatment" (Carson, 1973, p. 162.)

Haley's (1963) analysis of therapeutic intervention resembles Carson's, and both suggest that the outcomes described above are secured through the judicial use of "social power", therapist-client matching (Carson), and "control over the definition of the therapeutic relationship" (Haley). Indeed, Haley's argument takes the form that the control over the relationship exerted by the client in the form of symptoms may be countered only by control exerted through the therapist's paradoxical communication.

Both analyses emphasise the personal characteristics and skills of the therapist as an agent of social influence in achieving conversational competence. However, this dependence on the personal qualities of the therapist was challenged on the grounds that much of the therapist's social activity is routine and procedurally defined, that the objective of therapy is not to initiate specific changes in the client but to develop the capacity for adaptive change (Rogers, 1958), and that sucessful counselling is marked by the growth of self-counselling competence. The conversational procedures developed and reported in Parts 3 and 4 represented attempts to devise intervention strategies which functioned independently of the personal qualities of social agents by identifying the requirements of an interactive system capable of provoking client modelling.

The three strategies suggested by the analysis of conversational competence make use of social feedback to modify conversational processes. However, this feedback may be framed in three distinct ways:-

(i) it may be utilised as a component in persuasive instruction, as an appeal to the client to re-model his construction of particular aspects of his personal and social environment. This use of social feedback especially characterises rational-emotive therapy (Ellis, 1962) attribution therapy (Ross, Rodin and Zimbardo, 1969; Valins & Nisbett, 1972) assessment therapy (Davison & Valins, 1969), and the negative placebo effect (Storms & Nisbett, 1970).

(ii) it may be utilised as a guideline for a behavioural regime in which the client's remodelling of his personal and social environment is expected to be consequent upon the enactment of counter-attitudinal behaviours (Carson, 1973; Bem, 1967). Counter-attitudinal advocacy especially characterises techniques such as fixed-role therapy (Kelly, 1955),psychodrama (Moreno,1946), and the self-perception interpretation of forced-compliance studies (Bem, 1972).

These methods of utilising feedback may both be criticised in that an assumption is made concerning the veridicality of the therapist's account. Consequently, these strategies are not consistent with the rationale of the negotiation of accounts (Harré and Secord, 1972).

(iii) Social feedback may be utilised within the therapist-client relationship to identify and explore discrepancies between the client's accounts of his personal and social environment and his behaviour, and between the client's accounts and the therapist's accounts. This use of social feedback is grounded in the notion of "constructive alternativism" (Kelly, 1955), and is especially characteristic of the conversational use of repertory grid technique (Rowe, 1976) personal construct therapy (Bannister, 1975), and laddering procedure(Wright, 1970).

The third method of utilising social feedback was favoured as it most closely approached the ethogenic method advocated by Harré and Secord. Its acceptance, however, required that the role of the counsellor as a "cognitive reflector" (Pask, 1975) in the process of negotiating accounts be considered in greater detail.

5.1.2.2. The cognitive reflector.

An analysis of the counsellor's role as a "cognitive reflector" is essentially an extended analysis of the process of negotiating accounts ommitted in Harré & Secord's (1972) formulation. The term "cognitive reflector" derives from Pask's (1975) description of a device that externalises the cognitive operations of the client so that they are executed in a modelling facility (e.g. the counselling interview or defined procedures such as projective tests and repertory grid technique), as a result of which they become observable. In short, a cognitive reflector "mirrors (the client) in the context of R (the demarcated conversational domain), and does whatever is needed in order that (the client) shall understand R" (p.204).

Pask's formulation clearly required further elaboration. In particular, three aspects of cognitive reflection, namely reflective strategies, phases in reflection and consensus in negotiating accounts, were considered in greater detail.

(i) Reflective strategies.

Firstly, a reflective strategy requires that the counsellor respond by commenting within the conversational domain defined by the client. Such comments range from reflecting the content of the client's statements unchanged, summarising, clarifying and interpreting the client's statements, to questionning and prompting the client to extend his statements (Patterson, 1974).

Secondly, a reflective strategy is effective only when it enables the client to bring an alternative frame of reference to bear on the conversational domain. Such a strategy responds to cognitive fixedness by translating the client's statements into an alternative language system (Levy, 1963).

Thirdly, this translation has the function of making the client's observations more amenable to manipulation (Levy, 1963). Essentially, this translation constitutes a starting point for further elaboration of the conversational domain by the client.

Finally, the client's initial statements within the conversational domain may be distinguished from his responses to the reflective strategy. The latter, secondary modelling, requires that the client develop a higher-order interpretive system by which to manipulate and denote his initial statements.

(ii) Phases in reflection.

In his discussion of the interpretive process, Levy, (1963) distinguishes two phases in interpretation; (a) the semantic phase, in which a different language system is brought to bear on the description of events, and (b) the propositional phase, in which propositional statements are formulated in the terms of this language system. These two phases represent components of reflective strategies.

Firstly, the semantic phase is concerned with the relation of descriptive terms to designated events in the client's elaboration of the conversational domain. To achieve this events are assigned to equivalence classes according to the extent to which they display criterial attributes of those classes. The development of reflective strategies thus required the derivation of classes from a theory of conversational modelling and operational definitions of attributes defining those classes. These classes must be consistent with the principles outlined above, namely that they provide an alternative descriptive system and make the client's statements amenable to manipulation.

Secondly, the propositional phase is concerned with the formulation of propositions empirically rooted in the classification of the semantic phase. Such propositions assert relations between events, and in the course of orthodox psychotherapy are derived from a theory or theories of psychodynamics. However, to remain consistent with the reflective strategy outlined above, propositions formulated by the client and the counsellor are viewed as equally valid.

Finally, an appropriate reflective strategy was viewed as incorporating the semantic and propositional components in the following way. The counsellor's role consisted of enabling the client to externalise modelling statements within a conversational domain, transforming them by semantic classification, and displaying them as cues for the client's secondary modelling, the client's role being to formulate propositional statements accounting for these cues.

(iii) Consensus in negotiating accounts.

A third consideration in the analysis of cognitive reflection is the criteria by which the progress of negotiation is assessed. How might consensus be identified and at what point might negotiation be terminated?

Two levels of consensus required clarification. Firstly, methods for comparing the client's statements within a conversational domain over a period of time were required. In the course of reflection upon his own actions the client may restate a particular assertion in different terms, modify a previously stated assertion, or formulate novel assertions. It was thus necessary to externalise modelling statements in a form that enabled them to be compared.

Secondly, where two or more clients are involved (as in marital or family therapy), or where client or counsellor compare viewpoints, methods for establishing consensus were required. To achieve this, it was necessary to ensure that participants uniformly predicate within the same conversational domain.

Repertory grid technique provided a method capable of meeting these requirements. In this technique the conversational domain is specified by a sample of elements or figures (nodes in Pask's (1975) entailment structure) which are systematically predicated (forming topic relations in the entailment structure). Each element is defined by the pattern of predications which it obtains, usually represented numerically at an ordinal, ordered metric, or nominal level of measurement. Estimates of consensus in this technique thus reduce to the measurement of functional equivalence, defined as similarity in predication patterning with respect to a fixed domain. Functional equivalence between participants hinges on the assumption of the identity of the element sample for the participants, which may only be ensured by negotiating elements representative of the domain prior to predication.

Incorporating this technique into the reflective strategies outlined above enabled the progress of the client's modelling to be monitored, and in addition, to highlight consensus in the functional properties of models of two or more clients simultaneously.

5.1.2.3. Conversational procedures.

The function of cognitive reflection is to promote conversational skill. The analysis of cognitive reflection enabled the construction of a model for conversational procedures incorporating three phases of activity, namely, primary modelling within a conversational domain, the reflection and subsequent secondary modelling of that domain.

(i) Primary modelling comprised those activities in which the client engages when formulating initial statements. Firstly, procedures would enable the client to specify the conversational domain within which to formulate statements. Usually, this takes the form of demarcating the client's personal and social environment which encompasses the domain of his complaint. Initially, this demarcation is arbitrary, but may be contracted or dilated as modelling proceeds. Secondly, procedures should enable the client to systematically predicate within this domain in a form that is isomorphic to the client's modelling of that domain. This entails that the client employ personal symbolism as far as possible. Finally, the procedure should comprise a facility for recording the client's predications in a form that enables transformations to be subsequently applied.

(ii) Reflecting primary modelling comprised those minimal activities that a counsellor engages in to promote conversational competence in his client. Firstly, the procedure should comprise a system of descriptive categories capable of distinguishing functional aspects of the client's predications. Relevant functional aspects are determined by reference to the model of conversational mechanisms outlined in previous sections. Secondly, the procedure should incorporate a set of decision rules for assigning predications to categories. These two operations together form the semantic phase of reflection discussed above. Finally, the procedure should embody methods for assembling displays to exhibit to the client functional aspects of his predications. The feedback of transformation outcomes involves several considerations, including the timing and form of displays appropriate to the user's readiness for secondary modelling.

(iii) Secondary modelling comprised client activities associated with elaborating and assimilating the semantic phase of cognitive reflection. Firstly, the procedure should present augmented extrinsic cues in the feedback displays as a basis for the formulation of propositions by the client. These cues take the form of prompts, requesting the client to account for specific outcomes. Secondly, to formulate accounts the client must develop an internal representation of the system of categories and decision rules employed by the cognitive reflector. Thirdly, this entails that he distinguish intrinsic cues associated with functional aspects of his primary modelling independently of feedback displays. Fourthly, as the client's dependence on extrinsic feedback decreases and intrinsic feedback increases, his capacity to transfer perceptual skills to other conversational domains is increased.

These three phases of conversational procedures are diagrammed in Fig. 92.

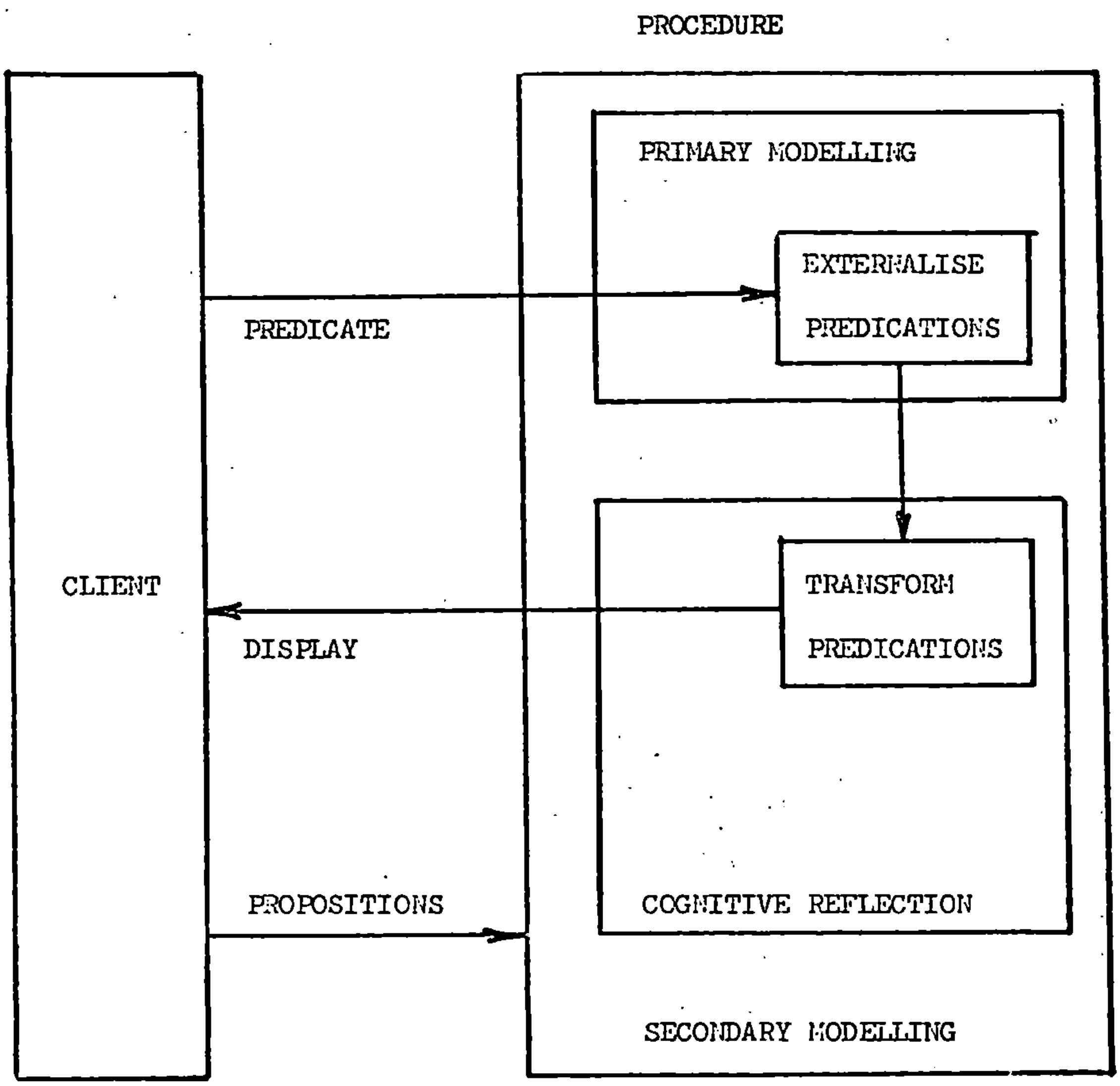


Figure 92 Phases in conversational procedures.

Procedures conforming to this model were conceived within the guidelines of the intervention strategies outlined in 5.1.2.1. Three classes of procedure were envisaged, converging on the time-structure of modelling processes (Strategy A), consensus in the outcomes of modelling (Strategy B), and the functional properties of models (Strategy C). Although studies of all three strategies were attempted, difficulties were experienced with Strategy A in particular, and the final research scheme was somewhat abbreviated (fig. 93).

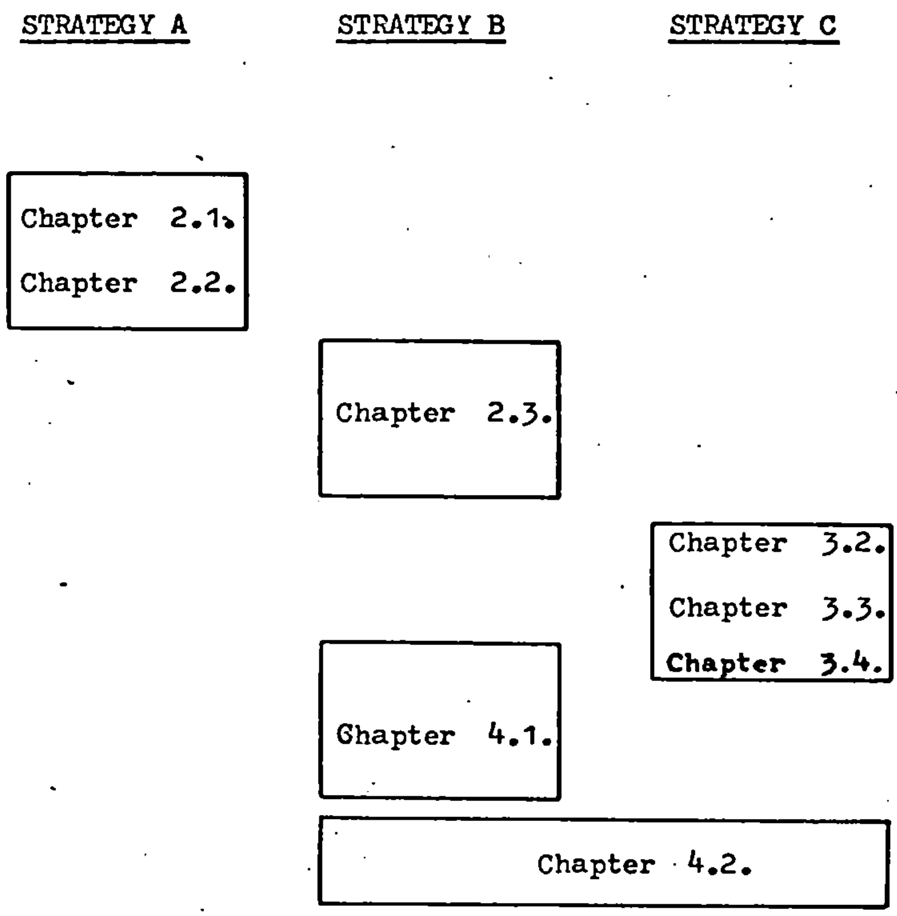


Figure 93 The research scheme.

The objectives of the three intervention strategies may be briefly summarised.

(i) Strategy A: The analysis of the time-structure of modelling processes.

With the objective of facilitating competence in regulating transitions between modelling and participative modes of self-experience, Strategy A procedures were intended to focus on two principal issues, namely the monitoring of reference frames in ongoing conversations and establishing criteria for intervening into and redirecting conversational processes. The first two pilot studies (Chapters 2.1. and 2.2.) reported attempts to implement this strategy. Consistent with Fig. 92, this strategy would entail a series of procedural steps.

Firstly, the conversational domain would need to be demarcated. This entails formulating criteria for isolating and selecting a sample of representative events from an ongoing conversation. Secondly, predications of the event sample would need to be systematically formulated. A variety of techniques were identified capable of guiding predication to a greater or lesser extent. Thirdly, a set of transformations and decision-rules would need to be constructed. Such transformations would comprise coding schemes for classifying predications and for characterising the event sample in terms of those predications. Fourthly, a system for the display of transformations would need to be constructed. As a component of this system, criteria for the timing and frequency of the displays would need to be formulated, since the display of transformations represents a cue for the shift to a modelling mode of self-experience. Fifthly, criteria for selecting salient cues in the displays would need to be formulated to provide prompts for secondary modelling. Finally, methods for guiding the secondary modelling of display information would need to be established.

(ii) Strategy B: The analysis of the distinctiveness of models.

Strategy B procedures had two principal objectives, namely the monitoring of the functional properties of two or more participants' self- and other-identity systems, and the display of disjunctions and consensus between their systems. Pilot study 2.3. explored the effects of interviewer bias in modelling conversations, and study 4.1. developed specific procedures for identifying disjunction and consensus in participants' modelling.

Strategy B again requires that the conversational domain first be demarcated. However, the domain must comprise figures common to the personal and social environment of all participants, which must, of course, include themselves. Secondly, the need for participants to independently predicate within this domain was highlighted in the study of interviewer bias in modelling conversations. However, wherever possible, participants' predications should be yoked, and the timing and conditions under which predication takes place be equivalent. Thirdly, a set of transformations and decision-rules would be required to classify participants' predications, revealing between-participant functional consensus and disjunction, and temporal changes in between-participant features. Fourthly, a system for the separate display of transformation outcomes to each participant would be required. Fifthly, selection criteria for identifying salient outcomes in each participant's display would need to be developed. Finally, reflective strategies for guiding the independent secondary modelling of participants would be required.

(iii) Strategy C: The analysis of differentiation of models.

The objectives of Strategy C procedures were to facilitate the emergence of perceptual specificity in the utilisation of social feedback. Consequently, Strategy C was intended to focus on three principal issues, namely an analysis of intrapersonal conversations to reveal modelling at different levels of complexity, an analysis of specific features of self-modelling predicates and their relationship to the coupling of levels of modelling, and an attempt to develop a training paradigm to heighten sensitivity to cues associated with modelling at different levels. Studies 3.2., 3.3. and 3.4. reported attempts to implement this strategy.

Firstly, a relevant conversational domain for a single participant must be demarcated. Such a domain would include the participant and a representative sample of his personal environment. Secondly, predications within this domain must be formulated over a period of time in order to display relationships between events within the personal environment and functional aspects of modelling. Thirdly, sets of transformations and decision-rules appropriate to different levels of modelling would be required to classify predicates and identify functional aspects of modelling. Fourthly, a facility to enable comparisons between the participant's expectations concerning his predications and their observed functions would be required. Fifthly, discrepancies between expected and observed functions must be utilised within a training paradigm, namely to provide the participant with knowledge of results of his expectations. Finally, reflective strategies for guiding secondary modelling of discrepancies would be required.

The preceding sections have summarised both the conversational mechanisms underlying modelling processes and the derivation of procedures to enhance these processes. In the following sections we critically review studies in which attempts were made to implement each of the intervention strategies described in this section. This review will focus on each strategy, or combination of strategies, to examine the methods developed for primary and secondary modelling, reflective strategies and evaluation, and will highlight difficulties encountered in implementing these strategies.

5.1.3. Strategy A procedures.

5.1.3.1. Strategy A was implemented in the pilot studies reported in Chapters 2.1. and 2.2. Both studies examined the logic of intervention into ongoing interactions, the former a series of conversations between two persons in a friendship relationship, the latter a planned series of meetings of a group of art and design students. The nature of the ongoing interaction in these studies was similar in many respects. In the friendship study, the focus of the conversations was the nature and the future of an existing relationship, whilst in the group study, the meetings evolved around the objective of exploring group processes. In short, both series of interactions were intentionally reflexive, and it was in this context that a high incidence of modelling activity was expected to occur. In the friendship study, however, regular opportunity for modelling conversations was established by following a planned "conversation cycle", comprising six tape-recorded conversations, each conversation immediately followed by independent tape-recorded commentaries along the lines of McFall's "mystic monitor" (1971). This was not the case for the group study, since only one of the 16 meetings provided an explicit opportunity to model events in the group.

In all other respects, however, the two studies were comparable, and may be examined by discussing each stage of the procedure in turn.

5.1.3.2. Recording the exchange and demarcating the conversational domain.

In the friendship study two audio-tape recordings of each two-person conversation were obtained, one recording for each participant. This was not the case for the group study, and although E made detailed notes after each meeting, group members had no recorded commentary concerning the series of meetings. This difference is significant for three reasons.

Firstly, the group members had to rely on their own recollections of group meetings when they came to formulate predications concerning those meetings. In contrast, participants in the friendship study were able to immediately appraise the tape-recording of events in the two-person conversations.

Secondly, the availability of the audio-tape recording in the friendship study suggests that states of objective self-awareness (Duval and Wicklund, 1972) were induced more readily than for the members in the group study. The use of audio- or videotape self-confrontation in psychotherapy has been argued to induce awareness of self as a social object (Bailey and Sowder, 1970), to reduce self-image dissonance (Boyd and Sisney, 1967), increase congruence in self-perception (Bailey, 1968), and increase personal rather than consensual validation of behaviour (Wilmer, 1968). In short, self-modelling would be expected to occur more readily for the participants in the friendship study.

Thirdly, the absence of recordings of group meetings might reduce the systematicity with which events in these meetings were sampled by group members, thus restricting the conversational domain.
In fact, ten events which the group considered to represent "definite stages in the group's development" were selected by the group as a whole, including E, hopefully reducing this effect. In contrast, participants in the friendship study were at liberty to isolate any events from the audio-tape recordings on which to base their predications. In this case it is evident that less control existed over the sampling of events than in the group study. However, independent modelling in this study was always preceded by the play-back of the preceding two-person conversation which was assumed to achieve a "priming" effect on subsequent predications. It was not possible to explore the nature of this priming effect in detail, although at least three components were suggested to influence subsequent predication. Firstly, the induction of objective self-awareness noted above was assumed to increase the salience and centrality of self-relevant predications (Lemon and Warren, 1974). Secondly, it was assumed that dissonance between expressed and unexpressed feelings in the two-person conversation would be high-lighted, increasing the incidence of self-role predications. This component is systematically utilised in Mair's "conversation cycle" (1970b). Thirdly, as an alternative to objective self-awareness, it was thought that playback in some circumstances may lead to "emotional absorption" in recorded events, priming other-relevant predications which may not have been expressed in the two-person conversation.

The comparison of the methods of demarcation of the conversational domain in the two studies suggests a dimension along which control of demarcation may vary, extending from experimenter-based event sampling, through a form of negotiated sampling exemplified in the group study, to the subject-based sampling of the friendship study. Whilst the consequences of restriction of the conversational domain were made clear in the interviewer-bias study of Chapter 2.3., further research is required to establish the conditions under which different levels of control are appropriate.

5.1.3.3. Exteriorising and recording primary modelling.

The two studies employed radically different methods for exteriorising and recording primary modelling. In the friendship study primary modelling was conducted independently and in complete isolation. As a result, the form that modelling activity took in these sessions is indeterminate. In addition, all records of primary modelling remained confidential and were not open to scrutiny. Consequently, comments concerning modelling activity in this study can only be anecdotal. In contrast, modelling activity in the group study comprised an event in which all members participated, records of which were available for further analysis. These differences between the methods in the two studies were significant in several respects.

Firstly, the locus and quality of control over the primary modelling situation clearly differed, and these differences reflect variations in the demand characteristics present in the two methods (Orne, 1962). Demand characteristics here refer to the sum total of cues present in the modelling situation which influenced participant's expectations concerning their performance in that situation. Thus, in the group study, where members were requested to independently formulate personal constructs to describe similarities and contrasts in their perception of the group event sample, it may be supposed that subsequent sharing or exchange of constructs was expected. Consequently, participant's modelling was shaped by the expectation that other group members would scrutinise their constructs and draw inferences about them. Similarly, some members collaborated in formulating constructs, suggesting the presence of cues capable of evoking evaluation apprehension. Some of the implications of demand characteristics operating in repertory grid interviews are explored in Chapter 2.3.

Expectations concerning modelling in the friendship study appeared to take three forms, namely an expected norm of extensive self-disclosure, anxieties concerning confidentiality, and expectations concerning the outcome of modelling. Explicit instructions for the first stage of the "mystic monitor" were minimal, but it was apparent that both participants viewed the activity as a test of the extent to which they could be "honest" with themselves. Despite assurances that the sessions would not be monitored, that the audiotapes would be retained by each participant, and that they were to be erased following the final two-person conversation, both participants reported a fear of eavesdropping, indicating the strength of the norm against "talking to oneself". Finally, both participants initially expected a significant outcome from the exercise, and reported some disappointment when this outcome was other than anticipated.

Secondly, the two studies differed in the extent to which the method employed guided modelling activity. In the friendship study, no guidance was offered during modelling activity. By contrast, modelling in the group study was guided firstly by the random selection of event triads which effectively yoked the otherwise independent construct formulations of group members, and secondly in the systematic numerical predication of events by constructs in repertory grid technique. Whilst repertory grid methods do not determine the content of predications, they do have the advantage of ensuring the predication of the entire conversational domain. One consideration that was observed, however, was the need to ensure by appropriate triad selection that the range of convenience of constructs encompassed the entire event sample (Bannister and Mair, 1968).

Thirdly, predication in the friendship study was expected to be characterised by a greater variety of form than in the group study. In the latter study predication took the form of written statements within a relatively fixed "sense of audience" (Rosen, 1973), namely self and other members of the group. In the friendship study, however, predications were not written but spoken, and the accompanying sense of audience free to vary. Thus, whilst within the repertory grid format the group members would be expected to be at some pains to word and phrase their formulations for the understanding of other group members, in the "mystic monitor" sessions the modelling monologue took a variety of forms associated with a range of role-relationships. Firstly, the fact that predication occurred within the context of an audience was evident from the prevalence of sociocentric speech sequences (Duncan, 1972), ranging from back-channel communication (e.g. "I mean", "You know?" utterances) to explicit other-directed sequences (e.g. apologies, corrections, confiding in whispers, etc.). Secondly, it became apparent that the nature of the audience varied according to the affective content of the predications, ranging from the "sympathetic listener" to the absent conversational partner. Thirdly, one distinctive form of audience was observed, namely, self-audience, represented either as a future listener to the audio-tape, in which case predicates took the form of "notes for future reference", or as a listener in the present, speech being marked in this instance by egocentric speech patterns in which only the subject was denoted and the predicate omitted. Fourthly, the enactment of entire episodes was observed, the subject alternately assuming the roles of two protagonists engaged in dialogue, frequently of a question-answer form. Finally, the sense of audience may become so acute as to inhibit any form of speech whatever, all overt predication coming to a halt.

In summary, what may be gained in the exhaustive predication of a conversational domain by the repertory grid methodology may be lost in the relatively fixed sense of audience associated with a strict construct elicitation procedure. To obtain an increase in the affective content of construct formulations it may be advisable to root construct formulation in a more fluid dyadic interaction of the kind suggested by Rowe (1976) in which "the therapist, starting with the grid, tries to learn and to work in the client's own language" (p.14). In view of the discussion of demand characteristics of such an interaction, it is apparent that great skill is required to encourage the unbiased externalisation of personal interpretations.

5.1.3.4. The transformation of primary modelling.

The transformation of primary modelling is an aspect of Strategy A that was not developed in the friendship study. Instead, the audiotape recording obtained in the first stage of the "mystic monitor" sessions was immediately played back as a basis for further independent modelling activity. Insofar as an audiotape provides an unbiased and nonselective record of modelling utterances no external transformations were present.

In the group study, however, transformations were varied and complex. The constructs formulated by each group member from the common set of 10 group events were pooled (providing 46 constructs in all from 7 group members) to form a "group grid". The group grid thus comprised a matrix of numerical ratings (taking values of 1, 2 and 3) in 46 rows and 10 columns. This grid represented the record of the group's primary modelling, and it was to this data that a series of numerical transformations were applied.

The first transformation was to assess the extent of functional equivalence between predicates in the grid. The concept of functional equivalence refers to similarities in the pattern of event predications obtained by any pair of constructs, and is rooted in the conversational domain specified by the event sample. If two constructs obtain identical ratings for all 10 events, they were said to be functionally identical. No assertions could be, or were, made as to whether this equivalence extended to other events beyond the demarcated event sample.

Functional equivalence was assessed by computer analysing the group grid to obtain a matrix of the similarities between each construct and all others. Because of the limited range of rating values, the matric employed by the program was the normalised matching score (Thomas and Garnons-Williams, 1970), a city-block metric of the form $(nd_{max}/2) - \sum d)/(nd_{max}/2)$, with values varying between -100. (maximal negative association) and +100. (maximal positive association). This metric was, however, very sensitive to biased rating distributions, and a more appropriate metric in this sample case would have been available if dichotomous sorting had been employed, namely Pearson's index of mean square contingency, or phi-coefficient.

The second transformation was applied to the similarity matrix to obtain a typal analysis solution, and comprised elementary linkage analysis (McQuitty, 1957). Essentially, elementary linkage analysis is an agglomerative single-linkage technique, where clustering by types (defined as categories comprising items most associated with other items within the same category) proceeds from the disjoint to one or more conjoint partitions. The procedure has distinct advantages over both complete clustering schemes (e.g. Cattell, 1944) and hierarchical clustering schemes (e.g. Johnson, 1967). Firstly, elementary linkage analysis does not require the arbitrary specification of a lower limit of inter-item association necessary to determine cluster membership in complete linkage schemes. Secondly, elementary linkage analysis is labour saving in comparison to hierarchical clustering schemes. Thirdly, hierarchical clustering schemes require a theoretical decision to be made concerning the representation of conjoint items in the residual matrix (e.g. averaging, centroid and centre of gravity methods) which elementary linkage analysis does not.

This transformation was applied in order to simultaneously locate consensual and disjunctive predications of group events for two reasons; first, to provide the group with a summary of their interpretation of events in the group's development, and second, to exhibit the pattern of assumptions in the group at the time of primary modelling. In fact, from the 46 constructs elementary linkage analysis located two large types to which all seven members contributed at least one construct, four small types and six isolate constructs. The presence of isolates is not to be expected from elementary linkage procedure, and indicates one of the difficulties experienced in applying this transformation.

Firstly, as the similarity matrix increases in size the likelihood of "straggly" clusters emerging from elementary linkage analysis increases. Straggly clusters comprise long chains of items with links of varying intensity. McQuitty (1957) foresaw this problem and suggested identifying such clusters as "mixed types", with one or more items acting as links between what might otherwise appear (in the absence of these items) as discrete types. In the group study the expedient of setting a lower bound on matching scores was employed, with the attendant danger of reducing the validity of the types produced by severing the weak links. As a result, six constructs with very weak typal membership emerged as isolates.

Secondly, McQuitty acknowledges that the number of types located by the analysis is determined exclusively by the number of reciprocal item pairs (where item i_1 has its highest matching score with item j_2, and j_2 has its highest matching score with i_1). By employing the above expedient, this restriction is lifted, as types may be located which do not converge on a reciprocal item pair.

These transformations gave rise to two outcomes in the group study. The first outcome was the characterisation of the group's development by its members. Focussing on the two largest linkage types, it was evident that they were consistent with social-emotional satisfaction (Type I) and task satisfaction (Type II), described by Bales and Slater (1955). This sharp distinction between task and group maintenance goals may well have been potentiated by the removal of legitimate group leadership creating some resentment in the group and requiring the differentiation of a maintenance leader to reform the group's shared assumptions (Verba, 1961; Burke, 1967). Ordering e the group attempts in a temporal sequence and scoring each event for positive and negative evaluation in terms of the two major types obtained a striking pattern of shifting task and social-emotional goal satisfaction over the series of group meetings. This shift appeared to coincide with E's observations concerning the movement of the group through the "grumble" and "party games" assumptions of Phases I and II towards the self-initiated "task-oriented" assumptions of Phase III.

A major problem in this analysis is the indeterminate extent of the contribution of individual members and E to the observed pattern of event evaluations. Since members vary in the number of constructs they contribute to each of the two major types the observations on which the evaluation pattern is based are not independent, and some degree of bias may be present. A more appropriate basis for the evaluation data would be to compute an evaluation index for each type for each group member, and base the pattern on the mean values of the index obtained for each of the ten group events.

However, the method does have distinct advantages. Previous studies of phases in problem-solving groups have relied upon behavioural data and objective criteria to establish shifts in the group climate throughout its development. For example, in a well-known series of studies, Bales and Strodtbeck (1968) employed the 12 category event schedule of the Interpersonal Process Analysis method to locate three generalised phases (orientation, evaluation and control) in problem-solving groups, requiring the presence of a trained observer. The present group study offers a more exact method for exploring members' <u>interpretations</u> of group activities, thus directly accessing shared assumptions concerning group climate, instead of relying on inferences from behavioural data. Nevertheless, the utility of such an analysis did not escape Bales and Strodtbeck, as they remark that "it may be used with some advantage as a baseline for the detection of discrepancies or accentuations due to known or experimentally introduced external conditions, or...as diagnostic indications of the presence of otherwise unknown conditions" (1968, p.398). These possibilities in connection with the present group study method are discussed in the following section.

The second outcome of the transformations applied in the group study was the display of shared assumptions within the group at the time of primary modelling activity. This was achieved by applying a third transformation, namely relaxed rank order typal analysis (McQuitty,

1971) to a similarity, or consensus, matrix, obtained by computing an overlap score between members according to the extent to which they contributed constructs to the types derived from the initial linkage analysis of the group's 46 constructs. Again an agglomerative clustering procedure, relaxed rank order typal analysis has the advantage of (a) assuming only an ordinal level of measurement in the overlap score, (b) being exhaustive, achieving the conjoint partition in every case, (c) making no assumptions concerning lower limits of typal membership, and (d) avoiding the typal determination by reciprocal item pairs associated with elementary linkage analysis.

In many respects, this analysis achieves a summary of intragroup relationships resembling those obtained by sociometric methods (Moreno, 1953), in which criterial aspects of relationships may be depicted as a proximity network. However, the method employed by the group study is essentially indirect, in contrast to members' deliberate estimation of proximity in the sociometric technique.

Essentially, this analysis exhibited three member types distinguished by their relative emphasis on the first three linkage types. Whilst these member types corroborated E's observations concerning task and social-emotional group leaders, the utility of the analysis for the members themselves will be discussed in the following section. The validity of the member types observed, however, may be questioned for two other reasons.

Firstly, the numerical basis for the overlap score from which the consensus matrix was obtained is extremely weak. The score itself reflects the ratio between the observed and expected frequencies of reciprocal typal membership of the constructs contributed by any member pair, or $\sum_{m}^{1} n_{1m}\, n_{2m} / N_1 N_2$, where m = number of linkage types, n= number of constructs contributed by each member to the jth type, and N = total number of constructs contributed by each member. With the exception of E, all members produced either 5 or 6 constructs distributed over 6 linkage types. Consequently, the overlap score is biased in favour of member pairs that contribute constructs to a limited number of types, and against pairs that distribute constructs evenly over the types. An alternative metric for the overlap score might be based on the partition of the expected frequency of reciprocal membership over the m types.

Secondly, inferences from the overlap score rest on the assumption that the conditions for construct sampling were equivalent for all group members, and that the overlap score reflects the relative salience of typally defined predicates for each member. That is, salient predicates, identifiable by their priority in elicitation (Tajfel and Wilkes, 1963) their elicitation frequency (Shubsachs, 1975), and their judgemental polarisation (Bonarius, 1965; Isaacson and Landfield, 1965), are viewed as important to the individual because they (a) allow more effective inferences to other predicates (centrality) and (b) provide a means of characterising self in relation to the group (self-relevance; Lemon and Warren, 1974). Similarly, Eiser and Stroebe (1972) point out that salience coincides with the effects of "ego-involvement" (Sherif, Sherif and Nebergall, 1965) and "valuing" (Tajfel, 1959) in social judgement. These assumptions underly the inference that member types reflect the intragroup structure of interpretations of group events. However, Eiser and

Stroebe point out the error of assuming that "just because an individual prefers to use certain dimensions rather than others when judging a particular set of stimuli, these dimensions or personal constructs, will remain equally salient for him whatever the nature of the stimuli he is judging. Dimensions which are found to be salient for a given individual in one situation will not necessarily be salient for him in another" (1972, p.214). Clearly, inferences concerning the structure of the group must take account of the nature of the primary modelling situation, and here we may note that predication in the group is likely to have been influenced by members' expectations and the demand characteristics introduced into the activity by E discussed in 5.1.3.2.

In summary, the transformations applied to primary modelling in the group study highlighted a number of numerical, procedural and inferential difficulties which have considerable consequences for the logic of Strategy A cognitive reflection, and as the following section displays, for subsequent secondary modelling by participants.

5.1.3.5. Intervention and the display of transformation outcomes.

A fourth consideration in assessing the two Strategy A studies is the manner in which transformation outcomes are utilised to promote secondary modelling. This aspect of Strategy A was not fully developed in the group study. However the friendship study included an attempt to devise criteria for regulating intervention into the ongoing conversation, and in the light of the discussion of transformations in the group study, some indications for the development of an appropriate reflective strategy may be outlined.

Developing appropriate reflective strategies in these studies required that three major issues be resolved, namely, the timing of intervention, the content of intervention, and the nature of secondary modelling.

In his discussion of psychological interpretation as a cognitive activity, Levy (1963) points out that there is an optimal frequency and timing for interpretations, and that this timing is associated with the client's capacity to identify intrinsic cues in accordance with the development of conversational competence; "too high a dosage of interpretation...may in some instances encourage dependency upon the therapist...(or) so gratify the patient as to reduce the frustration necessary for him to move forward in therapy" (p.254). Here we see a restatement of Holding's (1965) assertion that augmented feedback is valuable insofar as it redirects the trainee's attention to intrinsic cues arising during task performance. As to the optimal moment of interpretation, Levy suggests that this depends on the client's readiness to receive the propositions interpretation asserts, as reflected in the level of dissonance experienced by the client within the domain of those propositions.

As an attempt to assess mements of readiness for intervention in the friendship study, an analysis was made of the series of two-person conversations to establish criteria for intervention. To achieve this analysis an independent judge firstly selected from the audiotape recordings of the conversations a number of "significant events" which were viewed as having an effect on the course of the encounter.

From four hours of conversation 47 events were selected, and coded in such a way as to achieve three objectives: (a) to identify the interaction modality of each event by classifying it along two dimensions, active vs. passive and personal vs. impersonal, (b) to identify models of self and other constructed by the participants in each event by classifying events into a limited class of reference frames, and (c) to identify the sequencing and transitions between reference frames over the series of conversations. The reference frames in (b) above were constructed by the judge, who was instructed to analyse the event sample for its dramatic content and to group the events into a minimum number of discrete classes according to the roles enacted by the the participants. Four frames of reference were identified from the event, namely "debate" (intellectual discussion), "performance" (monologue by one participant), "stroking" (reciprocal exchange of concessions), and "fight-flight" (conflict and dispute). The four reference frames were then characterised by their predominant modality, as follows: debate, passive-impersonal; performance, passive-personal; stroking, passive-personal; fight-flight, active-personal.

Clearly, the procedure for sampling and coding events in the conversations is far from ideal. Firstly, the criteria the judge employed for selecting events were not made sufficiently explicit, and no attempt was made to test sampling stability or inter-judge reliability. Secondly, similar criticisms may be levelled at the encoding of the event sample by interaction modality and reference frame. Finally, the reference frames themselves have not been tested for their general validity.

However, this procedure represented a first attempt at establishing a means of identifying phases in ongoing conversations from which to develop intervention criteria. In applying the results of this coding scheme to the sequence of two-person conversations it became evident that two cycles of activity, each opening and closing with ritualised behaviours, were present. The first cycle, marked by the prevalence of the performance frame, appeared to set the stage for the activity of the second cycle, distinguished by the prevalence of the fight-flight frame. Within the second cycle, it became apparent that unsuccessful attempts to establish a new definition of the relationship were being made, and that these attempts were marked by the avoidance of complementary self-models, either through overt contradiction of self-models by one or other participant, or through inadvertant paradox in the demands participants placed on each other. Instances of paradox and contradiction seemed to represent moments of impasse, and thus moments of maximal readiness for intervention. On the basis of criteria for identifying contradiction and paradox, a reflective strategy might be constructed to intervene at those points, display the sequence of immediately preceding reference frames, and provide a basis for participants to engage in secondary modelling.

The assumption that paradox and contradiction represent ideal moments for intervention is grounded in Levy's theoretical account of interpretation (1963). Firstly, Levy points out that the purpose of interpretation is to introduce an alternative language system for describing events when those events are interpreted by the client in an inconsistent and unproductive way. Secondly, interpretation introduces dissonance into the client's interpretive system (Axiom 6) which the client seeks to reduce by cognitive restructuring. Thirdly, cognitive restructuring will occur only if post-interpretation dissonance is less than pre-interpretation dissonance (corollary IIIA). If the reverse is the case, Levy argues, interpretive propositions are rejected or distorted. Thus, intervention criteria may be stated in behavioural terms, as behaviours that indicate the occurrence of maximal dissonance in self-cognitions. Moreover, the development of competence in regulating transitions between participative and modelling modes of self-experience entails identifying intrinsic cues associated with dissonance of this kind.

The second major consideration in the development of a reflective strategy concerns the content of the intervention response. It was suggested that in the friendship study a reflective strategy would display the sequence of behaviours that led to the occurrence of paradox and contradiction of self-models. As this was not attempted in the study the consequences of this intervention are not known. However, transformation outcomes were displayed to participants in the group study, and some remarks concerning their consequences may be made.

Three displays derived from the "group grid" were presented and discussed in the group; (a) a "focused grid" (Thomas and Shaw, 1976) obtained from the linkage analysis to display the pattern of construct types produced by the group, (b) a chart depicting the evaluation of events by the group in terms of the first two construct types, and (c) a "consensus" diagram derived from the relaxed rank order typal analysis depicting the three "member types" within the group. These three displays were introduced as discussion items and, although they provoked considerable discussion, group members identified a number of difficulties in formulating propositions concerning them. Firstly, in the group study the timing of presentation of the displays was not coincident with dissonance in the group. Instead, the timing of presentation was determined by the time taken to process the data, and in many cases members observed that their interpretations of group events were now so different as to render their earlier formulations irrelevant. Secondly, some members were reluctant to formulate propositions concerning the displays because the transformations that had been applied were not explicit. Consequently, members rejected the alternative language system provided by the displays. Finally, members felt that their original predications were not entirely valid, influenced as they were by the context in which they were formulated.

In summary, although some secondary modelling did occur, difficulties were experienced by group members in accepting the semantic phase of cognitive reflection. It is important to note that this is not an instance of "rejection of an interpretation" (which Levy views as indicating the magnitude of dissonance produced by interpretation) because no interpretation was offered. Secondary modelling by group members was intended to be the only propositional activity in the strategy. Instead, members found the process of primary modelling, its various transformations and the timing of the displays unacceptable.

5.1.3.6. The discussion of Strategy A procedures has focussed on four issues relevant to the model of cognitive reflection outlined in 5.1.2.3., namely the demarcation of the domain of primary modelling, the conditions under which primary modelling occurs, its transformation, and the intervention and display of transformations to redirect the course of ongoing conversations. The difficulties emerging from the implementation of Strategy A are far from resolved, but the studies have shown the need to consider a number of factors in the design of Strategy A procedures. Firstly, care is required to ensure that both the selection of the conversational domain and subsequent predication within that domain is not controlled either entirely by the subject or by the experimenter. Problems associated with the former were exhibited in the friendship study, whilst the group study reflected the effect of the demand characteristics imposed on modelling by E. Secondly, a stable and appropriate set of transformations and decision-rules for classifying primary predicates is required, capable of identifying functional features of modelling. These transformations should be self-evident to the extent that they may be seen to be based on easily observable features of predications. Finally, to fully implement Strategy A behavioural criteria are required to determine the timing and frequency of intervention. Since Strategy A seeks to facilitate participants' abilities to self-regulate transitions between modes of self-experience, these criteria must also be stable and unambiguous. Further research concerning Strategy A procedures would be expected to rely on the construction of a machine-mediated system capable of sampling ongoing conversations, identifying the occurrence of recurring sequences of reference frames and paradoxical and contradictory self-monitoring, and intervening into the conversations to display these criterial features.

The development of Strategy A procedures was suspended for three reasons; (a) computing facilities do not yet exist for sampling and intervening into ongoing conversations, (b) the development of adaptive coding frames is a task which presents many difficulties, and (c) Strategy A depends entirely on carefully defined intervention criteria, and those developed in the pilot studies may not have sufficient generality.

5.1.4. Strategy C procedures.

5.1.4.1. Strategy C was developed and implemented in the studies reported in Chapters 3.2., 3.3. and 3.4. Essentially, this strategy seeks to develop participants' capacity to identify and utilise intrinsic cues arising during modelling to achieve increasing specificity and veridicality in the models they construct. In these studies, modelling was confined to the formulation of personal constructs in the repertory grid technique, since this methodology (in contrast to the audiotape method utilised in Chapter 2.1.) enabled the exhaustive predication of a given domain and the use of numerical methods for recording and transforming predications. Consequently, the three studies of Part 3 focus on five area, namely the development of classes of transformations for identifying functional features of predication, the development of a stratified model to systematise reflective strategies, the development of transformations appropriate to these reflective strategies, the development of displays to exhibit transformation outcomes and identify salient cues for secondary modelling, and finally the application and evaluation of these procedures in two case-studies. In all the studies the principal focus has been on the diachronic nature of modelling and the development of conversational competence. To sample modelling processes over a period of time, a longitudinal repertory grid methodology was first developed.

5.1.4.2. The repertory grid cycle.

A discussion of one procedure for sampling modelling over a period of time (Ryle and Lipshitz, 1975) in Chapter 3.3. gave rise to a number of considerations for the design of a serial repertory grid method. Firstly, it was evident that grid procedures are as likely to precipitate change in construction as they are to measure it. Secondly, since change in construction is under test, additional constructs should be elicited on each modelling occasion to detect shifts in predicate sampling (Slater, 1972, 1969), salience (Eiser and Stroebe, 1972) or shift change (Hinkle, 1965). Thirdly, since revision of construction is under test, predicates from previous modelling occasions should be reapplied on each subsequent occasion to detect rating consistency (Slater, 1972) or slot change (Hinkle, 1965). Fourthly, that the element sample should be representative of the conversational domain under consideration, namely the user's social and personal environment (Norris & Makhlouf-Norris, 1976).

These considerations led to the use of a repertory grid cycle, in which the user was firstly required to elicit a fixed number of constructs on each modelling occasion from an element sample fixed over all occasions, and secondly to reapply all constructs elicited on preceding occasions. This methodology had several advantages; the user might (a) reproduce the original meanings of constructs on subsequent reapplications of them, (b) view reapplied constructs as variations of other, perhaps more relevant, meanings, (c) view re-applied constructs as implying entirely novel interpretations, (d) revise particular element predications on reapplied constructs, (e) elicit constructs to duplicate or amend earlier constructs, and finally (f) to elicit constructs expressing entirely novel and independent interpretations.

Construct elicitation in the cycle followed a modified version of the Full Context Form (Bannister and Mair, 1968) in which the user considered all the elements (noted on separate cards) at once and was requested to locate two elements which differed in a single, important way. This distinction was verbally recorded by the user himself on a card provided, and the element cards sorted by him into five or seven ordinal piles between the extremes formed by the two selected elements. To ensure an adequate range of convenience for the elicited constructs, the user was asked to sort and resort the elements until he was satisfied that thay conveyed his subjective distinction, and if necessary to reword the construct definition to suit. The user also recorded on a provided grid form, the location of cards himself. This entire procedure was first practised with the objective of enabling the self-administration of the grid, thus reducing as far as was possible any bias attributable to experimental demand characteristics.

A number of considerations are relevant to this discussion, with a view to improving the methodology. Firstly, in the three studies the element sample was fixed across all modelling occasions to enable uniform comparisons to be made between the pattern of element placements on constructs. However, just as construct sampling may vary with time, so might the salient aspects of the user's personal and social environment vary (Slater, 1972). An improved repertory grid cycle might make provision for the user to introduce into the element sample additional figures viewed as having current relevance to the user's model of self. Providing elements were not deleted over successive occasions, inter-construct comparisons might then be made on ratings obtaining for the appropriate subsets of the element sample.

Secondly, as constructs are introduced on each occasion, the number to be reapplied increases over successive occasions. Experience with this method suggests that many reapplied constructs come to be seen as currently irrelevant, poorly expressed, or duplicated to an undesirable degree. An improved method might provide the user with the facility of either deleting some constructs from previous occasions, or for combining those that obtain a criterial level of similarity in element placement.

Finally, the appropriate number of constructs to be elicited on each modelling occasion was fixed at either 4 or 6 in the three studies reported here. Since it is argued that constructs represent successive approximations to "felt meanings" (Gendlin, 1972), this may be viewed as too small a number to adequately sample those meanings. On the other hand, priority in elicitation is argued to be an indication of predicate salience (Tajfel and Wilkes, 1963; Lemon and Warren, 1974), and the use of the modified Full Context Form for construct elicitation, consistent with this assumption, was intended to sample only those predicates reflecting a high degree of category accessibility (Bruner, 1957). An improved method might be to permit the user to elicit as many constructs, over and above a lower limit, as are felt necessary to convey current interpretations of the personal and social environment.

5.1.4.3. The development of transformation classes.

The purpose of Strategy C was to encourage the user to learn to identify and utilise cues associated with specific functional aspects of self-modelling conversations. Although the aspects are partly determined by the method chosen to exteriorise internal processes, repertory grid techniques permit a great variety of inferences concerning the functioning of constructs, ranging from specific features in the predication of particular elements (e.g. the ideal, social and actual self comparisons of Norris and Makhlouf-Norris, 1976) to general features of construct subsystems (e.g. complexity-simplicity, Bieri et al, 1966). The two features selected for attention in Strategy C were centrality of predication, giving rise to the core grid procedure (Chapter 3.2.) and stability of predication, giving rise to the reconstruction grid procedure (Chapter 3.3.).

Firstly, the feature of centrality of predication was grounded in the notion that "felt meanings" were only partly reflected by, or mapped onto, exteriorised predications. Gendlin's (1972) account of experiential explication and Pask's (1975) model of incompatibility and interference were both employed to identify sources of mapping failure in construct formulation. When the intention of construct formulation is the description of the user's self-identity system, failures of mapping may be identified in a variety of ways; (a) a failure to polarise the element SELF on construct scales (Cromwell and Caldwell, 1962; Mitsos, 1961; Landfield, 1968; Isaacson, 1966), (b) a failure to give priority to self-relevant constructs during elicitation (Tajfel and Wilkes, 1963; Lemon and Warren, 1974), (c) a failure to repeat self-relevant constructs during elicitation (Tajfel and Wilkes, 1963; Shubsachs, 1975), and (d) a failure of self-relevant constructs to resist changes in element allotment (Hinkle, 1965) or display test-retest consistency (Kelly, 1955). However, it was evident that features (b) and (c) above were less appropriate for <u>defining</u> central predicates than they were for <u>qualifying</u> central predicates. It was observed, for example, that for a user reluctant to direct his attention towards himself, central predicates are <u>less</u> likely to obtain priority and repetition in elicitation. Instead, it might be said that at that time central predicates were less salient (Eiser and Stroebe, 1972) for that user.

Consequently, centrality of predication was operationally defined in terms of the three components of Kelly's (1955) definition, namely predicates that polarise the element SELF, predicates that display relative polarisation of the element sample, and predicates that display stability of interpretation on retest applications.

This formulation is not without difficulties. Firstly, to obtain operational definitions of centrality some aspects of Kelly's original formulations have been distorted. For example, it may be argued that "comprehensive" constructs are not coincident with constructs that display element polarisation. Although polarisation has been shown to be consistent with "subjective meaningfulness" (O'Donovan, 1965; Landfield, 1971), Lemon and Warren find this term to be "a near-tautological designation which cries out for coherent unpacking" (1974, p.123). Lemon and Warren point out the variety of definitions of "meaningfulness", of which being "comprehensive but not too permeable...a person can use it to see a wide variety of known events as consistent with his personality" (Kelly, 1955), appears to simultaneously subsume two, namely implicative potential and self-relevance. Similarly, it is merely an assumption that constructs "by which (the person) maintains his identity and existence" (Kelly, 1955) are constructs which display self-polarisation, in which "the self-construct will act as an anchoring point to produce the effects of assimulation and contrast" (Lemon and Warren, 1974, p.123). However, to add rigour and to reduce these translation problems, central predicates were taken as only those constructs which satisfied all three operational definitions.

Analogously to defining central predicates, Chapter 3.2. also focused on the extent to which individual elements were central or incidental to each construct. Central elements were viewed as those figures which were more rigourouslydefined, or polarised, by constructs, incidental elements those that were more frequently located at or near the scalar midpoint. Essentially, central elements will be those that act as anchor stimuli (Bieri et al, 1966) for comparative judgements within the element sample. In addition, the use of the modified Full Context Form of construct elicitation was expected to immediately provide the user with anchor stimuli as end-points of the stimulus range. Since the provision of anchor stimuli (Sherif, Taub and Hovland, 1958) or categorial cues (Tajfel and Wilkes, 1963) have been shown to bias the use of judgement scales either towards assimilation (judged stimulus displaced towards anchor or category when in proximity to anchor) or towards contrast (judged stimulus displaced away from anchor or category when distal to anchor), the Full Context Form was favoured over the Minimum Context Form of construct elicitation as the user was free to choose appropriate anchor stimuli from the entire element sample. This procedure ensured that scalar end-points were both subjectively defined and reflected category accessibility.

A second feature of anchor stimuli was their stability of location on judgement scales (Bieri, 1966). Combining the polarisation and stability criteria provided a rigorous operational definition for element centrality. Element stability was estimated by computing a difference score between successive occasions over a set of re-tested constructs. One difficulty in estimating element stability was the effect of construct reinterpretation at the time of retest. Should construct meanings change (as reflected in low element rating similarity and low inter-construct pattern similarity between occasions) then it is clear that different anchor elements might be employed. If, however, elements systematically shifted on construct scales (low element rating similarity but high inter-construct pattern similarity) then original end-point elements may be regarded as unstable. Consequently, element stability was estimated only from constructs that display stability of interpretation between occasions.

The second class of transformations focused on the feature of stability of predication. A discussion of the conditions under which change in construction occurs revealed that it was logically necessary to postulate two levels of construction, namely an outwardly directed interpersonal construct system, and an inwardly directed system taking the former as its object. This stratification is consistent with the notion of objective self-awareness (Duval and Wicklund, 1972; Wicklund, 1975) in which self and self-cognitions become the objects of attention and social-comparison. By utilising Pask's (1975) exposition of subjective uncertainty, it was possible to analyse the strategies for coping with invalidating data described by Fransella (1970) as examples of different degress and qualities of coupling between the two systems.

The repertory grid cycle described above permits comparisons between constructs over successive occasions. Operational definitions of construct reconstruction were threefold, distinguishing between stable constructs (constructs maintaining element placement patterns throughout a series of replicated grids), transitional constructs (constructs displaying change in element placement patterns on some replications and stability on others in the grid series), and unstable constructs (constructs failing to maintain element placement patterns on any of its replications). Analogously to constructs, elements were operationally defined as stable, transitional or unstable.

The rationale of this threefold operational definition was to distinguish constructs and elements which represented revision of opinion (transitional) from those about which opinion was indifferent or random (unstable). Clearly, this distinction is rather arbitrary, since repeated revision of opinion may reflect a significant area of uncertainty rather than random predication. Indeed, over a series of replications a user may alternate between two discrete interpretations of a given construct or element which, when only sequential comparisons between construct or elements are made, would suggest opinion concerning that item to be unstable. A more appropriate set of operational definitions might be obtained if the standard for comparison over replications was taken as the element or construct scores obtaining on the occasion on which it was first elicited. Thus, some constructs otherwise defined as unstable may be classified as transitional. This would, of course, not be appropriate to the definition of transitional items, since what is examined here is the sequential properties of replicated constructs and elements, and comparisons with the standard suggested above would conceal revisions of opinion which subsequently stabilised.

Secondly, it was observed that a very small proportion (9.3%) of elements were classified as stable. This outcome was attributed to the procedure of the repertory grid cycle, in which additional constructs were introduced on each successive occasion. Unlike construct comparisons, this required that only sequential element comparisons could be made, since the number of constructs on which each element was scored incremented over occasions. It was suggested that because of this effect element stability was adversely affected, firstly because of the successive increase in the size of the sample on which the index of element association was based, and secondly because of the hypothetical instability of newly elicited constructs.

All estimates of consistency between replicated constructs and elements were based on exact probabilities of association computed by a custom-built program EXACT (Appendix D). This program computes the entire population of score differences that may be obtained between any pair of score strings (element ratings on constructs, or construct ratings on elements) with known distributions, calculates the cumulative probability distribution associated with the variate $\sum d/n$, and derives the exact probability associated with the value of that variate observed for the given pair of score strings. Whilst this procedure is powerful, assumption-free and superior to alternative association metrics, it has two disadvantages. Firstly, it is an extremely cumbersome method requiring a great deal of computer time which increases exponentially with sample size. Secondly, the derivation of the population of score differences between construct pairs differes markedly from that for element pairs, leading to incompatibility between the exact probabilities for constructs and elements.

5.1.4.4. The stratification of reflective strategies.

The two classes of transformations, centrality and stability of predication, discussed above were intended to identify fuctional features of the user's predications in completing a repertory grid. However, it was argued that modelling processes were hierarchically organised, and that whilst grid predications represented lower-order processes, their functional properties had implications for a number of higher-order processes. Consequently, it was possible to enumerate a number of reflective strategies, and to implement these strategies to take effect at distinct levels of organisation in modelling processes. Essentially, this analysis of modelling competence paralleled the theoretical analysis of Miller, Galanter and Pribram (1960) who suggest that the basic unit of analysis (the test-operate-test-exist unit, or TOTE) represents a simple self-regulating servo-mechanism, and that skilled activity exhibits the organisation of

TOTEs into successively larger units, each unit having the same fundamental feature of self-regulation.

In their analysis Miller et al emphasise the role of the perceptual, or "test" mechanism over that of the "operate" mechanism. In the absence of adequate discriminatory powers, the most sophisticated operations will be maladaptive. The role of reflective strategies in Strategy C was thus expressly stated as the development of perceptual specificity in identifying and recognising cues intrinsic to modelling activity. The transformation classes discussed in the previous section are intended to provide augmented extrinsic feedback (Holding, 1965) as knowledge of the results (KR) of modelling activity. As Annett (1972) points out, KR must be regarded as providing informational feedback because its "incentive function adds nothing to its properties as feedback since in a general sense motivation can be regarded as feedback in action", and that the interpretation of KR as reinforcement "has serious empirical and theoretical defects which cannot be lightly brushed aside" (1972. p.160-161). Instead, the learner must be conceived of as generating and testing a series of hypotheses concerning the nature of the outcomes he has achieved.

This rationale is fully incorporated into Strategy C reflective strategies. Firstly, modelling activity was stratified into minimally three levels, and KR appropriate to each level identified; (a) at the lowest level the user obtains information concerning the attributes of each predicate (construct-element interaction) he formulates in completing a repertory grid, (b) at the second level the user obtains information concerning the models (element-concepts) from the first level predicates were derived, and (c) at the third level the user obtains information concerning the contexts or circumstances in which second level models are employed. These reflective strategies were utilised in a training paradigm in which the user was required to specify his hypotheses concerning outcomes at each level before KR was made available to him.

This stratification of levels was made for expedience rather than on empirical grounds. As is evident in the account of Miller et al, the TOTE analysis is more frequently conducted on functional grounds, as in the case of skilled task analysis. The levels of modelling activity described above cannot be postulated as the only levels of organisation in modelling, but simply as acknowledging that modelling is organised in some way. However, this analysis would permit increased clarity in defining the locus of effect of features identified by other workers. For example, the dimension of cognitive complexity-simplicity (Bieri et al, 1966) appears appropriate to Level 2 descriptions (i.e. as a dimensional feature of the models an individual constructs concerning his interpersonal environment). However, in the context of Level 3, complexity-simplicity may be designated as a situational feature, subject to alterations of the circumstances under which modelling occurs.

5.1.4.5. <u>The stratification of transformations</u>.

Within the training paradigm outlined above Strategy C was intended to provide the user with concurrent feedback (Holding, 1965) concerning the two functional features of his grid predications, namely their centrality and their stability. To provide concurrent feedback it was necessary to develop a series of transformations to be applied to the repertory grid for two reasons. Firstly, the operational definitions of centrality and stability drew on features of predication samples from completed repertory grid cycles. The definition of centrality, for example, could not be derived from a single observation of a given construct or element, as one component of the definition of centrality referred to the stability of predicates over a series of replications. A concurrent feedback system thus required the development of a means to predict these functional features from a single observation. Secondly, the analysis of levels of modelling activity required the development of reflective strategies appropriate to each level. As reflective strategies were viewed as tactics for initiating secondary modelling, appropriate strategies for each level were conceived in the following way; (a) at the first level the user states his hypotheses concerning the functional features of each grid predicate, matches his hypotheses against observed outcomes, and furnishes accounts for any discrepancies that obtain, (b) at the second level, the user identifies the structural properties of his predications, and furnishes accounts for the observed structure, and (c) at the third level the user identifies significant changes in the functional properties of replicated predications and furnishes accounts for any observed changes that obtain.

These two requirements were met by the use of three levels of transformations; (a) at the first level a set of decision rules for classifying predicates according to their properties of centrality and stability, (b) at the second level a method for exhibiting the underlying parameters of grid predications, and (c) at the third level a set of decision rules for predicting first level classification predicates on subsequent replications. The procedures developed for each of these transformations will be examined in turn.

(i) Level 1 transformations.

Chapters 3.2. and 3.4. outlined the development of two methods for classifying grid predicates in terms of centrality and stability, namely as discrete qualitative variables and as continuous quantitative variables.

Firstly, the predication centrality variable was derived from a multivariate analysis of the matrix of grid scores. Chapter 3.2. compared two models for structuring the multivariate population of grid scores, namely the typal model for locating configurations of items in an undefined space, represented by elementary linkage analysis (ELA; McQuitty, 1957), and the multidimensional model for defining the reference coordinates of items, represented by principal components analysis (PCA; Slater, 1972).
In the former model homogeneous types are obtained by first grouping together those items that are reciprocally most similar, and successively including those items more related to items in this primitive type than to any other item in the sample. Typal structure is thus determined by the number of reciprocal pairs, and typal relevancies may be computed analagous to factor loadings. In the latter model, a sequence of orthogonal latent variates are located which successively account for the largest proportion of

initial or residual variation, until all variability in the grid scores is exhausted. This variability is simultaneously partitioned between elements and between constructs, and the loadings of each construct and element on each latent variate, or component, obtained.

To achieve comparability with ELA and to eliminate error variance, a method of component representation was developed for PCA in order to assign constructs to their most representative component according to the magnitude of each construct's loading across all components. In addition, an analogous method of representation was devised to assign elements to components in PCA and to types in ELA, namely to locate those elements that accounted for at least the first 50% of variance to each component or type. In both methods, these elements were designated as central elements and those not accounting for half the variance on any significant component or type, incidental elements. To locate central, or core, constructs central elements were first examined for the inclusion of the element SELF. Those types or significant components which included the element SELF as a central element were designated core components or types (all others being designated as peripheral), and similarly all constructs located within that type or representative of that component designated as core constructs.

On a test case, both methods obtained identical solutions for constructs. However, different solutions were obtained for central elements, and consequently the designation of core constructs differed. These differences were attributed to the fact that PCA represents all grid scores as deviates from the mean for each construct, whilst ELA represents grid scores as deviates from the scalar midpoint. Consequently, ELA is insensitive to biased element distributions whilst PCA compensates for this bias.

PCA was selected on the basis of this test case as a more appropriate transformation model for three reasons; (a) because the PCA solution accounted for less of the total variation in the grid scores, reflecting the greater specificity entailed in locating latent variates when contrasted with the ELA procedure of locating item-specific types prior to estimating the variance they subsume, (b) the total variation in the grid scores was simultaneously partitioned between constructs and elements in PCA in contrast to the alternative of obtaining two typal solutions (with incompatible assumptions) for constructs and elements separately, and (c) most importantly, PCA assumes continuity in the mapping of "felt meanings" onto grid predications (all constructs load to a greater or lesser extent on all components), whereas ELA embodies a discrete item assumption, in which each construct is viewed as a unique psychological event.

Secondly, the predication stability variable was also obtained from PCA solutions. However, two classes of reconstruction were envisaged, requiring some modifications to be made to PCA procedure; (a) the user may exhibit contraction in his predication of a conversational domain by abandoning or coalescing constructs which were distinct on previous occasions, or (b) the user may exhibit elaboration in his predications either by introducing new predicates into his grid or by reinterpreting predicates over successive occasions. In order to monitor these classes of reconstruction serial grids were processed cumulatively, PCA solutions being obtained for the entire sample of constructs produced by the user ($grid_t + grid_{t+1} + grid_{t+2} + \ldots grid_{t+n}$). This method had the following advantages; (a) all predications formulated by the user have equal weight in the PCA solution, (b) novel predications introduced on later occasions are traced back to their origins in previous grids, and (c) these features reflect the directionality of ongoing predications over an extended period of time.

Five discrete classes of reconstruction outcome were defined in terms of cumulative PCA solutions, namely emergence (predicates in grid $_{t+1}$ not represented in $grid_t$), replication (retested predicates in grid $_{t+1}$ replicating predicates in $grid_t$), duplication (introduced predicates in grid $_{t+1}$ replicating predicates in $grid_t$), displacement (retested predicates in $grid_{t+1}$ replicating nonidentical predicates in $grid_t$), and finally, abandonment (disappearance in grid $_{t+1}$ of predicates present in $grid_t$). Similarly, two discrete element reconstruction outcomes were defined as follows: (a) elements were said to be consistent if their scores obtained on retested constructs were associated with their original score to an exact probability (Appendix D) of 5 percent or less, and (b) inconsistent if the exact probability of association exceeded 5 percent.

Three major problems were experienced when these qualitative variables were utilised in case studies. The first two problems reflected inadequacies in the transformation procedures, whilst the third concerned the difficulty of utilising the variables within a concurrent feedback paradigm. Firstly, it was clear that the 50% criterion of element centrality was an arbitrary standard, and led to numerous ambiguities in its application. If, for example, a single element accounted for 50% or more of a single component's variance, that component was viewed as "one-sided" since only one anchor could be located. Not only did this make it difficult for the user to identify such a component, it also led to the inference that the component failed to establish a consistent dimension of contrast within the element sample. Secondly, the application of this 50% criterion occasionally led to the exclusion of the element SELF from the subset of central elements, and the conclusion that none of the user's constructs were self-relevant. The expedient of relaxing the criterion until the element SELF was included was used in these cases, with a consequent reduction in the validity of the term core construct. Thirdly, users experienced some difficulty in identifying the distinctive features of the core-peripheral attribute, and features associated with the attributes of replication, duplication and displacement. These difficulties were attributed to the exceptionally coarse scale grain employed to define these variables (Bilodeau, 1966).

To correct these difficulties,.information feedback at the first level was redefined in terms of continuous variables in Chapter 3.4. by constructing four measures; (a) an element centrality score, as the sum for each element of its loadings on significant constructs, (b) a core construct score, as the sum for each construct of the product of its loading and the element SELF vector on significant components, (c) an element reconstruction score, as the exact probabilities of association between element ratings on successive occasions, and (d) a construct reconstruction score, as the exact probabilities of association between constructs on successive occasions. These continuous variables were all significantly related to the earlier discrete variables.

In conclusion, the development of continuous measures of stability and centrality afforded the user with fine-grain information feedback in order to test his hypotheses in a more detailed way by making ordinal, rather than categorial, judgements concerning the functional features of his grid predications. Moreover, the use of an ordinal level of measurement enabled a more precise test of matching between his hypotheses and observed outcomes to be made.

(ii) Level 2 transformations.

Having selected PCA transformations as an appropriate model for locating the underlying parameters of modelling in the grid, second level transformations were straightforward. Firstly, the cumulative principle components analysis provided an exhaustive listing of components underlying grid predications of all grids completed by the user. Secondly, the method of representation discussed above located significant components and anchor elements for each component. The data available to the user was thus an account of the structure of his predications, each underlying parameter represented by a component, and described in terms of the representative constructs and the distribution of elements on that component.

One difficulty of note in employing the method of representation to assign constructs to components was a problem familiar to multivariate analyses, namely the "naming of factors" problem. Whilst the advantage of PCA was that constructs contributed variance to a lesser or greater extent to all components, making it possible to view constructs as approximations to a subjectively "felt meaning", this advantage was lost when constructs were unequivocally assigned to components. Indeed, the procedure reintroduced the disadvantages of ELA by suggesting that components were discrete item-specific variates. For the user, this problem manifests itself only in those instances where a single construct was located to represent a significant component. Clearly, such a construct could not display the full implications of the component, and users were occasionally struck by the apparent contradiction of an element distribution on the component which was inconsistent with the ratings they had assigned to elements on the representative construct.

An improved procedure is, however, available in order to display to the user the implications of significant components located by the method of representation. Rather than insist that a component's meaning is encapsulated in representative constructs, information concerning the loading of all constructs, ordered from the highest to the lowest loading may be presented, and the element distribution ordered in the same display. The resultant matrix may then be filled with the original ratings rearranged to exhibit the gradient of meaning, and repeated for each significant component. Figure 94 depicts this scheme for a sample grid with two significant components, the vertical and horizontal divisions partitioning central elements and representative constructs respectively, and constructs reflected according to their signed loadings.

COMPONENT I

	E_6	E_5	E_1	E_3	E_4	E_2
C_2	1	1	1	2	4	5
C_3	1	2	3	5	4	5
$-C_4$	1	4	1	1	1	4
$-C_1$	2	4	5	5	5	3

COMPONENT II

	E_3	E_1	E_4	E_6	E_5	E_2
$-C_4$	1	1	1	1	4	4
C_1	1	1	1	4	2	5
$-C_3$	1	3	2	5	4	1
C_2	2	1	4	1	1	5

Figure 94 An alternative representation of principal components in a sample grid.

(iii) Level 3 transformations.

The rationale of third level reflective strategies was to present the user with observed changes in the functional properties (centrality and stability) of grid predications, and request them to furnish an account of these changes. To achieve this it was necessary to develop a procedure for labelling constructs and elements according to their expected centrality or stability on the basis of sequential observations of their functional features. The problem was posed in the following way: given the transformation outcomes observed for constructs or elements on the basis of one or a few repeated grids, to what extent do these outcomes indicate that particular constructs and elements are cases that meet the established operational definitions of centrality and stability, bearing in mind that these defintions are derived from completed grid cycles?

This problem was analysed in the following way. First, it is clear that the more frequently a given outcome obtains for a particular construct or element over a series of replicated grids, the greater the certainty that the same outcome will obtain on subsequent replications. Secondly, the greater the certainty that particular transformation outcomes are associated with established operational definitions of centrality and stability, the greater the certainty that particular constructs and elements may be labelled as such. Thirdly, to the extent that outcomes fluctuate for a particular construct or element over a series of replicated grids, certainty concerning subsequent outcomes will not be influenced by the sequence of preceding outcomes but by their frequency of occurrence. The appropriate sequential process model for this problem is thus that of a non-stochastic stationary path-independent process (Coombs, Dawes and Tversky, 1970), where certainty concerning outcomes on trial n is determined by outcomes on all preceding trials irrespective of their trial number.

This model was consistent with the Bayesian formulation in which the unconditional probability distributions of the operational definitions of stability and centrality are modified by the conditional probability of observed outcomes on these definitions to produce posterior probability distributions of the definitions for each construct and element. Put simply, this means that we begin by forming an estimate of the likelihood of any construct or element being stable or central before observing its function in the user's grid, then estimate the likelihood that particular functional features predict stability or centrality over the completed grid series, and finally modify prior opinion concerning particular constructs and elements on the basis of their outcomes in that grid. Posterior opinions then provide (a) labels with degrees of certainty attached for each of the user's constructs and elements, and (b) predictions concerning their function in the user's subsequent grid.

To implement this procedure it was necessary to obtain (a) estimates of the unconditional distribution of operationally defined central and peripheral constructs, central and incidental elements, and stable, transitional and unstable constructs and elements, and (b) estimates of the conditional distributions of the transformation outcomes derived from PCA, given these operational definitions. The former was obtained from a sample of serial grids from seven subjects who had completed repertory grid cycles of different lengths, providing samples of 80 constructs and 54 elements.

Firstly, prior distributions were obtained for the centrality variables. To achieve this, the sample was reduced to five subjects, as two subjects had completed grids using the ranking form and the component definition of element rating extremity were not applicable to these grids. From the remaining subjects 192 separate construct sorts were obtained, and 47 element rating profiles. Each construct sort and element profile was coded according to the aggregate definitions of core/peripheral constructs and central/incidental elements. Converting these frequencies into proportions provided the required distributions for the centrality variables. In fact, the ratio of core to peripheral constructs and central to incidental elements was approximately 2:1.

Secondly, the complete sample of seven subjects was again examined to estimate the prior probabilities of the stability variables. The 80 sample constructs and 54 sample elements were coded according to the stable, transitional and unstable operational definitions and their frequencies converted to proportions to obtain unconditional probability distributions. In fact, the ratio of stable to transitional to unstable constructs was 5:4:1, whilst that for elements was 1:7:2. The relative scarcity of stable elements was discussed in section 5.1.4.3.

Thirdly, conditional probabilities were obtained by applying the centrality and stability transformations described in this section. To achieve this, each grid replication (32 in all) was separately analysed within the cumulative PCA paradigm, obtaining 192 constructs centrality outcomes and 47 element centrality outcomes in the 5-subject sample, and 238 construct reconstruction outcomes and 54 element reconstruction outcomes in the 7-subject sample. These classifications were then cross-tabulated with the classifications obtaining for the operational definition of centrality and stability to derive conditional probability distributions, expressed in the form of likelihood tables. Testing each likelihood table by computing the Goodman-Kruskal index of predictive association (λ) obtained moderate levels of predictive power; (a) for core constructs λ = .327, (b) for central elements λ = .351, (c) for construct stability λ = .282, and (d) for element stability λ = .5.

The procedures described above may be criticised on a number of grounds. Firstly, the observations on which the estimates of unconditional distributions are based clearly not independent. That is, the distributions may be biased owing to several sources of nonrandom variability. For example, subjects may systematically vary in the extent to which they formulate self-relevant predications, or predications may systematically vary in centrality as they are successively replicated. Moreover, these two effects may interact in some indeterminate way. To construct prior probability distributions on firmer ground it may well be advisable to tabulate the frequencies obtained from the samples according to several contingent factors (subject, occasion, replication, and so on) and compute the extent of independence by partitioning χ^2 according to the method advocated by Lancaster (1951). Those factors that emerge as significant from this treatment would indicate the structure of future samples. There is reason to assume, however, that the conditional distributions would be unaffected by such a bias, since these distributions merely reflect whether particular classification criteria may be predicted from grid transformations.

Secondly, in some cases it was evident that the relationship between transformation outcomes and operational definitions was near-tautological. For example, since the operational definition of element instability was an element that failed to display criterial consistency on any replication, the observation of a single case of inconsistency automatically eliminated the hypothesis of element stability. Similarly, a single case of consistency eliminated the hypothesis of element instability. Thus, if after two observations one case of consistency and one of inconsistency had been observed, posterior probabilities associated with a transitional hypothesis attained the terminal level of p = 1.0 (see Figure 95).

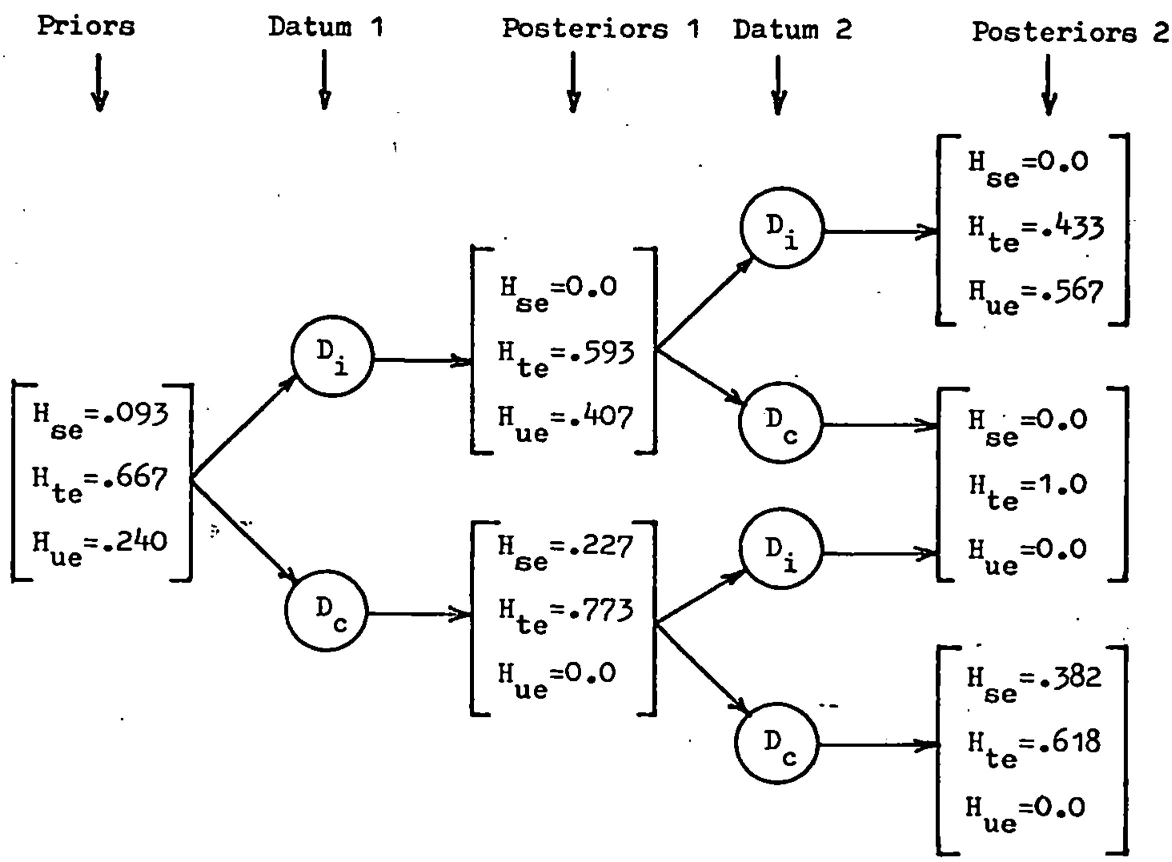


Figure 95 Sequential posteriors for element stability.

This outcome is the consequence of the use of discrete operational definitions of stability in conjunction with discrete outcome or data classes. A more appropriate procedure, and one that would be consistent with modifications to first-level variables, would be to utilise continuous variables for definitions of stability and centrality. To achieve this it would be necessary to (a) specify prior distributions by approximation to a Beta distribution for both stability and centrality variables (Phillips, 1973), (b) determine the parameters p and q of the distribution, (c) find the credible intervals for the priors, (d) test observed centrality or stability scores in relation to this interval, (e) revise the prior distribution in the light of the observed score, (f) find the credible intervals for the posterior Beta distributions, and so on.

Thirdly, because neither the unconditional nor the conditional distributions markedly distinguished between hypotheses concerning centrality and stability, posterior probabilities displayed only gradual increments following replications. For example, to attain a 95% level of confidence concerning the centrality of a construct, it would be necessary for it to function as a core construct in 6 grid replications (see H_{cc} in Figure 96). Similarly, the 95% level is attained after 6 replications for a central element (H_{ce}), 6 replications for a stable construct (H_{sc}), and 7 replications for a stable element (H_{se}). Figure 96 also reveals the increment in the likelihood of the transitional element hypothesis (H_{te}) prior to the elimination of the unstable element hypothesis (H_{ue}) by replication 2. To increase the slope of these functions requires the construction of transformations which obtain higher levels of predictive association with centrality and stability variables. This would be one objective of further research and development of Strategy C procedures.

Finally, further research, in addition to ensuring that sample observations are independent, would increase sample size in order to establish more stable conditional and unconditional distributions.

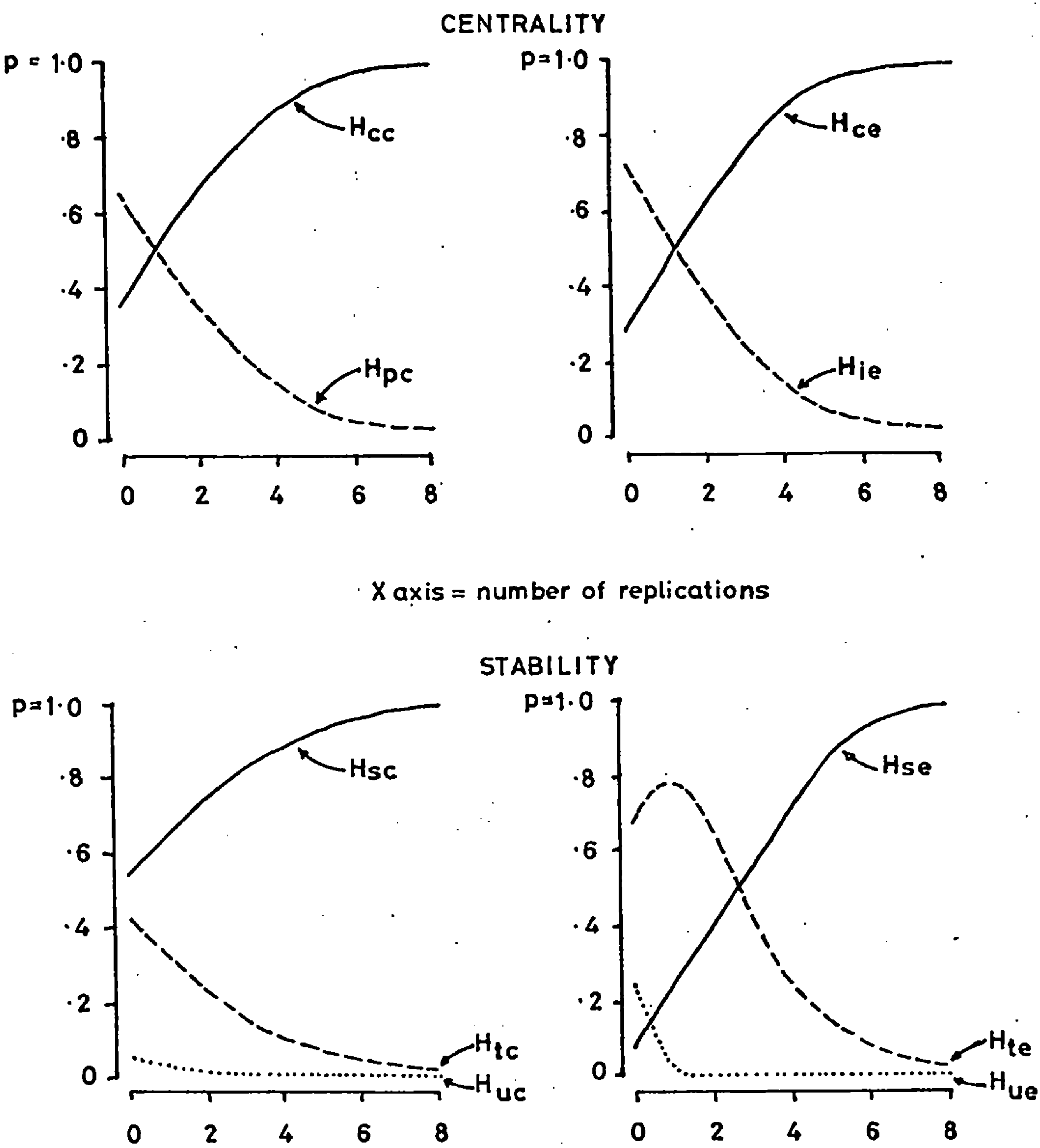


Figure 96 Posterior probability functions for stability and centrality hypotheses.

5.1.4.6. Assembling displays.

By assembling information displays concerning functional features of grid predication, Strategy C attempted to initiate secondary modelling of this information. Chapters 3.2., 3.3. and 3.4. developed information displays appropriate to each level of modelling, and in addition established reflective strategies to direct secondary modelling at each level.

(i) Level 1 displays.

Firstly, L_1 displays were developed for both variables of centrality and stability for constructs and elements. Secondly, the reflective strategy component entailed that the user state his hypotheses concerning the centrality and stability variables by ranking constructs and elements from those expected to be most stable or central to those expected to be least. Thirdly, expected and observed rankings were assembled into a two way display by locating construct or element cards in the array according to their coordinates on the two rankings. Perfect match between these rankings would thus locate the cards on the array diagonal. Fourthly, cards which represented errors of anticipation were identified as those which were off-diagonal by a factor greater than or equal to n/2, where n= number of cards in the sample. Finally, errors of anticipation were presented to the user, who was requested to furnish an explanation for the observed discrepancy.

Whilst this procedure has the advantage that the user is able to appreciate the implications of the stability and centrality variables and is thus assisted in identifying their distinctive features, it does have a number of disadvantages. Firstly, the array becomes increasingly difficult to assemble and interpret as the sample size increases. With large samples it may be advisable to employ computer-drawn arrays. Secondly, the method employed for locating significant discrepancies is somewhat arbitrary. A more appropriate procedure would be to compute the standard error of differences in rank placement (assuming, of course, that the ranks represent underlying normally distributed continuous variables) and express observed discrepancies in terms of normal deviates with their associated probabilities. Finally, users experienced some difficulty in formulating accounts of observed discrepancies. However, it was the process of furnishing accounts rather than the accounts themselves that was important, since identifying the distinctive features of stable and central predicates does not require that those features be verbalised.

(ii) Level 2 displays.

Second level displays entailed the assembly of firstly, a principal components array in which representative constructs were assigned to components, and secondly outcome displays which exhibited the interaction between centrality and stability variables.

Firstly, the PCA display employed gave rise to some problems owing to assigning constructs to components without replacement. This problem has already been discussed (5.1.4.5. (ii)) and an alternative procedure proposed. For this reason, users occasionally experienced difficulty in naming their components. In utilising the alternative procedure described above, component naming may be systematically guided by requesting the user to develop superordinate constructs of the type described by Hinkle (1965) to distinguish between components. Further development of this procedure may show this to be a fruitful area of research.

Within the PCA paradigm, however, alternative displays have been utilised by other workers, notably Ryle (1975) and Slater (1972). Ryle's method utilises the first two principal components to construct a two-component graph, whilst Slater's program INGRID provides either the polar coordinates of items plotted as projections on the surface of a hypersphere utilising three components, or as a series of two-component plots of elements in construct-space for each pair of significant components. Both these methods may be criticised on the grounds that (a) two-, or even three-, component plots lead to unjustified assumptions concerning the magnitude of error variance, (b) plotting items as points in hyperspace removes the user from the raw data of his grid predications, and (c) makes it more difficult for the user to formulate his own interpretations of the underlying structure of his predications.

<u>(iii) Level 3 displays.</u>

The purpose for third level displays was to exhibit any observed change in the functional properties of constructs and elements over a series of occasions. To achieve this the posterior probabilities associated with centrality and stability variables were carried forward from each occasion as predictions for subsequent occasions, qualified in terms of the degree of certainty associated with the posterior probabilities. Thus, posteriors from one observation of a predicate's function become priors for the subsequent occasion on which it is used.

An appropriate display to exhibit changes in function was to classify items within a two-way array according to most likely prior hypotheses and observed data class (Figure 97).

DATA CLASS

		D_1	D_2	...	D_j	...	D_J
	$p(H_1) \geqslant .5$	c	d	...	d	...	d
	$p(H_2) \geqslant .5$	d	c	...	d	...	d
PRIOR	⋮	⋮	⋮		⋮		⋮
HYPOTHESES	$p(H_i) \geqslant .5$	d	d	...	c	...	d
	⋮	⋮	⋮		⋮		⋮
	$p(H_I) \geqslant .5$	d	d	...	d	...	c

Figure 97 General scheme for third-level displays.

In this scheme it was possible to directly determine conjunctions (cells marked c) and disjunctions (cells marked d) between data classes and prior hypotheses, and to request the user to formulate explanations for observed disjunctions. However, this was appropriate only in those cases where data classes and hypothesis classes were nominally equivalent. For example, the data class "central element" was equivalent to the hypothesis "element centrality". In those cases where nominal equivalence did not obtain (i.e. for the stability variables) it was necessary to convert data classes into hypothesis classes by applying Bayes theorem for a single observation, and assigning items to the most likely hypothesis class. For example, the observation that construct$_i$ replicates a component in a previous grid would lead to the designation of that construct as "stable" with $p(H_{sc}) = .661$. In contrast to the scheme described above, this procedure implies a comparison between prior hypotheses based on a series of two or more observations, S_n $(p(H_i/\sum_{n}^{1} S_n))$, and a posterior hypothesis based on a <u>single</u> observation $(p(H_i/S_1))$. As this scheme (see Figure 98) has greater generality, it would be desirable to standardise on this procedure in future applications of Strategy C.

PRIOR HYPOTHESES		POSTERIOR PROBABILITY OF DATA CLASS AFTER ONE OBSERVATION $p(H_1/S_1)$	$p(H_2/S_1)$	$p(H_i/S_1)$	$p(H_I/S_1)$
	$p(H_1/_n\ S_n) \geq .5$	c	d	d	d
	$p(H_2/_n\ S_n) \geq .5$	d	c	d	d
	$p(H_i/_n\ S_n) \geq .5$	d	d	c	d
	$p(H_I/_n\ S_n) \geq .5$	d	d	d	c

<u>Figure 98 Modified scheme for third level displays.</u>

These schemes assume discrete hypotheses concerning centrality and stability. However, as discussed in the previous section, definitions of centrality and stability are more appropriately couched in terms of continuous variables. The application of Bayesian transformations to continuous variables would require the reconceptualisation of third-level displays, since observed centrality and stability scores would be tested in relation to a given credible interval of the prior distributions of hypotheses. Further research would indicate the form these displays should take.

5.1.4.7. Evaluating the procedures.

The Strategy C procedures discussed above were implemented in two case-studies in the form of the insight grid (Chapter 3.4). Both case-studies concerned the work relationships of two individuals, Tom and Brenda, which enabled an almost exhaustive sampling of the relevant conversational domains, namely those persons with whom the individuals were in daily contact in a work capacity. The insight grid comprised an elaborated repertory grid cycle divided into a sequence of 6 modules, each module representing a separate primary modelling, display or secondary modelling activity. Both individuals completed the repertory grid cycle three times, over periods of two and three months. Both individuals were concerned with their current employment, and sought some clarification of their positions in their work environment.

To assess the effects of Strategy C procedures three evaluative criteria were derived from the model of conversational skill. Firstly, it was postulated that an increase in the capacity to identify intrinsic cues associated with modelling predicates would enable the user to increase the extent of mapping between subjectively "felt meanings" and externally expressed predications, yielding an overall improvement in the quality of modelling. In greater detail, increased mapping was expected to be manifested in two ways; (a) an increase in the diversity of predication associated with the formulation of more subtle distinctions, and (b) an increase in the centrality or self-relevance of predications, associated with an increase in the personal significance of modelling.

Secondly, it was postulated that increasing sensitivity to intrinsic cues would lead to the elaboration of the conversational domain, manifested in two ways; (a) in the redirection of the user's attention to emergent attributes over successive occasions, associated with transitions in the user's interpretation of his personal environment, and (b) in the reinterpretation of past events in novel terms, associated with identifying alternative implications of familiar events.

Thirdly, Strategy C was expected to directly influence the user's capacity to identify intrinsic cues associated with modelling enabling the development of discriminative control of modelling and increasing independence of the extrinsic augmented feedback provided by the displays. This emergent control was expected to be manifested firstly in the user's capacity to retrospectively identify functional properties of predicates, and secondly, to enable the user to control the function of predicates he subsequently formulates. The emergence of discriminative control, then, should be exhibited in the increasing accuracy with which users retrospectively identify functional properties of predicates.

The two case-studies reported in Chapter 3.4. met some, but not all, of these criteria. Firstly, by testing the strength of construct inter-relationships over the three occasions it was found that diversity of predication did not increase as predicted, and that in one case-study diversity significantly decreased. However, it was found that centrality of predication significantly increased for both individuals over the three occasions. It was concluded that a decrease in diversity did not necessarily indicate diminishing quality of modelling, since such criteria were based on the assumption that participants' objectives coincided with the experimenter's objectives. It was postulated that both participants may have voluntarily focussed their attention on self-relevant attributes rather than seek more varied interpretations of themselves and their personal environment.

Secondly, the case-studies differed in the extent to which they displayed salient emergent attributes over the course of the repertory grid cycle. This observation reinforced the notion that participants differed in their objectives, one individual displaying a shift of attention to an emergent area of construction whilst the other giving more detailed attention to one area throughout.

In addition, some indications were found in one case-study that the procedures led to the elaboration of alternative interpretations of familiar events.

Thirdly, significant improvements in identifying functional properties of predications were found in both case-studies for element centrality, and in one case-study for construct centrality and reconstruction. However, neither case-study showed significant improvements in identifying the locus of element reconstruction. These findings were thought to indicate that gains in accuracy obtain only for those features of predication which are based on information available to the user during grid production. For example, as the entire element sample is predicated by each construct in turn, the user gains a clear picture of changes <u>along</u> construct dimensions, but very little information concerning changes in element predication <u>across</u> construct dimensions. In short, the centrality and stability features of predication differed in the extent to which intrinsic cues were evident during grid production, the more concealed the cues during the task the more haphazard the development of discriminative control. Moreover, where cues are difficult to locate the user may attempt to identify predication features in terms of previous outcomes. Thus, in one case-study accuracy in identification of construct centrality obtained for consistent retested constructs, but not for constructs introduced into the grid on the second occasion.

These tests of Strategy C may be criticised on two grounds, namely in the translation of criteria into operational tests, and in the derivation of criteria from the model of conversational skill. Firstly, the measure of diversity employed to test improvements in the quality of modelling may not be entirely valid. The diversity measure reflected the distribution of similarity coefficients (exact probabilities of association) between all constructs on each occasion, and was operationally similar to the measure of intensity of construct relationships (Bannister and Fransella, 1966; Bannister, Fransella and Agnew, 1971), and cognitive complexity measures (Adams-Webber, 1970; Bieri et al, 1966). Radley points out that these measures "stand in a paradoxical relationship...inasmuch as the same (or similar) operational measures apparently reflect quite disparate conceptual systems, i.e. loose schizophrenic thinking and complex normal thinking" (1974, p.317). In the present study the diversity measure was used to monitor increases in the subtlety which the user formulated distinctions, i.e. an increase in the complexity of his conceptual system. However, an increase in diversity may evidently arise from two sources; (a) an increase in the number of functionally independent constructs (an increase in the complexity of construction) or (b) an increase in the variability of element placements on functionally similar constructs (an increase in "looseness" of construction). Thus, identical distributions of similarity coefficients may obtain from a grid containing a large number of functionally independent constructs and from a grid containing a single functional construct dimension and a moderate to high degree of variability of element placement between these dimensions. Moreover, as Radley (1974) points out, the measure of consistency in the pattern of construct relationships (employed by Bannister and Fransella, 1966) does not distinguish these two disparate sources of diversity of construction. Whilst this discussion does not alter the implications of the present case-studies (as no increase in diversity was observed) it does suggest the need for less ambiguous measures in further attempts to evaluate Strategy C. In particular, a measure is required that will unambiguously reflect the structure of constructions in the grid. This, however, is no simple demand, as most measures of structure (e.g. articulation, Makhlouf-Norris, Jones and Norris, 1970; functionally independent constructs, Landfield, 1971) are based on the magnitude of similarity coefficients.

Secondly, the component representation measure of shifts in attention between occasions requires an appropriate statistical test before conclusions concerning the elaboration of predication may be drawn. Since representation is determined from partitioning between occasions the variance attributable to a component drawn from all occasions, an appropriate test would be of the null hypothesis of homogeneity of variance over the series of occasions ($\sigma_1^2 = \sigma_2^2 = \ldots \sigma_k^2 = \sigma^2$). This test, the Bartlett test, would of course be carried out for each significant component. Moreover, to test whether any specific occasion exhibits a departure from the variance expected on the basis of other occasions, the test may be made recursively by successively combining the sums of squares for each occasion.

Finally, in testing the accuracy with which users identify functional features of predications more trials are required to assess the stability of correlations between predicted and observed outcomes. Moreover, testing for significant changes in these correlations is less satisfactory than demonstrating the attainment of significantly high levels of correlation. Lastly, these tests did not distinguish between the production of predicates under the discriminative control of their functional properties, and the capacity to discriminate between predicates after their production. Whilst both processes suggest the development of a capacity to identify distinctive functional features, only the former represents an increment in conversational skill. A more appropriate test of the former might be to request the user to specify the function of predicates <u>in advance</u> of their formulation, and to match their performance against the user's predictions.

A second source of criticism of these tests centres on whether the criteria established to evaluate increments in conversational skill adequately reflect the model of conversations from which they derive. In particular , the inference that gains in discriminative control of predication reflects the acquisition of conversational skill was challenged on three grounds: (a) because apparent control may be achieved by identifying external features of predicates as they are represented in the repertory grid rather than internal features associated with the feelings they represent, (b) because readily identifiable features of predicates within the repertory grid obtained discriminative control more rapidly than concealed features, and (c) because users may develop response strategies to test subjective hypotheses concerning functional features which conceal increments in discriminative control.

These conclusions, combined with the suggestion that participants in the two case-studies differed in their objectives in engaging in their modelling activity, led to an attempt to reformulate evaluative strategies with respect to Strategy C procedures. The development of appropriate evaluative methods was clearly an urgent need, and the discussion of this issue is resumed in the following chapter.

5.1.4.8. This review of Strategy C procedures has attempted to highlight difficulties experienced in implementing the model of conversational procedures. In particular, it has highlighted the need for future applications of the strategy to consider (a) extending the flexibility of element sampling in the repertory grid cycle, (b) the need to redefine functional features as continuous variables and to obtain a more stable sampling of their occurrence, (c) the need to systematise grid transformations across all levels of information feedback, and to develop appropriate displays, and (d) to develop an evaluative strategy that is consistent with the model of conversations it seeks to test.

5.1.5. Combining Strategy B and C procedures.

5.1.5.1. Strategy B was developed in Chapter 4.1. and implemented in combination with Strategy C in Chapter 4.2. Essentially, Strategy B seeks to enhance interpersonal consensus by intervening into interpersonal modelling activity in a restricted way in order to exhibit the relationship between the functional properties of predicates of two or more participants. To achieve this supplementary methods were developed, namely aggregate grid methods, and incorporated into the general scheme of Strategy C procedures.

5.1.5.2. The aggregate grid method.

A number of considerations led to the development of a specialised procedure for monitoring interpersonal modelling. Firstly, it was considered desirable that modelling by two or more participants should proceed independently. The pilot study of repertory grid interviews in Chapter 2.3. indicated that diversity of construction within the interview context varied between interviewers and appeared to be largely controlled by the variety of elements elicited by the interviewer. These observations suggest that it is insufficient for interviewers to claim that "active" interviewing styles lead to increases in interviewee verbalisation (Heller, Davis and Myers, 1966) without reference to the content of verbalisation. Similarly, as it was the content of predication that was being examined in interpersonal modelling, it was considered desirable to entirely remove E and other participants by ensuring that all predication remained confidential. This was achieved by training participants to self-administer the repertory grid, and by ensuring that all construct cords were retained by each participant.

Secondly, it was necessary that both participants predicate within the same domain. To ensure this, and to lift restrictions on element sampling, participants were requested to independently construct a list of persons known to be familiar to them both. The final element sample was drawn equally from both lists and included the names of the participants themselves.

Thirdly, in order to reflect salient interpretations of the element sample the precaution of ensuring independence of construct formulation was taken by not yoking constructs between participants to element triads. Instead, a modified Full Context Form of construct elicitation was employed. Moreover, since the salience of self- and other-relevant predicates was under test, it was thought advisable to include either of these elements as anchor-stimuli in construct elicitation. As Bender (1974) has shown, the Sequential Form, and by inference the Self-Identification Form (Bannister and Mair, 1968), successively obtain attributes of decreasing "importance" to the subject.

Finally, as both participants formulate constructs within the same domain, two classes of analysis are made available; (a) an analysis of each individual's grid (IG) consistent with procedures developed in Strategy C, and (b) an analysis of constructs pooled from all participants to form an aggregate grid (AG). The principle of functional equivalence may be used in AG analysis provided the element sample is unambiguous.

From a pilot application of this procedure utilising the repertory grid cycle of activities described in the previous section, it was evident that the AG method yielded four classes of information; (a) the classes of predicates on which participants have achieved consensual self- and partner-definitions, (b) the classes of predicates on which participants display exclusive or disjunctive self- and partner-definitions, (c) changes in the salience of these predicate classes over a period of time, and (d) the interdependence of these changes between participants.

5.1.5.3. Transformations and reflective strategies in the aggregate grid.

To incorporate this methodology into Strategy C procedures additional transformations were required. These transformations centred on information concerning the functional properties of each participants' predicates in the context of their partner's predicates. For example, whilst a particular predicate is central to the Husband's self- definition, the proposition that a functionally equivalent predicate in the Wife's grid is central to her definition of Husband may be tested. Thus, predicate function in IG may be matched or mismatched to the function of the same predicate in AG. For any two participants, functional match or mismatch may arise from the following causes; (a) match may arise either because the partner does not contribute to AG any functionally equivalent constructs to those produced by self, thus preserving the function of self's constructs, or (b) because partner does contribute constructs to AG equivalent in all respects including their functional properties for self, indicating consensus in self-definition, and (c) mismatch may arise because the partner contributes constructs to AG equivalent in all respects except their functional properties for self, indicating disjunctive definitions of self.

The use of the principle of functional equivalence in this context was clarified by examining the status of principal components extracted from IG and AG analyses. The issue under investigation was the extent to which IG and AG PCA's were commensurable, and whether AG solutions differed in any significant way from straight forward comparisons of two participants' IG solutions for identical element samples. This latter comparison was achieved by testing the correlation of element eigenvectors on all components for two IG solutions and contrasting the pattern of component relationships with element eigenvectors extracted by the AG solution. It was found that equivalences between components in the IG solutions were recovered in the AG solution. In addition, the AG solution revealed dominant patterns of variation from a single IG source and the loss of less dominant patterns from the second IG source. It was concluded that patterns of variation which are under-emphasised in IG solutions and unshared in AG solutions must compete with the variations shared by both sources. Thus, the strength of the AG analysis is in its capacity to locate sources of variation common to two or more IG solutions, enabling tests of predicate function in the two contexts.

This analysis enabled the construction of a special class of comparisons, namely IG-AG function comparisons which influenced the development of reflective strategies and displays in a procedure which came to be termed the reciprocal insight grid. Chapter 4.1. reported a case-study in which these comparisons were developed, focusing on the functional property of predication centrality.

This procedure was further developed into a modular series of activities in Chapter 4.2. Again focusing on centrality of predication, these activities resembled those of Strategy C insofar as the IG transformations and displays were stratified into three discrete levels. In addition to the IG displays, however, corresponding AG transformations and displays were also stratified into three levels.

(i) Level 1.

The cumulative PCA and representation methods for determining significant components developed for Strategy C were applied to the AGs in the reciprocal insight grid. In addition, the construct centrality score developed in Chapter 3.4. was applied to constructs in the AG context for both participants. Thus, centrality scores in the separate IGs were directly comparable with AG centrality scores for the same constructs. In addition to estimating the relative centrality of constructs and elements in their individual grids, participants repeated this activity for the AG analysis. Similarly, significant errors were identified and participants were requested to furnish explanations for these errors.

(ii) Level 2.

By applying the Bayesian transformation developed in Strategy C for the predication centrality variable, two displays were assembled at the second-level; (a) an AG principal components display incorporating constructs from both participants, and (b) a direct comparison of construct and element classifications in IG and AG analyses according to posterior probabilities of predication centrality. In the former display, participants were requested to formulate descriptions of each significant AG component. In the latter display, functional disjunctions (where the functional properties of a construct or element in the IG analysis did not match those obtained in the AG analysis) were identified, and each participant requested to furnish an account of the consequences of observed disjunctions for the relationship.

(iii) Level 3.

The transformations developed to identify centrality attributes for Strategy C were applied and, utilising the same unconditional and conditional probability distributions derived in Chapter 3.2., posterior probabilities were obtained for the functioning of participants' predicates in the AG context.

Displays identical to those developed for Strategy C were employed for AG posteriors. That is, each participant was presented with a display which identified disjunctions between data classes and prior hypotheses for centrality in the aggregate domain. Analagously to IG displays, each participant was requested to furnish an account for observed changes in predicate function by identifying significant events in the relationship wherever possible.

Throughout the construction of AG transformations it has been assumed that AG information does not significantly differ from IG information. These procedures may be challenged on the grounds that they are not comparable with IG procedures for a number of reasons. Firstly, the sample of observations from which unconditional probabilities for predicate centrality were derived, namely a series of individual grids, may not provide an appropriate estimate of the unconditional probability of predicate centrality in the aggregate domain. Whilst the AG analysis identifies the major sources of variation in separate IG analyses, and is thus comparable to the extent that IG and AG solutions are similar, it is conceivable that components might be extracted from the AG solution which bear no resemblance to components in the separate IG solutions. This would indicate that predicates in the AG domain might more appropriately be treated as a discrete sample, requiring separate estimates of the unconditional frequency of central predications.

Secondly, similar criticisms may be levelled against the use of conditional probability distributions deriving from IG solutions. Clearly, if separate AG observations were collected, estimates of conditional distributions would also be required.

Thirdly, AG reflective strategies required participants to estimate the functional properties of their partner's modelling without providing any means by which these estimates might be tested. This was a serious shortcoming of the procedures. In the case-study reported in Chapter 4.2., for example, participants sought information from each other to assist them during secondary modelling activities. The procedures, however, were constructed to exclude such exchanges, however fruitful they might be. Further development of the reciprocal insight grid would need to consider methods by which such exchanges could be incorporated into the activities at appropriate points.

5.1.5.4. Evaluating the procedures.

The operational form of Strategy B and C combined, the reciprocal insight grid, was tested in a single case-study involving a married couple. In four sessions over three months, the couple completed the repertory grid cycle twice, formulating constructs from a jointly produced sample of 16 elements, including close friends, relatives and themselves. On the first session, the couple independently formulated 10 constructs, and in addition to two whole figure constructs (Bannister and Mair, 1968) of the form LIKE SELF/PARTNER IN CHARACTER, predicated the entire element sample in terms of these constructs. On the third occasion 6 additional constructs were independently formulated and applied, and the 12 from the first session reapplied.

The evaluation of the reciprocal insight grid paralleled the methodology employed in Chapter 3.4., in that criteria were first derived from the rationale of Strategy B/C and then operationally tested. If the procedures effectively enhanced interpersonal modelling by the couple, the following effects were expected to obtain in primary and secondary modelling performances; (a) that both participants display increasingly distinct models of self and partner as their awareness of the functional properties of self- and partner-relevant predicates improves; (b) that both participants engage in interpersonal modelling conversations more frequently leading to the increasing salience of partner-relevant predicates, (c) that both participants display increasing specificity of self- and partner-relevant predicates; and (d) that both participants display increasing descriminative control over self-modelling both in the IG domain, and in the joint AG domain.

These propositions were tested by (a) examining the correlation between element placements on the two whole-figure constructs LIKE SELF and LIKE PARTNER for each participant before and after secondary modelling, (b) comparing the salience of constructs elicited by the participants in the two grids to self- and partner-relevant AG components, (c) examining the loadings of the two whole-figure constructs on self- and partner-relevant AG components, and finally (d) comparing the correlations obtained between participants' rank-ordering of constructs in terms of self-centrality and observed centrality outcomes before and after secondary modelling.

The case-study reported in Chapter 4.1. met only a fraction of these criteria. Firstly, only one of the participants showed a tendency towards significantly distinguishing self from partner, whilst the other displayed a significant tendency in the reverse direction. Secondly, both participants displayed a non-significant tendency towards decreasing salience of self-relevant predicates, but only one participant displayed a significant tendency towards emphasising partner-relevant predicates in the second grid. Thirdly, both participants displayed a significant decrement in the loadings of the LIKE SELF construct on self-relevant predicates, and one participant displayed a significant decrement for the loading of the LIKE PARTNER construct on partner-relevant predicates. Contrary to predictions, both participants displayed significant or near-significant increments in the loadings of the construct LIKE SELF on partner-relevant predicates. One participant did, however, display a significant decrement in the loading of LIKE PARTNER on self-relevant predicates. Finally, both participants attained significant levels of competence in identifying self-relevant predicates in the IG domain, but neither participant displayed any improvement in identifying the same functional property of their predicates in the AG domain.

These findings were interpreted as indicating firstly, that evaluative criteria were not coincident with subjective strategies underlying modelling activity, and secondly that anticipating the functional outcomes of predicates in the AG context was a qualitatively different task to anticipating IG outcomes. It was suggested that the subjective strategies of the participants were directed towards a reversal of roles within the relationship because of differential assumptions initially held by the participants concerning self-partner similarity. The Husband, for example, had not previously demarcated his own role from the Wife's, whilst the Wife had reluctantly come to view herself as HAPPY WITH DOMESTICITY ALONE rather than compete on intellectual terms with the Husband. As a result of the procedures the Husband had not only learned to appreciate the Wife's distinctions between their roles but had also attempted to reverse these roles. In contrast, the Wife had attempted to view herself as intellectually on a par with the Husband. These relationship-defining strategies were not anticipated in the design of the procedures. Moreover, the procedures had excluded any systematic interpersonal exchanges concerning the content of participants self-partner modelling. In the absence of this information participants were not able to anticipate the effects of their partner's modelling on the functioning of their own self-relevant predicates. Further development of this procedure should thus incorporate means by which such information may be exchanged.

As in the previous study (Chapter 3.4.) the evaluation strategy in this case-study may be criticised on two grounds, namely in the translation of criteria derived from the rationale of Strategy B/C into operational tests, and the derivation of the criteria themselves. Firstly, the test of independence of self-partner modelling might be improved by examining the profiles of ratings for the SELF and PARTNER elements rather than, or in addition to, comparing the LIKE SELF and LIKE PARTNER whole-figure constructs. When this comparison is made (see Table 57) strikingly different results are obtained.

	Grid 1	Grid 2
Ruth	-.679 (N=12)	.182 (N=18)
Isaac	-.425 (N=12)	.767* (N=18)

(* denotes $p < .01$, two-tailed).

TABLE 57 Correlations coefficients between the elements SELF and PARTNER on two occasions for two participants.

Here it is evident that both participants distinguish self from partner prior to the procedures but both show a significant tendency towards identifying self with partner after the procedures (Ruth, $z = 2.396$, $p = .016$, two-tailed; Isaac, $z = 3.476$, $p = .0006$, two-tailed). The results of this test are contrary to those obtained for Isaac when whole-figure constructs were correlated. What might account for this discrepancy? A methodological point of note is that both these comparisons employed the product-moment correlation coefficient, which is not entirely appropriate because (a) the range of values of the grid scores is restricted to a seven-point rating scale, and (b) an interval level of measurement and normal distribution scores cannot be safely assumed. However, the discrepancy is so marked that these strictures alone cannot suffice to explain it. A more plausible explanation lies in the inconsistencies of the whole-figure constructs themselves. Whilst it was argued that the ambiguity of constructs of the LIKE SELF IN CHARACTER type made them particularly susceptible to multiple interpretations, and that this susceptibility was advantageous in determining the salience of such interpretations at any point in time, it was evident that participants experienced difficulty in employing the predicate consistently across the element sample. As Mair (1967) cogently points out, whole-figure constructs are extremely difficult to use wholistically, and subjects may tend to focus on one attribute in predicating one element, another attribute for a second element, yet another for a third, and so on. Thus, we cannot assert that the dimensions LIKE SELF and LIKE PARTNER represent a single salient attribute. The implications of this are that whole-figure constructs represented a less appropriate test of the evaluative criteria than element rating profiles.

Similar criticisms may be levelled against the use of whole-figure constructs to examine the specificity of self-partner models. Because of their probable inconsistency, the loadings of whole-figure constructs on self- and partner-relevant predicates is surely ambiguous. Even if whole-figure constructs could be shown to be consistent, the test of specificity reported in the case-study has a second weakness, namely that increasing specificity of, for instance, the self model, was assumed to be exhibited by an orthogonal relationship between self-relevant predicates and the whole-figure construct LIKE PARTNER. However, examining loadings only for orthogonal relationships conceals the presence of reversals of relationship (because the sign of the construct loading is ignored) which would be expected to occur if the opposite poles of central predicates came to be applied to self. In such a case, it would appear that no change of specificity had occurred (because the magnitude of the loadings of the constructs LIKE SELF and LIKE PARTNER had remained the same) even though self-relevant predicates had reversed their implications for the self model. To test for the presence of such reversals in the case-study, the loadings of whole-figure constructs were plotted taking the sign of the loadings into account (Figures 99a and 99b). Comparing these plots with Figures 86 and 87 reveals slight differences for Isaac's constructs on partner-relevant predicates (LIKE SELF from orthogonal tends towards a positive loading $z=2.014, p=.022$; LIKE RUTH from positive to negative loading $z=-2.41, p=.008$), and for Ruth on self-relevant predicates (LIKE ISAAC from negative loadings to orthogonal $z=1.765, p=.039$; LIKE SELF from positive to negative loading $z=-2.629, p=.004$). These reversals on the second, Ruth-defining component are significant since both Ruth and Isaac display reciprocal shifts. In conclusion, the test for

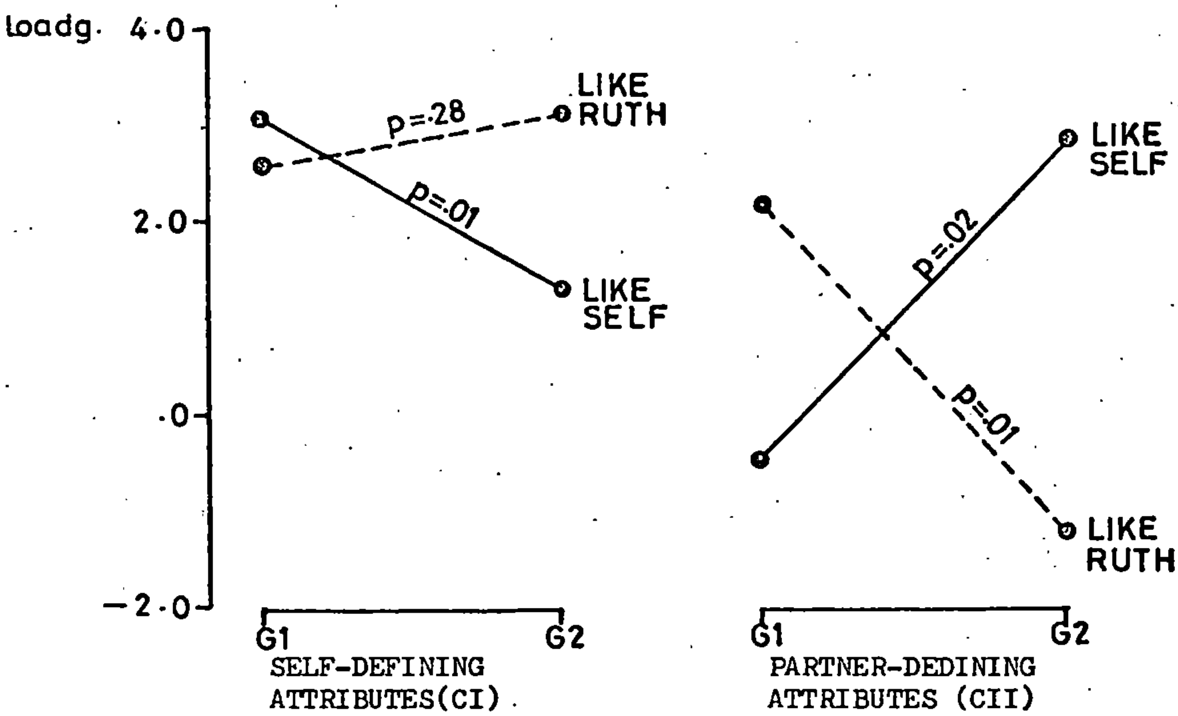


Figure 99a Loadings of ISAAC'S whole-figure constructs on central components.

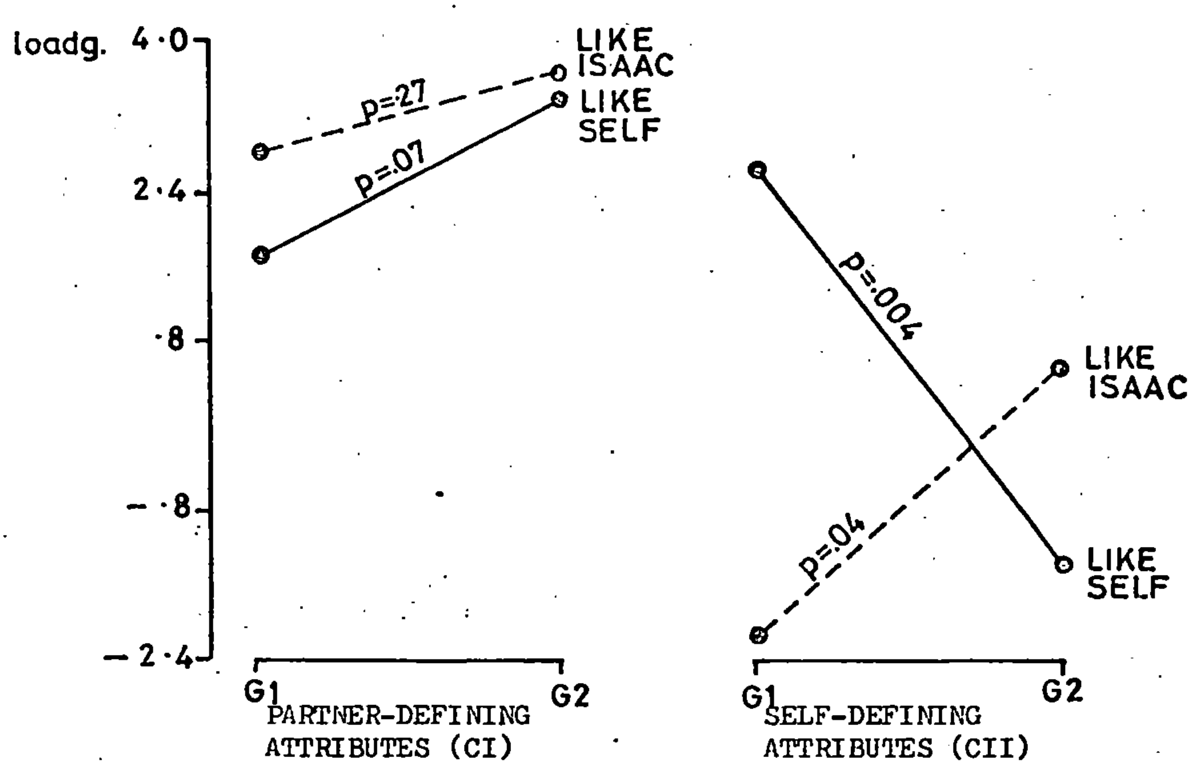


Figure 99b Loadings of RUTH'S whole-figure constructs on central components.

specificity did not consider reversals in the implications of self- and partner-relevant predicates.

Thirdly, the tests of improvements in discriminating features of modelling predicates in this case-study suffer identical faults to the case-studies reported in Chapter 3.4., namely (a) that the test fails to distinguish between improvements in identifying external features of predicates as they are represented in the grid form and improvements attributable to identifying distinctive features of "felt meanings", (b) more readily identifiable features (e.g. IG functions) obtain discriminative accuracy more rapidly than less identifiable features (e.g. AG functions), (c) response strategies may conceal increments in discriminative accuracy, (d) an insufficient number of trials were employed to test the stability of discriminative accuracy and (e) the test failed to distinguish between discriminative control (the capacity to formulate predicates of predetermined function) and retrograde discriminative accuracy (identifying predicate features after their production).

Finally, the tests remain inconclusive in the absence of appropriate controls. For example, a no-feedback comparison is required to establish that improvements in discriminative control are dependent on first-level information feedback and reflective strategies. Similarly, a no-contact control is required to determine whether increasing salience of partner-relevant predicates is a function of interpersonal modelling over the period intervening between the grid administrations. Further research would seek to clarify the causal processes underlying the effects of intervention strategy.

The evaluative methodology may also be challenged on the derivation of criteria from the rationale of Strategy B/C. In particular, the predictions concerning increasing self-partner distictiveness and salience of partner-relevant predicates hinge on participants' reactions to the outcomes of secondary modelling processes. To take an example, consider a man who construes himself as WARM AND LOVING and views this as a fundamental aspect of his relationship with his wife. On this basis he anticipates that this construct will be corroborated by his wife and will appear as central in the AG analysis. Suppose, however, that it is not central in the AG domain, how might he react? The theory of objective self-awareness (Wicklund, 1975) would suggest that this finding would lead him to examine himself and to turn his attention particularly to those attributes and behaviours relevant to being WARM AND LOVING. However, two options are available to him. He may either attempt to reduce the discrepancy by coming to view the construct WARM AND LOVING as nonessential to him, or he can escape from objective self-awareness by avoiding self-focussing stimuli. When requested to formulate constructs following this experience, these two reactions would lead to differential outcomes; in the former he would tend to produce self-relevant constructs that effectively distinguish himself from his wife, in the latter constructs that were not self-related, but which focussed on his wife or other persons in the element sample. If it was observed that the salience of self-relevant constructs declined whilst increasing for partner-relevant constructs we would conclude that he was avoiding self-focussing stimuli. If, however, the salience of self- and partner-relevant constructs increased, we would conclude that he was attempting to reduce the dissonance.

The evaluative criteria established to test the procedures did not take account of these strategies. To achieve an adequate assessment of the procedures it would be necessary to closely monitor subjects' responses to both validating and invalidating information, and to estimate subjective purposes, expectations, and strategies for utilising the procedures. Methods for achieving appropriate evaluative strategies are discussed in the final chapter.

5.1.5.5. This section has reviewed the construction and application of Strategies B and C combined. It has been pointed out that (a) the aggregate grid method required procedures of a different order to achieve optimal secondary modelling, (b) that procedures developed to display features of individual grids may not be entirely appropriate to the aggregate domain, and that (c) a methodology for evaluating the success of the procedures remains to be developed.

Chapter 5.2.

Implications for conversational practice.

5.2.1. Conducting conversations.

5.2.2. Methodologies of evaluation.

5.2.1. Conducting conversations.

5.2.1.1. The objective of this final chapter is to place the research in a wider context by briefly discussing the general implications of the models of conversation and conversational procedures. In this section we will focus on problems inherent to a procedural approach to conversations, namely factors in the exteriorisation of accounts and cognitive reflection, and the applicability of the skills paradigm and models of change to conversational competence.

5.2.1.2. Factors in the exteriorisation of accounts.

The procedures developed to enable persons to exteriorise their interpretive systems in this research are essentially double-edged. On the one hand it is recognised that the forces of social influence exerted by, for example, the counsellor or the teacher are sufficiently powerful to transform the modelling processes of the client or learner, both externally (in what the client or learner says he thinks) and internally (in what the client or learner says to himself). When these forces are ostensibly removed by removing the teacher or counsellor from the scene, modelling processes were assumed to take on a less biased form. To what extent was this assumption justified? In its most basic form this question seeks to reveal the conditions under which optimal self-expression may occur.

A first consideration is that the physical removal of a participant other (teacher, counsellor) need not be coincident with the removal of social influence. In his discussion of social influence Moscovici (1974) distinguishes two convergent forces of social pressure on the individual, institutional (pressure directly exerted by one person on another through the social agency of sanctions and control over resources), and inferential pressures (pressure indirectly exerted on the individual through the external agency of values, opinions and attitudes). Removal of the institutional forces does not necessarily lead to a reduction of inferential forces. Sherif's (1935) studies of group influence on autokinetic movement judgements clearly indicate (a) that subjects seek to establish an individual norm in the absence of social standards, and (b) that following social influence judgements are made in terms of the group norm. Even if it could be asserted, and this is highly unlikely, that no norms existed prior to the modelling experiences of our subjects this study suggests that the individual would establish his own frame of reference for guiding, selecting and expressing his interpretations. Whilst many writers suggest that establishing a norm reflects a need to reduce uncertainty, it is evident from the studies of Alexander, Zucker and Brody (1970) that it is not uncertainty about the physical environment that concerns the individual, but uncertainty concerning appropriate social behaviour. Using a confederate who tended towards either convergent or divergent judgements these authors demonstrated that subjects attempted to remain consistent with the confederate irrespective of the physical judgements he made. The function of norms, then, are to stabilise the social relationships between the subject and other persons on the basis of expectancies that he holds concerning such relationships. Thus, despite the repeated injunction that modelling was to remain confidential to the person, it is highly likely that subjects established a standard on inferences concerning experimenter expectations, the nature of the task and perceived social roles. Such standards need not necessarily have the effect of limiting modelling only to those predicates which are perceived as socially acceptable and desirable. As Ehrenzweig points out "by one of the many ironical turn-abouts in modern art, today self-expression has become a social duty forcibly imposed on the student by teacher, parents and the public alike...Individual self-expression has turned into another social convention" (1970, p.156). Similar statements may be made by observers of the encounter group movement or any of the modern therapies. Even here, in amongst the displays of primal emotions, group togetherness, aggression and hostility may be found standards of appropriate conduct. Non-evaluative therapies easily become transformed into social standards because "the social re-inforcers likely to be involved in the application of genuineness, accurate empathy and unconditional positive regard are fairly obvious" (Jones, 1971, p.282). Not only do the procedures fail to ensure that optimal conditions for self-expression are achieved, they also fail to determine what standards are operating in the individual's selection of aspects of his social environment to be predicated, and in the determination of the content of predicates.

A second consideration derives from the notion that the presence of direct social influence is essential to self-expression. Both Haley (1963) and Carson (1973), for example, assert that the role of the therapist is to engage the client in a social relationship with the intended purpose of changing him in certain ways. In order to do this the therapist must discover "the templates by which (the client) orders and construes his experiences" so that the social feedback the therapist supplies fails to "provide confirmatory and complementary feedback in response to the disorder-maintaining behaviours of the client" (Carson, 1973, p.162). The view expressed here is that neither exteriorisation nor change of the client's interpretive system can occur outside of such a relationship. Similarly, Jourard asserts that "self disclosure is a factor in the process of effective counselling or psychotherapy. Would it be too arbitrary an assumption to propose that people become clients because they have not disclosed themselves in some optimum degree to the people in their life?" (1971, p.225). The extension of awareness into Quadrant 3 (hidden experiences, not known to others but known to self) and Quadrant 2 (blind experiences, known to others but not known to self) in the Johari Window model of awareness (Luft, 1971) similarly cannot be achieved without self-disclosure in a trusting relationship. Even within the neo-Freudian tradition, the essential role of therapist as cryptographer and interpreter has been firmly established (Lacan, 1968). In all these accounts the therapist is seen as a catalyst, enabling rather than determining self-modelling by the client.

These considerations suggest that procedures designed to be entirely self-administered must necessarily be limited by the user's predispositions and expectations. However, the same procedures utilised in an interpersonal context transfer the enabling process of the therapist to a participant client who himself may become the helpee of other participants. Machine-mediated conversations of this kind seem quite feasible provided the means are embodied in the procedure to identify restriction on modelling (where participants limit their conversational domain), distortion (where participants fail to achieve adequate mapping between "felt meanings" and exteriorised predicates) and appropriate and unobtrusive guidance (to avoid selective omissions in predication).

(i) Restriction: Although users nominated specific persons within their social environment to provide an element sample the guidelines employed to delineate the class of elements to be included in the sample were somewhat arbitrary and occasionally appeared to restrict modelling activity. These restrictions were manifested by (a) a limited definition of the user's self-concept under consideration, (b) the use of a fixed element sample throughout the repertory grid cycle, and (c) the practice of allowing the user to select anchor-stimuli for construct formulations in order to test predicate salience. Each of these sources of restriction may be controlled by an automated procedure in the following ways: (a) by free sampling within a series of self-concept classes (e.g. family, male friends, female friends, work colleagues, etc.), (b) by extending the domains within each class as they vary between occasions, and (c) by monitoring the selection of anchor-stimuli and occasionally removing items on the basis of selection frequency from the element sample.

(ii) Distortion: Distortion may arise from two sources of failure to map felt meanings onto construct representations; (a) incompatibility, where verbal descriptions of a construct dimensions and the allocation of elements on dimensions fail to represent felt meanings, and (b) interference, where verbal descriptions and element allocations do represent felt meanings but not those originally intended. Both sources may be monitored to some extent by examining constructs for element polarisation in general, and criterial element polarisation in particular. These criterial elements will be determined by the purpose of the modelling activity. If, for example, self modelling is under consideration, the extent of polarisation of the element SELF may be monitored. This process can, of course, apply to any element in the sample.

(iii) Guidance: Unobtrusive guidance in modelling entails ensuring that all predicates are applied to all elements in the sample. One consideration relevant here, however, is the range of convenience of the predicates, especially when using an element sample segmented into a number of domains. Ranges of convenience may be monitored by the use of a non-applicable category (Landfield, 1971) and the domains monitored to ensure predication equally within all domains.

5.2.1.3. Factors in cognitive reflection.

The development of reflective strategies has entailed a discussion of the role of confrontation in facilitating conversational competence. The use of prompt cues to provoke secondary modelling consists of exhibiting

> "discrepancies between the clients' verbal expressions about himself (awareness or insight) and his behaviour either as it is observed by the therapist or reported by the client....Confrontation may be viewed as the attempt to bring to awareness the presence of cognitive dissonance or incongruence in the client's feelings,

attitudes, beliefs or behaviours. It may also lead to the discovery of ambivalance in feelings and attitudes towards persons in the client's life".

Patterson (1974, p.76).

In his discussion of confrontation in therapy, Patterson points out that initial confrontations are tentative and general, becoming increasingly specific as therapy progresses, and that confrontation in the absence of sensitivity to the client's receptive state may have a "demoralising and demobilising effect upon the inadequately prepared helpee" (Carkhuff, 1969, p.93). Similarly, confrontation concerning central beliefs held by the client in the absence of an adequately supportive context in which such beliefs may be examined is likely to lead to the client's rejection of the exploratory strategy in use. A systematic exploratory strategy of the kind described by Wright (1970) appears effective as it employs the "laddering" technique to initiate an examination of central beliefs by progressive elaboration from more peripheral implications. This strategy frequently reveals contradictory and conflicting "laddered" implications, but by exhibiting their origin in primary constructs, provides an explanatory context within which secondary modelling may take place. Such an exploratory context was not available in the procedures, in which discrepancies between expected and observed construct functions (Level 3 outcomes) and between subjectively anticipated and observed construct functions (Level 1 outcomes) were presented to the user without consideration to the centrality of the beliefs about self that each represented. Thus, whilst users found some discrepancies self-evident and easily explained, others appeared unnaccountable, arbitrary or disturbing.

Secondly, the process of cognitive mirroring entailed in reflective strategies is necessarily selective. The notion that direct, objective information feedback through the use of videotape playback methods alone represents a method of confrontation (Kaswan and Love, 1969) cannot be accepted following the discussion of Chapter 2.1. In such a methodology the element of confrontation is absent unless the subject is in a state of readiness to observe and respond to particular cues. Thus, our analysis of confrontation hinges on three elements, (a) the selection of appropriate cues, (b) the state of readiness of the subject, and (c) the intelligibility of selected cues.

(i) Selection of appropriate cues: For Kaswan and Love "confrontations can be subjective or objective in form. A reflective 'you sound angry' from a therapist or group member is more subjective than his playing back an audio or videotape of the angry outburst ...The videotape appears to be the most comprehensive form of objective confrontation because it presents information about the self more completely, directly and concretely than other media" (1969, p.225). Here they convey the sentiment that the biased subjectivity of the therapist is removed from acts of confrontation through the use of videatape playback. However, the inconsistency of this assertion is revealed when they describe their methodology; "Content chosen for feedback ranges from small samples of reiterated verbal behaviour to presentation or videotapes showing complex social interactions...When the family returned to the clinic... each of them was individually shown brief sections of the videotape that the consultant had judged to be representative of their interactions" (p.229). Moreover, clients evaluated their videotapes in terms of carefully constructed rating scales manifestly designed to draw their attention to particular aspects of their behaviour. It is clear from this study that information feedback fails to achieve confrontation in the absence of the client's directed attention to certain events, or patterns of events contained in the feedback. The question then becomes: on what basis is the clinet directed to observe selected aspects of his behaviour?

The criteria for selecting appropriate cues in the procedures are based entirely on the single assumption embodied in Patterson's account, namely observed discrepancies between different levels of user behaviour. For example, first level confrontation followed from a discrepancy between user expectations and observed predicate function. Similarly, level three confrontation followed from a discrepancy of observed predicate function between occasions. The behaviours compared by these methods are predication responses (element allocation on construct dimensions) and reflective responses (classification of predicates by expected function). Both forms of behaviour are as faithfully recorded in the procedures as are the videotaped interpersonal behaviours in the Kaswan-Love method. In contrast, the procedures have recognised the need to direct the user's attention to specific features of recorded behaviour, and objective criteria (e.g. magnitude of ranking discrepancy at Level 1, and magnitude of discrepancy between the probability of prior hypotheses and data classes at Level 3) were developed to meet this need.

(ii) States of readiness: Kaswan and Love do not discuss the relationship between confrontation and client readiness. However, timing of intervention has been explicitly discussed both in terms of the feedback of discrepancies (Patterson, 1974; Carkhuff, 1969) and psychological interpretation (Levy, 1963). In the development of Strategy A in which feedback was intended to redirect ongoing modelling activity, confrontation was viewed as essentially tied to the status of the conversation. Although this was equally true for Strategies B and C, confrontation in those case-studies was procedure-based rather than user-based. For Levy the timing of interpretation is grounded in the model of cognitive dissonance developed by Festinger (1957, 1964), timing being determined by the magnitude of dissonance between criterial elements in the domain under consideration. It is important to note that interpretation for Levy differs from the process of confrontation in both the Kaswan-Love method and the procedural approach in the preceding chapters, in that the client is aware of the dissonant relations between elements and in a state of readiness to receive or construct an alternative description of these relations. The therapist in this situation merely offers one of several alternative descriptions. In the process of confrontation, however, the user is initially unaware of the relations between elements and thus does not experience dissonance directly. Instead, confrontation through information feedback introduces dissonance by exhibiting behavioural discrepancies. Subsequently, all propositional interpretations are formulated by the user via secondary modelling activities.

Yoking confrontation to the state of readiness of the client is thus a problematic issue which cannot be solved by simply basing intervention on estimates of experienced dissonance. Instead, confrontation must be articulated against measures which reflect "failures to elaborate one's personal construct system" (Bannister, 1975, p.132). Essentially, these measures should assess the extent of coupling between levels of control of modelling as indices of the timing of confrontation. Bannister points out that Kelly's formulation of change as three stages of circumspection, preemtion and control indicates three points at which change may stabilise, requiring different types of intervention at each stage. Firstly, "it may be that the person's construing system has become too tight, too specific,...to restricted to particular strategies for handling experiment and evidence" (1975, p.132). Hence, in the obsessional "we apparently see the execution of low-level tactic plans without higher-level strategic control...(the) plans become detached into closed loops to produce the recycling repetitive behaviour so sharacteristic of the disorder" (Jones, 1971, p.283). Secondly, the personal construct system may become "too loose, too chaotic... so vague and inconsistent that they generate no testable expectation" (Bannister, 1975, p.132). Finally, there may be "particular contradictory implications...which prevent elaboration" (p.132).

Clearly, dissonance inducing confrontation is less appropriate to the second and third forms of stasis than to the first, and confrontation of this kind might be most effective if timed to occur within a period of tight construing.

The progression of stages in the C-P-C cycle may not, however, be as continuous and gradual as Kelly supposed it to be. Methods of articulating confrontation may become more effective if movement between stages were viewed as discontinuous. The recent development of catastrophe theory may provide an appropriate model of the cycle of reconstruction. Zeeman (1976), for example, has provided a simple cusp catastrophe model of anorexia nervosa and reports a treatment strategy based on converting the behaviour surface of the cusp into a butterfly catastrophe by introducing reassurance as a fourth control parameter. We may speculate that a similar cusp catastrophe may be utilised to describe discontinuous shifts of state in an anxiety-hostility catastrophe (Figure 100). For a competent subject, invalidation leads directly to circumspection, the elaboration of alternatives and consequent choice. For a less competent subject however, invalidation leads to a "self-criticism" catastrophe, projecting the subject into an anxiety state of excessively loose construing. Attempts to tighten construing may complete the hysteresis cycle and through a second "tunnel-vision" catastrophe project the subject onto the lower plane where he extorts validation from social events by acting in a hostile way. Either side of the fold lie the two cycles of hostility and anxiety which represent equilibria at the tight and loose stages of the C-P-C cycle. The role of confrontation would be to induce this hysteresis cycle for subjects stabilised in a hostility equilibrium by inducing dissonance and consequent loosening whilst moving the entire cycle along the competence dimension by facilitating insight into modelling processes. This entire procedure would result in a spiral course along the cusp (Figure 101).

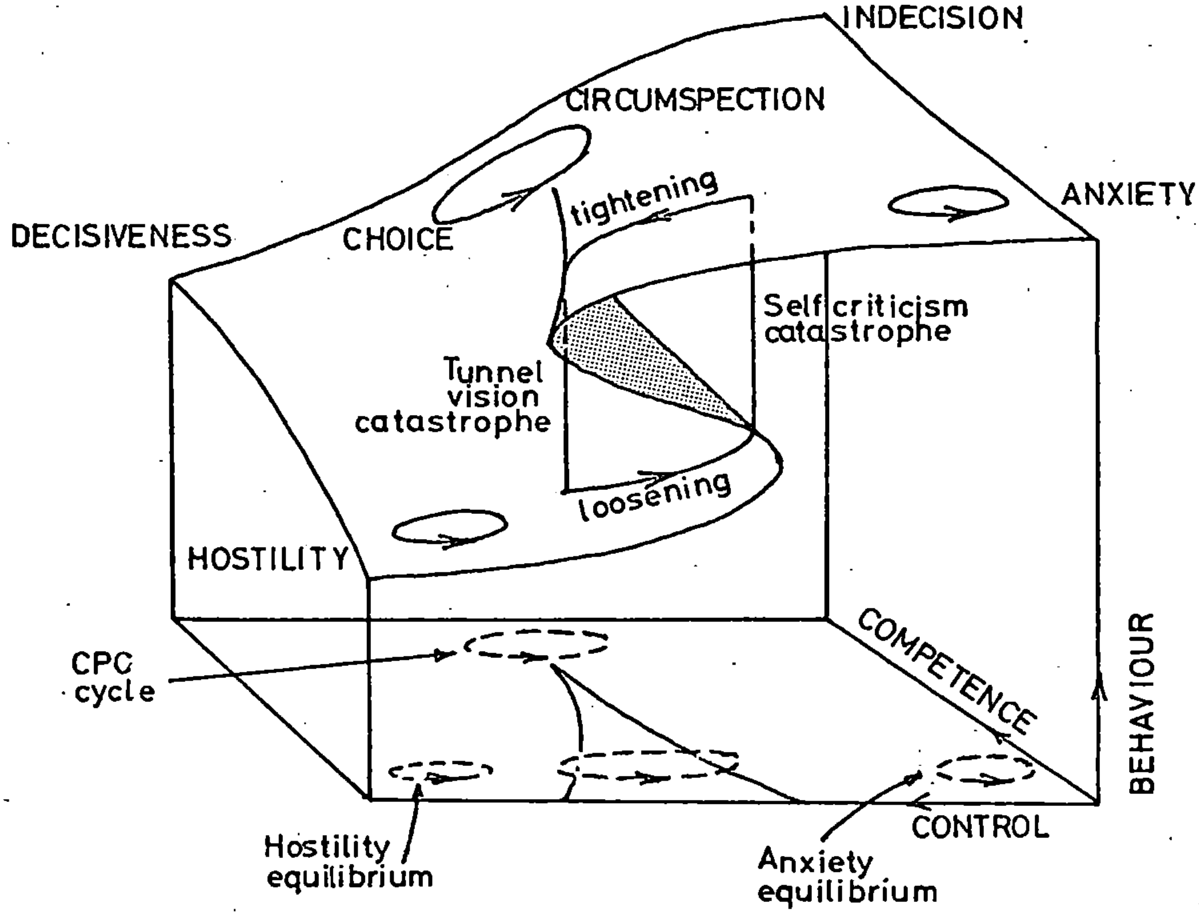


Figure 100 Anxiety-hostility cusp catastrophe.

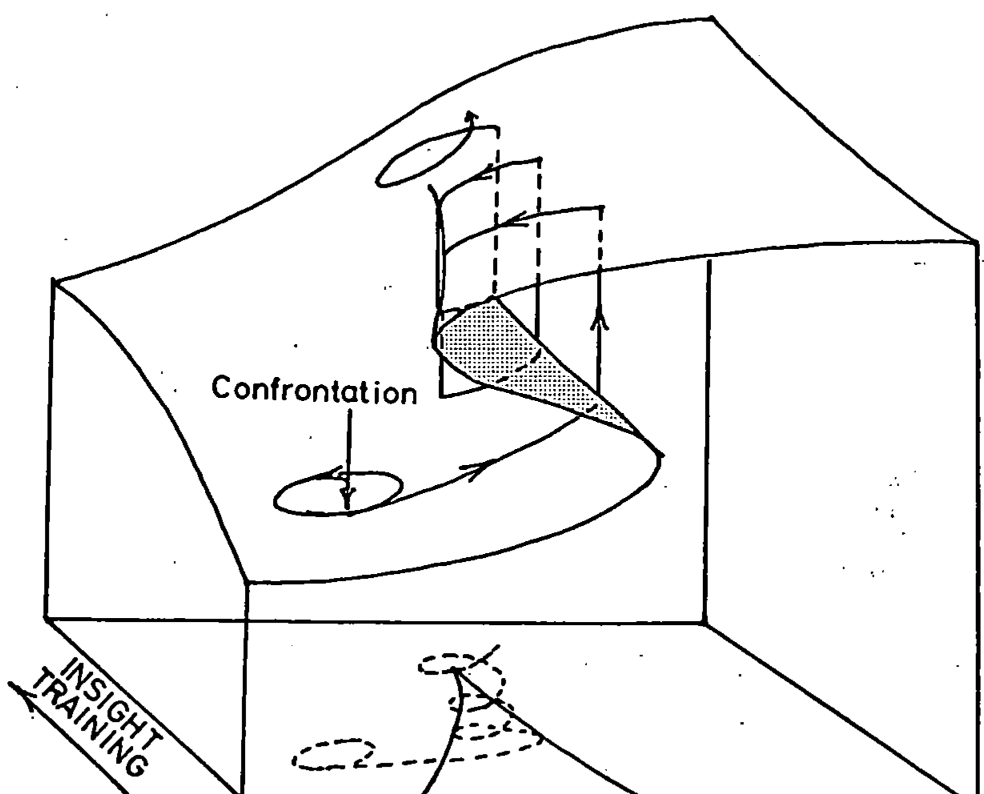


Figure 101 Increasing competence following confrontation.

(iii) Intelligibility of cues: Selecting cues from a record of behaviour and presenting them to a subject also supposes that the subject will be able to make them intelligible by attributing them with meaning. It was pointed out in Chapter 3.1. that if modelling processes are hierarchically organised, cues derived from one level of organisation may be made intelligible only by the development of a denotative metalanguage at a superordinate level of complexity. Thus, the reflective statement "you seem angry" may only become meaningful if the individual reflects on antecedent behaviour in such a way as to isolate both behavioural elements and associated feelings and predicate them as examples of anger or not-anger. In the case of the Kaswan-Love videotape method, cues are propositions which may be checked against the objective recording, presented without additional implications ("I did x", "she did y"). In the conversational procedures cues are propositions concerning the classification of predicates ("Construct x is self-relevant"). In both cases, however, the subject must utilise an alternative language projection (Jones, 1968) to add meaning to the propositions ("I did x because I was angry", "I thought construct x was self-relevant because my wife is x"). The role of the developing meta language is thus the focussing of experience, or "the putting into unambiguous words and making conscious something which has been vaguely 'known', suspected, or 'felt', or something which is just outside the 'focus-range' of consciousness" (Jones, 1968, p.95). All secondary modelling activities have this function, namely the development of a propositional language capable of making behavioural cues intelligible.

5.2.1.4. Applicability of the skills paradigm.

Chapter 1.2. proposed that the development of conversational competence entailed that the individual acquire the means to initiate and direct modelling activity to achieve adaptive adjustments to self-cognitions. Modelling was viewed as a skilled activity because (a) it may be learned, (b) it is a self-regulating process, (c) it requires the differentiation of cues intrinsic to the modelling process, and (d) the breakdown of competence is manifested in failures to regulate modelling processes (e.g. anxiety, hostility, guilt, etc.). The analysis of self-modelling suggested three performance dimensions; (a) the alternation between participant and modelling modes of self-experience, (b) the distinctiveness of the self-model, and (c) the differentiation of predicates. Each dimension was translated into a specialised training paradigm, and embodied in three separate intervention strategies. The objective of the intervention strategies was to develop sensitivity to cues associated with each dimension of competence, and was rooted in the methodology of feedback control for which techniques for exteriorising, transforming and displaying modelling functions were developed. In the light of these studies, a number of observations may be made concerning the relevance and adequacy of these techniques.

(i) Feedback classes: One major consideration in the design of training paradigms concerns the nature of the intrinsic cues the learner is expected to identify. In the group study of Strategy A, for example, transformations were geared to exhibiting phases in the development of the group with a view to establishing behavioural indices to signpost transitions between phases. It was argued that future use of Strategy A depended on (a) the specificity of behavioural cues and (b) the assumption that group members could learn to recognise their occurrence. Similarly, in Strategy C operationally defined indices of predicate function were established with the intention that subjects would learn to identify intrinsic cues associated with their functional properties.

However, the Strategy C training paradigm was challenged on the grounds that it might equally lead to a task-specific learning outcome, namely the recognition of cues associated with the representation of cues in the repertory grid format. That is, subjects may have been learning to identify those features recognised by transformation procedures as indicative of predicate function rather than internal cues associated with their production.

In their discussion of rehabilitative training, Smith and Smith (1969) propose a distinction between three classes of information feedback (IF) which may clarify this problem. Their analysis of unaided motor actions identifies "the direct sensory effects of movement or <u>reactive feedback</u>; the dynamic effects of this movement on the environment...<u>dynamic operational feedback</u>; and the persisting static effects of the movement on the environment, called <u>static operational feedback</u>"(1969, p.395). Applying these distinctions to modelling processes, cues arising during the production of a construct represent reactive feedback (RF), the effects created by applying that construct to the element sample dynamic operational feedback (DOF), and the functional properties of the construct in relation to other constructs static operational feedback (SOF). Whilst RF and DOF are directly available to the subject, SOF is made available only on the application of transformation procedures. Smith and Smith found that performance under DOF control was markedly superior to performance under SOF control, and that learning in the latter did not transfer to DOF. In the repertory grid context, this implies that subjects will experience difficulty in utilising information concerning predicate function to identify DOF cues in the allocation of elements on construct dimensions. In fact, in the reciprocal insight grid study subjects occasionally requested E to specify how core constructs differed from peripheral constructs in terms of element placement, indicating this problem of transfer. Transfer was made more difficult by the use of accumulated terminal feedback (KR provided after a response series is complete, as in repertory grid feedback) rather than serial terminal feedback following the production of each construct. In view of this effect, it is thus doubtful whether learning outcomes obtained on this task will transfer to other modelling contexts.

(ii) Discriminative control: In addition to this limitation, the Smith and Smith scheme also highlights a second issue in relation to first-level learning, namely the distinction between the discriminative control of predication (formulating predicates of predetermined function) and retrograde discriminative accuracy (identifying predicate function following their formulation). The objective of the training paradigms is clearly the former, and entails learning to identify cues in RF. However, secondary modelling tasks were based on SOF, and in the absence of a serial feedback system providing SOF following production of each predicate, reactive control of modelling was unlikely to obtain.

It seems clear, therefore, that discriminative control is likely to occur only within a serial feedback system. Such a system would require the automation of transformations and a detailed analysis of the constitutive elements of the modelling task. Bilodeau (1966) and Annett(1972) provide the necessary framework for such an analysis by enumerating the temporal relationships between task components. Although their analysis centres on three significant intervals, a repertory grid task is more complex as it comprises a construct formulation response (CR) and a series of element allocation responses (AR). Consequently, four intervals are involved in the production of a single predicate (Fig. 102); the intervals between (a) successive element triad presentations (S), (b) CR and SOF, (c) AR and SOF, and (d) SOF and subsequent CRs.

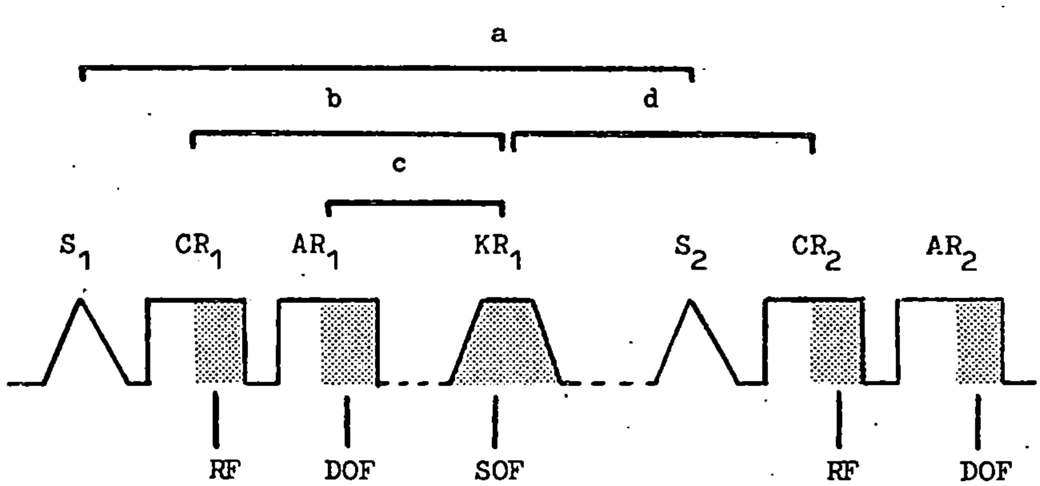


Figure 102 Predication task components.

(adapted from Bilodeau, 1966)

To achieve discriminative control the subject must match the information content of KR_1 to the RF arising in CR_1, possibly via the DOF arising in AR_1, and utilise this information to determine the IF function $CR_2=f(KR_1)$ (Bilodeau, 1966). Findings concerning the effect of size of each of these displays equivocal with respect to verbal learning tasks, although there are indications that the interpolated activity of AR could interfere with learning (Bilodeau, 1966).

(iii) Feedback transformations: The relationship between predication responses and IF is a third consideration in the design of training paradigms. In Chapters 3.4. and 4.1. Level 1 IF was essentially an ordinal difference score between R executed (S's anticipation of predicate function) and R required (observed predicate function), whilst Level 3 IF simply consisted of the categories "changed function" and "unchanged function". Bilodeau (1966) reports a number of studies in which coarseness of IF scale grain was detrimental to learning, and the use of extremely coarse IF scales at Level 3 may limit the extent to which cues associated with transitions of function are identified. Figure 103 depicts three degrees of scale transformation of IF, (a) representing Level 3 IF and (b) Level 1 IF.

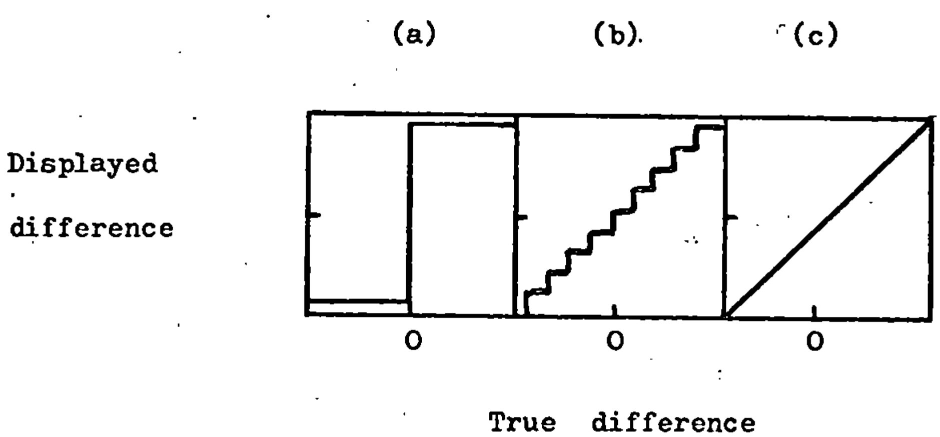


Figure 103. IF scale functions.

It is clear that for S to obtain continuous IF at Level 1 he would need to respond on a continuous scale when anticipating predicate function. Moreover, it was pointed out in the preceding chapter that the use of a continuous scale at Level 3 would require a different procedure for estimating disjunctions between prior hypotheses and data classes.

These three considerations suggest that the training paradigms employed in the studies are only marginally successful, and further testing should focus on (a) enhancing discriminative control of predication, (b) developing a serial feedback system, and (c) testing the effects of variations in IF scale grain. In general, the application of a feedback control paradigm to modelling activity has a future providing these relationships are clarified.

5.2.2. Methodologies of evaluation

5.2.2.1. Chapters 3.4. and 4.2. comprised tests of the effectiveness of Strategies C and B/C respectively. In both cases, evaluative strategies were developed in two stages; (a) the derivation of improvement criteria from the rationale of the intervention strategy, and (b) the construction of operational tests to assess change on these criteria. Test outcomes were disappointing. Whilst some tests did show evidence of criterial improvement, others obtained contraindicative results. These findings suggest five interpretations; (a) that the procedures did not achieve the desired outcomes, (b) that the improvement criteria were poorly matched to the strategy rationale, (c) that the operational tests did not sample relevant aspects of modelling behaviour, (d) that testing procedures biased behavioural outcomes, and (e) that subjective purposes did not coincide with the objective improvement criteria.

Chapter 5.1. has examined interpretation (c) in some detail and has concluded that some measures employed were ambiguous and in need of redefinition. However, the contraindicative findings cannot be fully explained by inadequate operational tests. Similarly, Chapter 5.1. has raised some doubts concerning the validity of some improvement criteria. This section is concerned, however, with determining the implications of interpretations (d) and (e) by taking a general view of the necessary and sufficient conditions for the evaluation of conversational procedures.

5.2.2.2. The control of nonspecific treatment effects.

One major feature of an appropriate evaluation strategy concerns the issue of whether conversational procedures contain specific therapeutic ingredients or whether some, or all behavioural change may be accounted for by nonspecific treatment effects. In his discussion of rules of evidence in the evaluation of psychotherapy, Thorne argues that "the effects of such concomitant variables as increased attention, suggestion, total push effects, etc., which seem to be present in all forms of psychotherapy, must be ruled out. As far as possible, concomitant variables must be identified" (1952, p.40). Thus, in evaluating conversational procedures it is necessary to identify and control for such variables.

Kazdin and Wilcoxon (1976) have attempted to identify concomitant variables in systematic desentitisation therapy in an attempt to devise control procedures. Their analysis centred on three non-specific effects; (a) treatment credibility, (b) demand characteristics, and (c) client expectancies concerning therapeutic change. They point out the problems in controlling for these factors and advocate the use of three control strategies; (a) the attention placebo strategy, in which subjects are administered a treatment which is designed to be credible but which excludes supposedly active therapeutic ingredients, (b) the treatment element strategy, in which subjects are administered a treatment which "resembles the actual treatment as closely as possible...most or all of the components of treatment are included...(but) altered or recombined in the control group to render treatment inert" (p.739), and (c) the empirically derived strategy, in which "the expectancy for therapeutic change generated by the control group is empirically demonstrated to be equal to that of the treatment group" (p.741).

Interpreting these strategies in terms of conversational procedures, control strategies may be constructed to utilise existing variables as follows:-

(i) Attention placebo: Subjects complete a repertory grid consistent with existing conversational procedures. Subsequently, a series of unstructured free-response self-description schedules are administered (e.g. the "Who are you?" technique, Bugenthal and Zelen, 1950; the sentence completion technique, Rotter, 1951; etc.), yoked to the same time-base as experimental subjects. Finally, the repertory grid is readministered.

(ii) Treatment element: Subjects complete an identical repertory grid cycle yoked to experimental subjects, but information feedback displays are randomised, displaced or excluded.

(iii) Empirical treatment: A series of tasks are devised and tested to ensure that they obtain comparable credibility and expectancy for therapeutic change. Tasks are preceded and followed by administrations of the repertory grid, and are yoked to experimental subjects.

Since before and after the repertory grid administrations are obtained, the dependent variables of component salience, complexity, anticipations of predicate function, etc. may be derived. It is clear from these proposals that evaluation strategies are based on between-groups designs. To what extent is such a design appropriate to conversational procedures? To examine this it is necessary to consider the rationale of conversational procedures in relation to subjective hypotheses and expectancies concerning their outcome.

5.2.2.3. Subjective modelling of measurement.

Chapter 3.5. discussed the implications of the observation that the differential effects of subjective strategies in the reported case-studies may lead to outcomes at variance with the improvement criteria. In particular, it was observed that two subjects displayed divergent trends on the dependent measure of diversity of predication, suggesting that these subjects entertained different purposes in their interactions with these procedures.

To place these observations in context it was pointed out that measurement in conversational procedures differed from the traditional experimental approach in two ways: (a) because measurement data was channelled back into ongoing modelling activity in the form of feedback displays, and (b) because the objective of the procedures was to enable the subject to exercise greater choice and control in his modelling activity. The procedures were then conceptualised as providing the conditions necessary for the subject to elaborate an internal model of measurement and transformation procedures (Figure 74, p.506). However, four possible responses to measurement information were envisaged; (a) non-response, in that the subject may acknowledge measurement outcomes, and even paraphrase them in secondary modelling, but fail to utilise the information to develop an internal model of measurement transformations, (b) noncontingent responses, where the subject fails to attribute meaning to measurement information, secondary modelling consequently being arbitrary and unrelated to transformation procedures, (c) restricted response, where the subject utilises measurement information to model a limited aspect of transformation procedures, and (d) strategic response, where the subject utilises measurement information to generate and test hypotheses concerning transformation procedures by manipulating primary modelling outcomes.

Response (d) is likely to give rise to the differences observed between subjects in their approach to modelling. Without implying that subjects deliberately manipulated primary modelling outcomes, it may be hypothesised that the discovery of relevant predicates in primary modelling may lead subjects to subsequently focus their attention to those predicates in order to maximise certain functional outcomes. Thus, in the case-studies of Chapter 3.4. one subject focussed on predicates which were manifestly self-relevant, whilst the other focussed on emergent predicates which provided an alternative description of relevant experiences. In short, improvement on objective criteria may arise only when those criteria coincide with subjective strategies for utilising measurement information. Consequently, the derivation of improvement criteria and the use of control groups to eliminate nonspecific treatment effects are both handicapped by the effect of indeterminate subjective strategies.

5.2.2.4. Negotiating assessment criteria.

Given the need to assess or control bias introduced into evaluation by nonspecific treatment effects and subjective strategies, it is possible to sketch the broad outlines of an evaluation strategy capable of meeting these needs. Firstly, Thorne's fifth rule of evidence must be observed, namely "external criteria of therapeutic success must be utilised" (1952, p.40). However, the procedure for establishing external criteria is flexible, and a system in which these criteria are negotiated may be envisaged. That is, subjective strategies may be compensated for by externalising these strategies and establishing improvement criteria partly on their basis. As Krumboltz has pointed out, "one set of statements cannot apply to all subjects...the goals of one client might be in direct contradiction to the goals of another client" (1966, p.154).

Such procedures are by no means new to the behaviour therapist. Many techniques may be evaluated only by (a) identifying a problem in behavioural terms with the aid of the client, and (b) developing individualised behaviour change goals, again with the aid of the client. However, there are implicit dangers in the construction of simple-minded objectives, not the least being the expression of therapeutic goals in negative terms (e.g. to stop biting my nails, stop smoking, stay out of gaol, etc.). McFall (1976) has suggested a simple test for such negatively-framed objectives, namely the "dead-man test"; "if a dead man could satisfy the criteria for the treatment objective, then the treatment's goal response is incomplete in that it does not adequately specify positive response criteria" (p.233). For McFall, objectives are preferably framed as increments in competence, "as the learned ability, acquired through training or experience, to perform with sufficient skill to produce an effect that meets the needs of a life situation" (p.234), a definition that is consistent with the concept of conversational skill developed in these chapters.

McFall's analysis offers four guidelines in the construction of subject-specific objectives; (a) definition by fiat, where "behaviours are identified as desirable merely because someone in a position of authority arbitrarily decides they are " (p.234), (b) definition by reference to known groups, where any specific behaviour that differentiates between the groups is treated as an essential component of competence, (c) definition by consensus, where opinion is pooled from several individuals, and (d) definition by experiment, where proposed objectives are sequentially modified on the basis of empirical tests. This last guideline implies that assessment should respond not only to subjective purposes, but also to <u>changes</u> in those purposes as treatment proceeds. Consequemtly, conversational procedures should entail a component concerned with the initial and sequential elaboration of objectives by which external criteria may be aligned. Landfield (1975) conceives this process as the elaboration of the complaint, in which client and therapist must overcome various restrictions on communication (client expectancies, therapist expectancies, threat of self-disclosure, client-therapist incongruency in attitudes and values) in order to establish counselling goals.

A more detailed account of the development of individualised goals is to be found in the ten steps advocated by Weigel and Uhlemann

(1975); (a) general goals (what change does S feel to be most important?), (b) behavioural goals (how would S behave if that change was achieved?), (c) observable behavioural goals (how could E tell if S had changed in this way?), (d) specific observable behavioural goals (in what context is changed behaviour expected to occur?), (e) establish base rate (how frequently does this behaviour occur now?), (f) establish criteria of failure (how could E tell if S did not achieve goals?), (g) reality check (how realistic are S's goals?), (h) importance check (do goal behaviours still appear as important as in (a)?), (i) contract (does S agree to pursue these goals?), (j) evaluation and recognition (subsequent evaluation of behaviour and renegotiation of goals as necessary).

With some modification these steps might be incorporated into the intervention strategies to enable evaluation procedures to become more formally aligned with a single-case methodology. It should be borne in mind that a single-case methodology does not imply that generalisations to other cases are not possible. Clinical psychologists have, for some time, been concerned with developing single-case methodologies which may (a) measure symptom changes in a single patient, and (b) do so in a manner which enables comparisons between patients (Shapiro, 1961a, 1961b). Moreover, to determine the extent of nonspecific treatment effects in the intervention strategies it will be essential to make such comparisons. Framing assessment criteria in terms of the single-case should in no way prohibit between-subject comparisons provided it is possible at least to establish (a) the variables on which change is expected to occur, (b) the magnitude of change on these variables, (c) the initial values, or base-line, on these variables, and (d) the time-base over which change is expected to occur. Further implementation of intervention strategies and their associated training paradigms may thus be conducted as systematic single-case experiments which would nevertheless permit comparisons between subjects or treatment groups established to test any of the features outlined in this chapter.

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Appendices

Appendix A

Reference frames in a friendship.

A.1. Coding significant events.

The table below summarises the distribution of the sample of 47 significant events by the independent judge over the reference frame and interaction modality categories.

Event	Onset (mins)	Duration (mins)	Reference Frame				Interaction modality			
			Deb.	Per.	Str.	F-F.	Act.	Pas.	Per.	Imp.
1.1.	3.1	.5	●					●		●
1.2	8.0	1.1	●				●			●
1.3	9.6	.9		●				●	●	
1.4	11.9	1.8		●				●	●	
1.5	14.0	1.1			●			●	●	
1.6	16.3	.5			●			●	●	
1.7	18.0	.8		●				●	●	
1.8	19.9	1.2		●				●	●	
1.9	23.7	1.0				●	●		●	
1.10	28.5	1.1				●	●		●	
2.1	2.2	.6		●				●	●	
2.2	5.2	1.0		●				●	●	
2.3	10.5	.8		●				●	●	
2.4	14.0	.9		●				●	●	
2.5	16.8	1.0		●				●	●	
2.6	23.5	.5				●	●		●	
2.7	30.8	1.2				●	●		●	
3.1	9.6	.5		●				●	●	
3.2	13.4	2.5		●				●	●	
3.3	16.9	.8		●				●	●	
3.4	25.5	.3		●				●	●	
3.5	27.2	1.2				●	●		●	
3.6	31.4	.6				●	●		●	
3.7	36.3	2.9		●				●	●	
3.8	50.4	2.0				●	●		●	
4.1	8.0	.8			●			●		●
4.2	9.0	1.2			●			●		●
4.3	11.8	1.9				●	●		●	
4.4	14.7	1.2		●				●	●	
4.5	19.1	4.2				●	●		●	
4.6	27.9	.7				●	●		●	
4.7	29.1	1.4				●	●		●	
4.8	37.5	1.0				●	●		●	
4.9	39.4	2.2				●	●		●	
4.10	44.0	.6				●	●		●	
4.11	46.6	1.3				●	●		●	
4.12	54.4	.6			●			●	●	
5.1	5.9	1.2		●				●	●	
5.2	7.8	.4		●				●	●	
5.3	9.3	1.4			●			●	●	
5.4	12.4	2.0		●				●	●	
5.5	15.0	.8			●			●	●	
5.6	16.9	1.5			●			●	●	
5.7	27.0	.6			●			●	●	
6.1	14.7	1.1	●					●		●
6.2	22.0	.6			●			●	●	
6.3	25.6	1.4	●					●		●

A.2. Transitional frequencies between reference frames.

The table below summarises the relative frequencies of transition from one frame to another in the sample of 47 significant events.

Convers.	Transition												Total
	D/P	D/S	D/F	P/D	P/S	P/F	S/D	S/P	S/F	F/D	F/P	F/S	
1	1				1	1		1					4
2						1							1
3						2					1		3
4						1			1		1	1	4
5					2			1					3
6		1					1						2

Appendix B

Reference frames in a group.

B.1. Elicitation instructions.

"From your list of group events, will each of you choose three at random and note down their numbers on your first row of the construct sheet. From those three events can you find a way in which any two are similar whilst different from the third? Note the numbers of the two that are similar under the column labelled "Pair" and the odd one out under the column labelled "single". Now note down in the space provided what it is that the pair have in common. A short phrase or sentence will do. Note in the other space what converse quality the single has that distinguishes it from the pair. Now consider all ten events in turn and d cide if each possesses the quality defined by the pair, by the single, or possesses qualities defined by both or neither the single or pair. If the first, put a ✓ in the appropriate square of your grid form, if the second an x, and if the last leave the square blank. Now select a second three events, ensuring that you do not select two together that you have previously considered, and repeat the process. Continue until you have produced and scored six constructs".

B.2. The element sample.

Listed below are the group events elicited by the group, numbered in order of elicitation:

E1 excluding E from discussion (week 3).
E2 improvised music event (week 7).
E3 "consequences" party game (week 4).
E4 first meeting (week 1).
E5 role-playing exercise (week 2).
E6 visiting the university (week 12).
E7 visiting the furniture workshop (week 8).
E8 tape-measure race (week 5).
E9 grid exercise (week 14).
E10 visiting the perspex factory (week 10).

B.3. The group grid.

Listed below are the grids completed on the sample of 10 group events by the seven group members (including E). Simon's constructs are not listed as he reserved the right to confidentiality and retained his constructs. In addition, Anne produced only 5 constructs, and E 11.

Member	No.	Pair = ✓	Single = x	Elements									
				1	2	3	4	5	6	7	8	9	10
Anne	1	POSITIVE	NEGATIVE	x	x	x	x	x	✓	✓	✓	✓	✓
	2	NO OBVIOUS PURPOSE	OBVIOUS PURPOSE	✓	✓	✓	✓	✓	-	x	✓	✓	x

Member	No.	Pair = ✓	Single = x	Elements 1 2 3 4 5 6 7 8 9 10
	3	AIM	AIMLESS	✓ ✓ x ✓ ✓ ✓ ✓ ✓ ✓ ✓
	4	SURE	UNSURE	x x ✓ x x - ✓ x x ✓
	5	AN EVENT	A WHOLE EVENT	✓ ✓ - ✓ ✓ x x ✓ - x
Simon	6			x ✓ ✓ x ✓ ✓ - ✓ - ✓
	7			x ✓ ✓ x ✓ ✓ - x ✓ ✓
	8			x ✓ ✓ x ✓ ✓ ✓ x ✓ ✓
	9			x ✓ ✓ x x ✓ ✓ x ✓ ✓
	10			✓ x x ✓ x x x ✓ x x
	11			✓ x x ✓ x x ✓ x ✓ ✓
Linda	12	OBVIOUS PURPOSE	AIMLESS	✓ ✓ x ✓ x ✓ ✓ - - ✓
	13	COMMON PREDICAMENT	BORING	x ✓ - ✓ x ✓ ✓ - - ✓
	14	OBVIOUS PURPOSE	EXUBERANT FUN	✓ ✓ x ✓ - ✓ ✓ x ✓ ✓
	15	COMMON PREDICAMENT	NEGATIVE	x ✓ x ✓ ✓ ✓ ✓ - - ✓
	16	EVERYBODY ON THEIR OWN	BEST BEHAVIOUR	✓ ✓ - ✓ ✓ x x ✓ - -
	17	EXCITING	UNEXCITING	x ✓ ✓ x x ✓ ✓ ✓ x ✓
Thomas	18	IMPERSONAL ROBOTIC	PERSONAL FEELINGS	x x ✓ x x ✓ x x ✓ ✓
	19	IMPERSONAL ENVIRONMENT	GOOD FUN	x x ✓ ✓ ✓ x x ✓ ✓ x
	20	RELAXED PARTICIPATION	GOOD FUN	x x ✓ x x ✓ x ✓ ✓ ✓
	21	US AGAINST YOU	RELAXED	✓ ✓ x ✓ x ✓ ✓ x ✓ ✓

Member	No.	Pair = ✓	Single = x	Elements 1 2 3 4 5 6 7 8 9 10
	22	POSITIVE	NEGATIVE	x ✓ ✓ x x ✓ ✓ ✓ x ✓
	23	WOULD DO IT AGAIN	WOULD NOT	x ✓ ✓ x x ✓ ✓ ✓ ✓ ✓
E	24	EXCITING	BORING	x ✓ ✓ ✓ - - x ✓ - -
	25	AIMLESS	OBVIOUS PURPOSE	✓ ✓ - - - x x x - x
	26	FUN	BEST BEHAVIOUR	x - ✓ x x x x ✓ - -
	27	COMMON PREDICAMENT	EVERYONE ON THEIR OWN	x ✓ ✓ x x ✓ ✓ ✓ - ✓
	28	POSITIVE	NEGATIVE	✓ ✓ ✓ x x - - ✓ - -
	29	WOULD DO IT AGAIN	WOULD NOT	✓ ✓ ✓ ✓ - - - ✓ ✓ -
	30	SURE	UNSURE	✓ x ✓ ✓ x ✓ ✓ ✓ x ✓
	31	NONEVENT	EVENT	x ✓ ✓ ✓ ✓ x x x ✓ x
	32	IMPERSONAL	PERSONAL	x ✓ x ✓ ✓ - - ✓ - -
	33	CONFIDENT ASSURED	EDGY, NERVOUS	x x ✓ x x ✓ ✓ ✓ - ✓
	34	UNIFIED	FRAGMENTED	✓ x ✓ x - ✓ ✓ ✓ x ✓
Barry	35	INVOLVED	NOT PERSONALLY INTERESTED	✓ ✓ x ✓ x ✓ ✓ ✓ ✓ x
	36	FORCED	RELAXED	✓ x ✓ ✓ ✓ x x x ✓ x
	37	GROUP RELAXED	ACADEMIC	x ✓ ✓ x x ✓ ✓ ✓ x ✓
	38	TIGHT MENTAL PROCESSES	NATURAL PERSONIFICATION	✓ x x ✓ ✓ x x x - x
	39	TOTAL PARTICIPATION	DISSIPATION OF ACTION	✓ ✓ ✓ ✓ x ✓ ✓ ✓ - ✓
	40	BORING	UNITY	x x ✓ x ✓ x x x ✓ x

Member	No.	Pair = ✓	Single = x	Elements 1 2 3 4 5 6 7 8 9 10
Sue	41	EXCITING	BORING	x ✓ ✓ x x ✓ ✓ ✓ x -
	42	AIMLESS	OBVIOUS PURPOSE	x x ✓ x x x x ✓ x x
	43	FUN	BEST BEHAVIOUR	x ✓ x x x x x ✓ ✓ ✓
	44	COMMON PROBLEM	EVERYBODY ON THEIR OWN	✓ x x ✓ ✓ ✓ ✓ x ✓ ✓
	45	POSITIVE	NEGATIVE	✓ ✓ x ✓ x ✓ ✓ x ✓ ✓
	46	WOULD DO IT AGAIN	WOULD NOT	✓ ✓ x ✓ x ✓ ✓ ✓ ✓ x

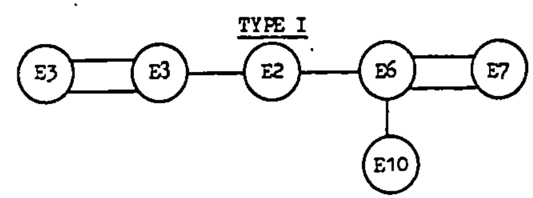
B.4. Group grid analyses.

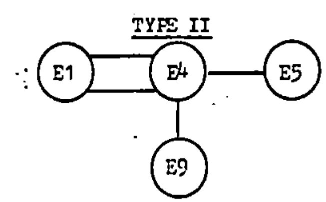
The 460 data points comprising the group grid were recoded into numerical form and processed by MQUIT (Thomas & Garnons-Williams, 1970) a computer program for analysing repertory grids, on Brunel University's ICL installation. The program computes a 'city-block' metric of numerical similarity ("matching scores") between the 10 elements and between the 46 constructs, and an elementary linkage analysis solution (McQuitty, 1957) for the two similarity matrices obtained. The following tables summarise the similarity matrices for the 10 elements, and linkage solutions for elements and constructs. The construct similarity matrix is not included as it comprises 1035 matching score entries.

(i) Similarity matrix for elements.

	E2	E3	E4	E5	E6	E7	E8	E9	E10
E1	4	-34	38	12	10	8	-25	-4	0
E2		-10	2	2	25	36	27	-2	31
E3			-36	-14	-21	6	48	10	6
E4				14	0	2	-23	27	-23
E5					-29	-19	-23	2	-14
E6						51	4	-17	59
E7							40	2	44
E8								-2	14
E9									-2

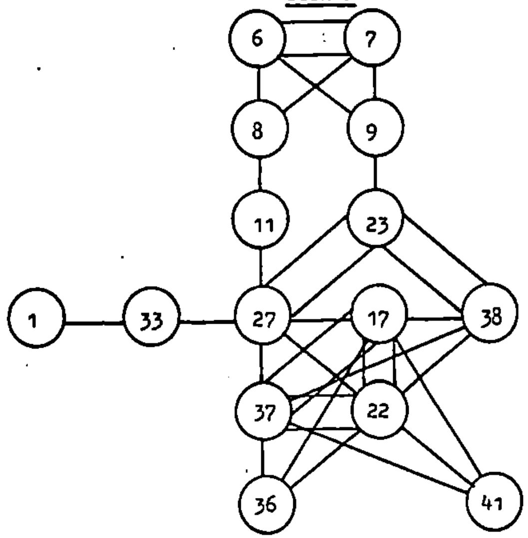
(ii) Elementary linkage solution for elements.



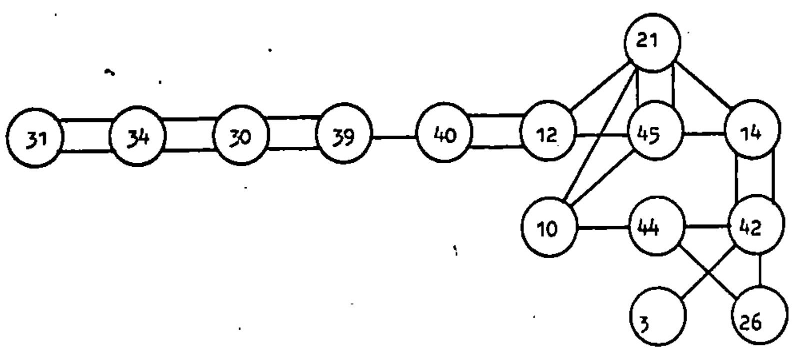


(iii) Elementary linkage solution for constructs.

TYPE I



TYPE II



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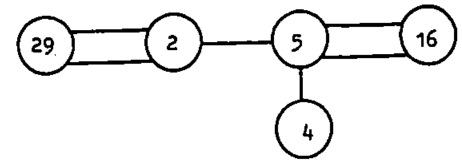
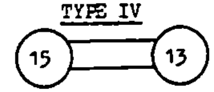
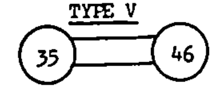


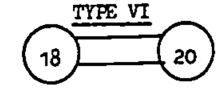
TYPE IV



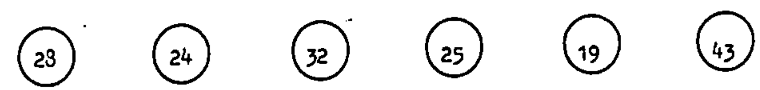
TYPE V



TYPE VI



ISOLATES



B.5. Scoring group events.

The constructs comprising Types I and II were examined and aligned such that all poles describing the satisfaction of Type I or II goals were denoted by +, and poles describing the failure to achieve Type I or II goals denoted by -. The ten group events were then arranged in chronological order, and scored + if located at the positive pole, - if at the scalar midpoint of Type I and II constructs. The following tables list element scores on constructs for Type I and II constructs, and the proportion of positive ratings for each phase of group development.

(i) Type I: social-emotional goal achievement.

Constructs	Elements									
	4	5	1	3	8	2	7	10	6	9
1	-	-	-	-	+	-	+	+	+	+
6	-	+	-	+	+	+		+	+	
7	-	+	-	+	-	+		+	+	+
8	-	+	-	+	-	+	+	+	+	+
9	-	-	-	+	-	+	+	+	+	+
11	-	+	-	+	+	+	-	+	+	+
17	-	-	-	+	+	+	+	+	+	-
22	-	-	-	+	+	+	+	+	+	-
23	-	-	-	+	+	+	+	+	+	+
27	-	-	-	+	+	+	+	+	+	
33	-	-	-	+	+	-	+	+	+	
36	-	-	-	-	+	+	+	+	+	-
37	-	-	-	+	+	+	+	+	+	-
38	-	-	-	+	+	+	+	+	+	
41	-	-	-	+	+	+	+		+	-
Total +ve	0	4	0	13	12	13	12	14	15	6
Total -ve	15	11	15	2	3	2	1	0	0	5
Grand total	15	15	15	15	15	15	13	14	15	11

(ii) Type II: Task goal achievement.

Constructs	Elements									
	4	5	1	3	8	2	7	10	6	9
3	+	+	+	-	+	+	+	+	+	+
10	+	-	+	-	+	-	-	-	-	-
12	+	-	+	-		+	+	+	+	
14	+		+	-	-	+	+	+	+	+
21	+	-	+	-	-	+	+	+	+	+
26	-	-	-	+	+		-		-	
30	+	-	+	+	+	-	+	+	+	-
31	-	-	+	-	+	-	+	+	+	-
34	-		+	+	+	-	+	+	+	-
39	+	-	+	+	+	+	+	+	+	
40	+	-	+	-	+	+	+	+	+	-
42	+	+	+	-	-	+	+	+	+	+
44	+	+	+	-	-	-	+	+	+	+
45	+	-	+	-	-	+	+	+	+	+
Total +ve	11	3	13	4	8	8	12	12	12	6
Total -ve	3	9	1	10	5	5	2	1	2	5
Grand total	14	12	14	14	13	13	14	13	14	11

(iii) Proportion of positive ratings.

Phase	Type I	Type II
1	.089	.675
2	.844	.500
3	.976	.878
4	.546	.546

B.6. Commonality of member's construing.

To assess the extent to which group members displayed commonality of construing of group events, a consensus matrix was obtained by calculating an index of reciprocal representation of types (i) between all pairs of members. This entailed obtaining two values: the product of the number of constructs contributed to each type by each member in the pair (p), and the product of the total number of constructs contributed by each member to the group grid (q). The value for i for members A and B defined by

$$i_{AB} = \frac{\sum_{j=1}^{m} p_{AB}}{q_{AB}}$$

where m = the number of types mutually represented by members A and B. The higher the value of i, the greater the commonality of construing between member pairs. Computing i for each member pair obtains the following consensus matrix:

	Barry	Anne	Linda	Simon	E	Sue
Thomas	.22	.10	.11	.28	.12	.14
Barry		.17	.19	.42	.21	.28
Anne			.20	.17	.14	.13
Linda				.14	.17	.19
Simon					.15	.19
E						.21

A rank-order typal analysis solution (McQuitty, 1971) was obtained from the consensus matrix, and is represented on page 223.

Appendix C   Reference frames in interviews.

C.1.   The grid sample.

Repertory grids depicting the construction of "personally significant learning experiences" by 12 A-level students were obtained in interviews with 6 team-members during a "learning-workshop", conducted at a South London College of Technology. The 12 students were aged between 16 and 21 years, and were studying a variety of A-level courses. Listed below are (i) the learning experiences (elements) nominated by each student, and their classification within the coding frame described on page 237, (ii) the constructs derived by the minimal context method from these elements for each student, and (iii) the grid matrices obtained by each student rating on a 5-point scale each element in terms of each construct.

(i)   The element samples and codification

S1   JB

		Code
1	embarrased in cashiers job	-=
2	private tuition in maths	+S
3	embarrased in maths class	-S
4	failure as a marine engineer	-=
5	accepted by geography teacher	+S
6	resented sister's success	-F
7	encoyraged in practical hobbies	+F
8	meeting new friends	+P
9	resented friend's success	-P
10	stimulated by friends	+P
11	reading Scott Fitzgerald	+R
12	listening to Leonard Cohen	+P

S2   KB

1	family's attitude to employment	+F
2	sister's asthma	+F
3	close relationships	+P
4	getting ideas in discussions with friends	+P
5	pop press	+R
6	the "Game"	+R
7	required reading	-S
8	reading for myself	+R
9	free classroom discussions	+S
10	tread quietly while Mr. X is around	+S
11	playing table football	+P
12	drop in for advice	+S

S3   NB

1	liberal and understanding father	+F
2	mother as educator	-F
3	difference in parental discipline to brothers	-F
4	closeness to sister	+F
5	gap between stepmother and me	-F
6	neighbours' attitude	-=
7	reading to pick up facts	-S
8	reading for cpurse	-S
9	plugging by teachers	-S
10	formal teacher-student relationship	-S
11	no outside contact with teachers	-S
12	getting to know teachers as people	+S

S4   MC

1	break-up with boyfriend	-P
2	leaving needlework class	-S
3	first day at junior school	-S
4	guys watching us who crashed	-P
5	chased in the park	-P
6	reading "The Devils"	-R
7	reading "Brave New World"	-R
8	detention in history class	-S
9	reading James Baldwin	-R
10	splitting up	-P

S5 RD		Code
1	revising for physics	-S
2	learning biology	-S
3	seeing "Easy Rider"	+R
4	friends getting engaged	-P
5	argument in family	-F
6	getting in late when 13	-F
7	seeing "The Klansmen"	-R
8	breaking off with boyfriend	-P
9	being approached by a drunk	-=
10	sister's overweight problem	-F

S6 JF		
1	bullied by father	-F
2	living alone with family	-F
3	resented friends	-P
4	jealous of desk-mate	-P
5	reading around the house	+R
6	reading done in sick-bed	+R
7	reading for lectures	-S
8	homework	-S
9	going to lectures	-S
10	jealous of teacher	-S
11	being naughty and found out	-S
12	leaving school with friends	+P

S7 EJ		
1	reading "Lord of the Rings"	+R
2	meeting teacher outside of school	+S
3	dinner party in Paris	-P
4	argument with headmistress	-S
5	row with sister's finance	-F
6	meeting new friends	+P
7	best friend moving away	-P
8	changing school and finding new friends	+P
9	moving to unfriendly district	-P
10	breakup with boyfriend	-P
11	grandmother coming to live with us	-F
12	caught up in drugs bust in pub	-P
13	disliked my primary school head	-S

S8 PP		
1	mistrusting people	-S
2	public school	-S
3	reading Poe and Blake	+R
4	school made me cynical	-S
5	seeing family in new light	-F
6	freedom of thought at college	+P
7	questioning authority	-S
8	insular existance	-F
9	better in small bursts	+S
10	working on my own	+S
11	unstimulating teachers	-S
12	problems with girls	-F
13	pop festival	+P
14	acceptance of drugs	+P
15	seeing father's narrow existance	-F
16	music an emotional outlet	+R

S9 CS		
1	eyes opened to chemical warfare	+R
2	moving to England from Canada	+S
3	poetry evenings	+P
4	seeing "Godspell"	+R
5	elected head boy	+S
6	failing R.A.F. medical	-=
7	learning to drive	+R
8	history lectures a waste of time	-S
9	conducting debates on school council	+S
10	careers visit to London Airport	+=
11	holiday in Germany	+P

12	reading bible in assembly	+S
13	reading about Kim Philby	+R
14	gliding: overcoming the odds	+R

S10 LS

1	meeting new people	+P
2	getting religion	+P
3	meeting persuasive people	+P
4	understanding other people	+P
5	field course	+P
6	accepting parents could divorce	-F
7	mother's interest in social work	+F
8	explaining own point of view	+P
9	help from friends	+P
10	getting confidence from a friend	+P
11	forced to develop a social conscience	-P
12	parasites	-S
13	lectures	-S

S11 BU

1	winning football match	+P
2	responsibility for brother and sister	+F
3	coming out of shyness	+P
4	failure at poetry	-S
5	fifth year club	+P
6	success at P.E.	+S
7	hit by woodwork teacher	-S
8	not understanding Shakespeare	-S
9	awareness of germ warfare	+R
10	learning guitar with friends	+P

S12 SW

1	discussions with friends	+P
2	father	+F
3	meeting Marc Bolan	+P
4	parents taking an interest	+F
5	helped out of shyness at nursery school	+S
6	reading for course	-S
7	bullied by teachers	-S
8	meeting interesting people	+P
9	helpful teacher	+S
10	subjected to authority	-S
11	conforming to syllabus	-S

NOTES

The following symbols denote the origin of the experiences; S, school or college; F, family; P, peer relationships; R, recreational activities; =, miscellaneous. The symbols + and - denote confirming and disconfirming experiences, respectively.

(ii) The construct samples

S1 JB

1	represent an inability of my own character because of judgement by other people.	something I've achieved myself without direction from authority... it might also appeal to those who judge me.
2	represent education system...my inability to be absorbed into it whilst friends were successfully	represents a success of my own which alienates me from the system
3	represents success and more enjoyment, my ability to relate to	situated where something was expected of me, but where inability to comply less painful than in education
4	able to obtain certain satisfaction myself whilst giving some to others.. less demanding	no set patterns or direction laid down for me to follow...able to choose own situation & direction that appealed

5	overwhelmingly unpleasant...could not come to terms with these situations...too traumatic...localised	existed over longer time...moments of pressure...able to look objectively in time/& partly come to terms with it
6	I believed there was a greater pressure on me...built up in my mind.. atmosphere very impersonal	less pressure...atmosphere more personal...less demanding..my failure taken less harshly

S2 KB

1	experience in the schoolroom... originating there anyway	day-by-day life
2	to do with immediate outlook or feelings	not into direct contact...like seeing films of foreign cities... more remote
3	feeling of only being appropriate for specific occasions	feel that I could always do it... any time
4	only acquire flat images	like pottery...shape becomes more distinct...build up solid experiences
5	fantasy...can never acquire reality	harshness of reality
6	feeling of insecurity	security...safe amongst friends
7	feeling of goodwill...social awareness	social awareness but no goodwill
8	feeling of "oh yes I'd like to do or feel that"	feeling of "It's a waste of time" sometimes
9	experience of educating oneself by reading	experience of educating oneself by discussion

S3 NB

1	apply to my mother in that she as an educator has caused the difference in parental discipline	deals with my father, he being more different from my mother
2	attitude of my mother and sister to me and mine to them are different but do influence my learning	attitude of my neighbours has little to do with learning or way of life at all
3	deal with my reading and what I read	plugging by teachers was unimportant unlike my reading
4	as I started sec. school & Tech. I found just a pupil-teacher relationship existed	later at school I found that I got to know the teachers more as people
5	plugging by teachers at attitude of neighbour count for very little	difference in parental discipline has altered my life quite considerably
6	I have an almost teacher-pupil relationship with my mother	reading has little to do with my relationship with my mother
7	relationship with father and the reading I do influences my learning	the pupil-teacher relationship with lecturers does not account for any change or difference in my learning
8	relationship with my mother and sister are very different but they are very influential	getting to know teachers has influenced my school life but not my home life as well

S4 HC

1	other people's behaviour changed my attitudes	it was to do with me rather than other people
2	made me consciously want to change	had an effect on me in an unconscious way

3	enabled me to do something about changing people	nothing I could change in my behaviour...just my ideas
4	gave me an outlet to change	bad experiences
5	put me off authority	no effect on my feelings for authority
6	thought how callous people are	thought how callous I am
7	really couldn't tolerate it	prepared to tolerate the bad side

<u>S5 RD</u>

1	really had to work	its me trying to find an easy way out
2	feels reasonable at the time	don't feel reasonable at the time
3	seemed injustices...concern many people...difficult to solve	personal concern...could easily be solved
4	someone else's decision	own decision involved
5	made me feel trapped	nothing to do with that feeling
6	made me a bit cautious	grinding effect
7	made me feel I <u>ought</u> to do something	made me feel I <u>wanted</u> to do some-thing

<u>S6 JF</u>

1	subtle external influence	pressure to learn
2	effect of the environment	pressure (again)
3	incentive to learn caused by jealousy of others who are cleverer than me	opposite
4	learning things not specifically to do with me	learning things that were to do with me
5	did by choice	no choice
6	for personal satisfaction	general interest
7	produced good results	obstinacy
8	provoked me to think more	following blindly
9	my own conditions	conditions imposed by parents & others
10	like	dislike
11	"good thing" in others' estimation	"bad thing...."

<u>S7 EJ</u>

1	affected dealings with other people	didn't...
2	changed way of seeing people	didn't...
3	contact with new people...ideas	loss of someone
4	opened up new ideas...new things to discuss	opposite
5	other people entering the family circle...causing various upsets	me entering somebody else's family and circle of friends
6	losing contact with familiar people and things	making contact with new person
7	meeting new people...different types but similar to myself	coming up against someone whose character crushed my own
8	losing someone close	
9	changed relationships inside the family	didn't

10	finding out people's true character.. looking further than superficialities	finding out my own character

S8 PP

1	affected view of authority	didn't
2	made me think of other people's views	hasn't
3	made me question society	no effect on views on society
4	made me realise importance of academic interest	no effect on views of importance
5	made me realise the validity of	no effect on realisation
6	made me try to understand others	no effect on my trying to understand
7	realising value of expressing myself through the medium	no effect on realisation
8	made me want to break away from society	no effect on wanting to break away
9	made me wary of other people's characters at first	no effect on making me wary

S9 CS

1	fear that if west and east went to war, serious disasters could result on the people	excitement in handling a car, adventure which is safe
2	fear in coming into something new my fears compared to other people's fears	confidence in my job of being in command
3	receiving something	giving something
4	overcoming a worry	receiving a worry
5	pleasure in reading and seeing	work that goes with the job
6	speaking out	silent majority
7	knowing what it was all about	not really knowing
8	learning about people	learning about myself
9	finding something new about myself	already knowing
10	moving from one country to another ...travelling long distances	stationary
11	flying	ground

S10 LS

1	learning from more than one person	...from one person in particular
2	emotional self expression	unemotional...impersonal
3	from others insights (my insight into their insights into events)	from my own insights (my insight into events directly)
4	thing learned as end product	thing learned leads to further activity
5	(influence by) vague ideas... dependent on my own memory of them	(influence by) clearly thought out ideas, which are set down and can be directly referred back to

S11 BU

1	growing up...thought..awareness	part of life whereas pair are new.. accepted
2	different sort of achievement... learning	achievement through learning
3	liking	dislike...discouraged...disillusioned
4	like	dislike
5	liking...growing up..authority	hate...growing up...embarassment

6	incomprehensible...academic	basic...sport
7	friendship...coming out of a shell	not necessarily friendship...shy...embarassed
8	good	bad...hate
9	reading...concrete	a sense

S12 SW

1	same generation	older generation
2	self organised	someone else telling you what to do
3	if interested has more positive effect	if not interested has negative effect
4.	more related to life in general	related particularly to school
5	open..free..talk about what I like	not free to say what I like..on guard
6	take notice of and therefore learn	put off and not remember
7	affected attitude to life positively ...generation gap..etc.	affected attitudes negatively

(iii) THE GRID MATRICES

(N.B. CONSTRUCTS BY ROW, ELEMENTS BY COLUMN).

S1 JB

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	3	2	2	3	1	4	4	4	5	5	5
2	1	3	1	2	4	2	4	4	2	5	5	5
3	4	2	3	5	1	4	3	2	3	2	1	1
4	3	1	3	2	1	3	1	5	4	5	5	5
5	1	3	1	4	3	5	3	3	5	3	3	3
6	1	5	1	5	4	2	4	5	3	4	3	3

S2 KB

	1	2	3	4	5	6	7	8	9	10	11	12
1	5	5	5	4	4	5	2	3	3	1	3	1
2	1	1	1	1	5	4	3	3	3	2	2	2
3	1	3	4	4	5	5	1	5	5	2	2	2
4	1	1	1	1	2	3	5	5	1	1	1	1
5	4	5	5	3	3	1	3	1	4	4	4	4
6	1	2	2	5	4	4	4	4	5	1	3	3
7	5	2	4	2	2	1	2	2	2	5	1	3
8	2	5	5	1	1	1	1	1	1	3	1	3
9	5	5	5	5	1	1	1	1	5	3	5	5

S3 NB

	1	2	3	4	5	6	7	8	9	10	11	12
1	5	2	1	5	1	3	3	4	3	2	2	4
2	1	2	2	1	1	5	5	5	5	4	4	4
3	3	2	3	3	3	5	1	1	5	4	4	4
4	5	2	4	5	2	3	3	3	1	1	1	5
5	5	4	5	5	5	1	3	3	1	4	3	4
6	1	1	2	1	1	3	3	5	3	1	2	2
7	1	2	3	2	1	5	1	1	4	2	5	1
8	1	2	2	1	1	3	3	3	3	4	2	5

S4 MC

	1	2	3	4	5	6	7	8	9	10.
1	2	5	1	4	1	2	2	1	2	4
2	3	3	4	2	1	5	5	4	5	2
3	5	3	4	4	5	3	5	1	1	2
4	1	3	2	2	1	4	4	2	5	5
5	1	4	1	4	5	2	1	1	1	5
6	4	3	2	3	3	1	2	1	1	5
7	4	1	4	2	4	5	5	5	5	2

S5 RD

	1	2	3	4	5	6	7	8	9	10
1	5	1	1	3	4	4	3	4	5	5
2	3	5	5	1	1	5	5	1	1	5
3	3	5	4	3	3	5	1	5	1	1
4	3	1	1	1	2	2	1	1	1	5
5	2	4	1	3	1	5	1	1	1	1
6	2	5	1	5	1	4	5	1	5	1
7	1	3	5	3	5	3	1	5	1	1

S6 JF

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	3	2	2	3	2	2	5	1	2	4	2
2	2	1	2	2	1	1	2	5	2	2	4	1
3	1	2	1	1	2	2	1	5	1	1	4	2
4	5	4	5	5	4	4	1	2	2	5	1	4
5	5	5	1	1	2	4	1	1	1	1	4	2
6	1	5	1	1	2	5	1	4	2	1	4	5
7	1	4	2	2	1	1	2	5	1	2	1	1
8	2	2	1	5	4	4	1	1	1	2	4	1
9	1	1	4	5	2	2	4	5	4	5	1	3
10	2	4	1	2	4	4	2	5	1	2	5	2
11	1	5	2	2	4	1	1	5	1	2	2	5

S7 EJ

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	4	2	3	3	1	1	1	2	1	1	2	3	3
2	5	2	2	2	3	2	5	2	4	1	3	1	2
3	1	2	2	4	5	1	5	1	1	5	4	3	5
4	1	2	4	3	5	1	5	2	4	5	4	3	5
5	5	4	5	5	1	4	5	4	2	5	1	2	3
6	5	5	2	3	2	5	1	3	1	1	5	2	5
7	2	1	5	5	5	1	5	1	4	3	4	5	5
8	5	5	5	5	3	5	1	5	2	1	5	2	5
9	5	5	5	4	1	2	1	3	3	3	1	2	4
10	5	1	3	1	1	2	5	2	4	5	3	2	1

S8 PP

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	4	1	2	3	3	5	1	2	5	5	2	5	5	1	2	3
2	2	1	1	1	1	4	1	4	5	5	3	1	2	3	1	2
3	4	1	1	1	2	2	1	1	5	5	4	5	1	1	1	3
4	5	1	2	5	5	5	2	3	1	1	1	5	5	5	5	2
5	4	1	2	3	3	3	1	1	5	5	4	5	1	1	1	1
6	1	1	1	3	1	5	1	5	5	5	3	1	2	4	1	3
7	5	1	1	5	5	2	2	3	5	5	4	2	1	3	2	1
8	2	1	1	3	3	4	1	2	5	3	4	2	1	1	1	2
9	1	1	3	1	1	5	1	4	5	5	5	1	5	1	2	5

S9 CS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	3	2	4	4	2	5	3	3	4	2	4	2	5
2	4	1	2	2	5	1	4	3	4	4	3	3	2	4
3	2	2	1	2	4	3	2	1	4	1	3	5	2	3
4	4	3	4	3	2	5	2	3	2	1	2	3	4	1
5	2	3	2	1	3	4	2	5	5	3	2	3	1	4
6	5	4	5	3	2	4	2	3	1	2	3	1	4	3
7	5	5	4	2	1	2	2	1	3	2	3	3	2	1
8	5	4	5	4	1	4	3	5	2	2	1	4	2	2
9	1	3	3	5	2	1	1	4	3	2	3	5	4	2
10	4	1	5	4	2	2	5	5	3	4	1	3	3	2
11	2	4	5	3	2	1	2	5	5	1	2	3	5	1

S10 LS

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	2	1	3	4	4	4	2	5	5	5	5
2	1	1	2	1	5	2	3	1	2	1	4	5	5
3	2	1	2	1	4	5	2	1	1	4	3	3	2
4	1	4	5	2	5	3	4	2	2	5	4	4	5
5	1	4	4	2	1	2	1	1	2	3	5	5	5

S11 BU

	1	2	3	4	5	6	7	8	9	10
1	4	2	3	5	4	3	4	3	1	3
2	2	3	2	5	3	1	5	2	1	1
3	3	2	1	4	3	2	5	4	3	2
4	1	3	2	4	3	2	5	4	2	2
5	3	2	1	5	3	3	5	5	3	1
6	5	3	4	1	4	5	3	2	2	3
7	2	2	1	5	2	1	5	5	4	4
8	2	2	2	4	3	2	5	4	3	2
9	2	2	5	1	3	2	3	1	1	2

S12 SW

	1	2	3	4	5	6	7	8	9	10	11
1	1	5	1	5	3	4	5	1	2	5	4
2	5	4	2	1	1	4	1	4	3	1	1
3	1	2	1	2	2	5	5	1	1	5	5
4	1	3	1	5	3	5	1	1	5	1	5
5	1	5	1	3	2	4	4	1	3	5	3
6	1	1	1	3	2	5	1	1	2	1	5
7	1	2	1	1	2	3	5	1	2	5	3

C 2 Diversity of construction

To develop a measure of diversity of construction Kendall's coefficient of concordance was adapted for use with sets of ratings rather than rankings. The procedures involved are as follows:-

(i) A similarity matrix between constructs in each grid was obtained by computing "matching scores" (Thomas & Garnons-Williams, 1972) for all pairs of constructs. The diversion of rating on constructs was adjusted to optimise matching scores where necessary.

(ii) The sums of ratings for each element over all constructs were obtained (r_j) and summed ($\sum r_j$).

(iii) A value of χ^2 was computed for each grid as follows:-

$$\chi^2 = \sum_{j=N}^{1} \left[\frac{\left(r_j - \frac{\sum r_j}{N} \right)^2}{\frac{\sum r_j}{N}} \right]$$

with N-1 degrees of freedom

where N=number of elements in each grid.

It is evident that this measure seeks to estimate the extent of divergence of the observed distribution of r_j's from a square distribution. If after the direction of rating on constructs has been optimised to obtain the highest matching scores for the n(n-1)/2 pairs of constructs, it is possible to infer a high degree of diversity of construction. A significant departure from a square distribution of r_j's indicates a high degree of numerical similarity between constructs, and low diversity of construction. However, since the probability of diversity increases as the number of elements increases, the diversity score is adjusted as follows:-

$$\text{diversity score} = \chi^2/\text{number of elements } (N)$$

The following table lists the values of χ^2 and diversity scores obtained in the sample of 12 grids.

Subject	χ^2	df	N constructs	Diversity score
S1 JB	19.31	11	6	1.609
S2 KB	7.49	11	9	.624
S3 NB	7.57	11	8	.631
S4 MC	21.63c	9	7	2.163
S5 RD	11.47	9	7	1.147
S6 JF	37.63a	11	11	3.135
S7 EJ	10.09	12	10	.776
S8 PP	63.55a	15	10	3.972
S9 CS	7.77	13	11	.555
S10LS	26.43b	12	5	2.033
S11BU	16.63	9	9	1.663
S12SW	26.30b	10	7	2.391

Notes: The following subscripts denote level of significance: a, $.001 > p$; b, $.01 > p$; c, $.05 > p$.

C3 Classification of elements.

The sample of 145 elements was coded according to the origin and type of experience reported by the students. The following tables tabulate (i) frequency of element classes, and (ii) frequency of element classes by interviewer.

(i) Frequency of element classes.

High Diversity Group	School Conf	School Disc	Peers Conf	Peers Disc	Fam. Conf	Fam. Disc	Rec. Conf	Rec. Disc	Misc. Conf	Misc. Disc	T
S9 CS	4	1	2	-	-	-	5	-	1	1	14
S2 KB	3	1	3	-	2	-	3	-	-	-	12
S3 NB	1	5	-	-	2	3	-	-	-	1	12
S7 EJ	1	2	2	5	-	2	4	-	-	-	13

	Sch. Conf.	Sch. Disc.	Peers Conf.	Peers Disc.	Fam. Conf.	Fam. Disc.	Rec. Conf.	Rec. Disc.	Misc. Conf.	Misc. Disc.	T
S5 RD	-	2	-	2	-	3	1	1	-	1	10
S1 JB	2	1	2	1	1	1	2	-	-	2	12
S11 BU	1	3	4	-	1	-	1				10
Subtotal	12	15	13	8	6	9	13	1	1	5	83
Low Diversity Group											
S10 LS	-	2	8	1	1	1	-	-	-	-	13
S4 MC	-	3	-	4	-	-	-	3	-	-	10
S12 SW	2	4	3	-	2	-	-	-	-	-	11
S6 JF		5	1	2	-	2	2	-	-	-	12
S3 PP	2	5	3	-	-	4	2	-	-	-	16
Subtotal	4	19	15	7	3	7	4	3	0	0	62
Grand total	16	34	28	15	9	16	17	4	1	5	145

(ii) Origin of experience, immediate effect, and interviewer.

Inter.	S	Origin of experience and immediate effect: Sch. Conf.	Sch. Disc.	Fam. Conf.	Fam. Disc.	Peers Conf.	Peers Disc.	Rec. Conf.	Rec. Disc.	Misc. Conf.	Misc. Disc.	Total
1	12	2	4	2	-	3	-	-	-	-	-	11
	8	2	5	-	4	3	-	2	-	-	-	16
	11	1	3	1	-	4	-	1	-	-	-	10
2	4	-	3	-	-	-	4	-	3	-	-	10
	5	-	2	-	3	-	2	1	1	-	1	10
3	2	3	1	2	-	3	-	3	-	-	-	12
	6	-	5	-	2	1	2	2	-	-	-	12
4	3	1	5	2	3	-	-	-	-	-	1	12
	9	4	1	-	-	2	-	5	-	1	1	14
5	1	2	1	1	1	2	1	2	-	-	2	12
	10	-	2	1	1	8	1	-	-	-	-	13
6	7	1	2	-	2	2	5	1	-	-	-	13
Total		16	34	9	16	28	15	17	4	1	[illegible]	145

Appendix D. A consideration of the formal properties of repertory grids.

D 1 The formal properties of repertory grids.

The most elementary formulation of the population of grid responses is as a semi-ordered set of predications represented numerically on a series of judgement scales. Different methods of numerical representation entail different assumptions and associated data models. Since these data models determine subsequent data reduction methods, it is important to distinguish procedures for representing grid responses. Three representation procedures are commonly employed [1]; (a) the dichotomised form, elements being exclusively assigned to one or other pole of each construct, (b) the ranking form, elements being ordered by proximity to one construct pole, usually the emergent pole, (c) the rating form, where elements are assigned to an ordinal set of categories on an equal-interval scale between the extremes formed by the two poles of the construct.

The response matrices by these methods offer three data types within Coomb's Theory of Data [2]:-

(a) Dichotomised form: pair of points from different sets, proximity. Form of matrix: off-diagonal, dichotomous, symmetric data on points (Quadrant IIb;). Example Datum: Does element A belong with attribute 1?

(b) Ranking form: pair of distances from different sets, dominance. Form of matrix: off-diagonal, nondichotonous dominance data on distances (Quadrant Ia;). Example datum: does the distance from element A to attribute 1 exceed the distance of element B to attribute 1?

(c) Rating form: pair of points from different sets, proximity. Form of matrix: off-diagonal, nondichotonous, symmetric proximity data on points (Quadrant IIb). Example Datum: to what extent does element A belong with attribute 1?

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1 Bannister D. & Mair J.M.M. The evaluation of personal constructs. Academic Press, 1968.

2 Coombs C.H. A theory of data, Wiley, 1964.

Having decided which data type the grid predicates denote, it is possible to summarise these necessary assumptions in the data model[3]:-

(a) Dichotomised and rating forms:

(i) Datum a relation: a datum is a relation on a pair of points or a pair of distances.
(ii) Common dimension: there exists at least one dimension that is psychologically common to both real world counterparts of the two points.
(iii) Excluded indifference: either a given relation or its complement connects the two points; no third category exists.

(b) Ranking form in addition to the above:

(iv) Positive direction: the researcher decides in advance which responses he will arbitrary call positive and interpret to mean that one point dominated a second, not that the second dominated the first.
(v) Monotonicity: the relation between the response and the order of the two points is monotonic.

In summary, if the grid matrix is treated numerically the conditions listed above must be satisfied in each of the threee modes of representation. As will be seen, these data types may themselves be transformed into other types, and the rationale of this transformation depends critically on the assumptions made at this stage.

D 2 Data reduction models.

Depending on data type, grid matrices may be numerically analysed to reveal multidimensional patterns. To achieve this a second-order proximity matrix is derived composed of coefficients of similarity or association between judgement scales and items. Each data type represents a discrete level of measurement, and ideal coefficients of similarity or association are as follows:

(a) Dichotomised form: assuming point distribution for both dichotomised variables the most appropriate statistic is the phi-coefficient, φ. Suitable for both construct and element relationships.

(b) Ranking form: assuming monotonicity of ordinal relationships for both ranked variables, the most appropriate statistic is Spearman rank-difference correlation coefficient, r_s. Suitable for construct relationships only.

(c) Rating form: exact probabilities of observed differences given rating distributions on both variables. Suitable for both construct and element relationships.

Employing the appropriate coefficient, two new matrices are generated from the original grid data, namely an element proximity matrix, and a construct proximity matrix. In both cases, these matrices conform to the following type:-

Quadrant IIIb: Intact, non-dichotomous, symmetric proximity data on points of the same set.
Example datum: Do elements/constructs A and B belong in the same class?

Such proximity matrices may be further reduced by application of a multivariate analytic model. Four such models are commonly employed:-

(i) Cluster/typal analysis: essentially aimed at identifying configurations in proximity space, cluster and typal analyses have evolved from non-Cartesian models, such as non-dimensional graphs and sociometric analyses. Attempts to integrate the location of configurations into a space of known dimensionality have yielded multidimensional models such as simplex, circumplex, and radex models[4]. The disadvantages of the cluster/typal model are (i) that different models entail different membership conditions, and boundary criteria are fairly arbitrary; (ii) that the solution is non-dimensional and inter-relationships between types are frequently difficult to estimate; (iii) that in many forms od data intransitivities are frequent and membership criteria inadequately resolve ambiguities[5].

3. Runkel P.J. & McGrath J.E. Research on human behaviour, Holt Rinehart & Winston, 1972.

4 Runkel P.J. & McGrath J.E., op. cit.

5 Blashfield R.K. Mixture model tests of cluster analysis: Accuracy of four agglomerative hierarchical methods, Psychol. Bull., 1976, 83(3), 377-383.

(ii) Factor analysis: essentially aimed at defining the reference coordinates of proximity space, in which "every stimulus is represented by a point, and every point has a projection, or position on every dimension or 'reference vector'...Factor analysis represents stimulus points as vectors (that is, directed lines) and seeks a reduced set of vectors spanning a space in which the original vectors can be embedded. In factor analysis, consequently, the search for axes or reference vectors is explicit, and the choice of an efficient set of axes is a central problem"[6].

(iii) Principal components analysis: This model "accounts for the variance within a set of data by providing those linear combinations of correlated variables that maximise the variance of the weighted sum...The new variable (the weighted sum) is called the first principal component...and other weighted sums that are orthogonal to the first are also considered. The weights in the principal components associated with a vector of correlated attributes are exactly the normalised latent vectors of the covariance matrix of the vector of attributes, and the latent roots of the covariance matrix are the variances of the principal components".[7]

(iv) Multidimensional scaling: in contrast to factor and principal components analyses, multidimensional scaling employs only ordinal relationships within the proximity matrix. Reference coordinates are evaluated by the criterion of "goodness-of-fit" or stress;

"We seek, simply, that configuration of n points in the (Euclidian) space of smallest possible dimensions such that, to an acceptable degree of approximation, the resulting interpoint distances d_{ij} are monotonically related to the given proximity data, in the sense that $d_{ij} > d_{kl}$ whenever $S_{ij} > S_{kl}$. In order to apply the gradient method, and, hence, to find the optimum configuration of points, the only further specification required is an explicit function to measure the to-be-minimised departure from the desired monotonic relation between the given proximity data S_{ij} and the distances d_{ij}. Then one simply employs an algorithm according to which the coordinates for the points are adjusted, during each interaction, in the direction of the (negative) gradient of that function until 'stationary' is reached in which the gradient vanishes and - barring entrapment in a merely local minimum - any further adjustments could only make the fit worse".[8]

Notwithstanding the merits of these techniques, a number of points should be raised regarding their applications to grid analysis:-

(a) To what extent do the models omit potentially important responses? Factor and principal components analytic solutions tend to depreciate small sources of variation (e.g. individual constructs). Cluster-typal analytic solutions frequently reject ambiguous or tied relationships in demarcating typal boundaries.

(b) Are the models of functional equivalence employed by the techniques appropriate? That is, are the descriptive statistics adequate for the level of measurement employed in the grid, and are the statistics satisfactorily utilised in deriving solutions?

(c) To what extent are original responses recoverable from solutions? The reference coordinates of factor and principal component analytic solutions are synthetic, whilst typal solutions are recombinations of original responses.

(d) Are the solutions readily interpretable? In very few models is this the case. Investigators may experience equal difficulty in identifying the basis on which constructs have been grouped in typal solutions as in identifying the underlying reference axes in factor analytic solutions.

D 3 EXACT: A FORTRAN IV program for calculating exact probabilities of association between constructs and elements in a repertory grid by reference to observed responses.

As noted above, association coefficients in current usage are sensitive to implicit assumptions which are rarely satisfied. To satisfy them requires either a

6 Runkel P.J. & McGrath J.E. op. cit. p.336

7 Press S.J. Applied multivariate analysis, Holt, Rinehart & Winston, 1972, p. 283-284

8 Shepard R.N. in Multidimensional Scaling: Vol 1 Theory, Shepard R.N., Romney A.K., Nerlove S.B. (Eds) Seminar Press, 1972, p.7-8.

knowledge of the nature of the distribution of scalar responses, or the constraint of scalar responses to form a known distribution with invariant properties i.e. the split-half and ranking forms.[9] The use of constrained scales presents many problems (ambiguous scalar placement on bipolar scales; ties, and the consequent reduction of the sum of squares; non-equality in direction of ranking on bipolar scales, etc.). On the other hand, alternative methods (e.g. the rating form) and alternative statistics (e.g. matching scores, Pearson r, etc.) yield biased measures of similarity if the assumption of interval equality is not met. A problem in this respect is construct "lopsidedness", and the confounding of similarity measures that this produces.[10] Empirically, construct rating distributions vary a great deal, and this diversity in itself reveals much information about the nature of construing. Using five-point scales, symmetrical distributions are fairly rare, and symmetrical square distributions rarer still. Of the symmetrical distributions most take a "saddle-shaped" form. Interestingly, as constructs of this form are retested, many appear to approximate to a square distribution, indicating that the construct has acquired a more "verbal" identity, and comes to be used independently of the extreme elements that initially defined it.

By far the most common are irregular distributions, often with zero frequencies at one or several points. For a similarity coefficient to compensate for irregular distributions the distribution must be known, and must figure in the derivation of the coefficient measure. By far the most reliable, if a little inconvenient, method of deriving such a coefficient is to calculate the distribution of the entire population of differences that may be obtained between a pair of scales with known rating distributions, and to derive the probability density associated with a difference as large as that observed. Thus, any deviation from a square distribution of ratings on either or both scales reduces the size of the population of differences.

However, it is usually desirable to obtain both construct and element proximity matrices, and for this reason careful thought has to be given to what constitutes the population of differences in the two cases. The examples that follow describe the derivation of element and construct difference populations using the variate $\sqrt{\sum d^2/n}$, as this produces a distribution that approaches normality as the size of n increases.

(i) The population of differences between construct pairs: The distribution of $\sqrt{\sum d^2/n}$ between a pair of constructs is a function of the rating distributions on each of those constructs. For simplicity, consider a grid of ratings on a five-point scale comprising five elements and two constructs, one of which is "lopsided", the other "square" (Table I).

		ELEMENTS				
		P	Q	R	S	T
CONSTRUCTS	A	1	1	1	2	5
	B	1	2	3	4	5

TABLE I

The distributions of ratings on each of these constructs may then be calculated (Table II).

RATING SCORE	CONSTRUCT A	CONSTRUCT B
1	3/5	1/5
2	1/5	1/5
3	0/5	1/5
4	0/5	1/5
5	1/5	1/5

TABLE II

As the five-point scale is used, d may take any integer value between 0 and 4 for each of the five element comparisons, and thus the value of d^2 may be 0,1,4,9 or 16. But a d^2 of 0 may arise in 5 ways (5-5, 4-4, 3-3, 2-2, 1-1),

9 Bannister D. & Mair J.M.M., op. cit.

10 Bannister D. & Mair J.M.M., op. cit. p.59-60.

a d^2 of 1 in 8 ways (5-4, 4-3, 3-2, 2-1, 1-2, 2-3, 3-4, 4-5), a d^2 of 4 in 6 ways (5-3, 4-2, 3-1, 1-3, 2-4, 3-5), a d^2 of 9 in 4 ways (5-2, 4-1, 1-4, 2-5), and a d^2 of 16 in 2 ways (5-1, 1-5). Thus, for constructs A and B the distribution of d^2 for any single element comparison will be as follows:-

$$d^2=0= (1/5)(1/5)+(0/5)(1/5)+(0/5)(1/5)+(1/5)(1/5)+(3/5)(1/5) =5/25$$

$$d^2=1= (1/5)(1/5)+(0/5)(1/5)+(0/5)(1/5)+(1/5)(1/5)+(0/5)(1/5)+(0/5)(1/5)+(1/5)(1/5)+(3/5)(1/5) =6/25$$

$$d^2=4= (1/5)(1/5)+(0/5)(1/5)+(0/5)(1/5)+(1/5)(0/5)+(1/5)(1/5)+(1/5)(3/5) =5/25$$

$$d^2=9= (1/5)(1/5)+(3/5)(1/5)+(0/5)(1/5)+(1/5)(1/5) =5/25$$

$$d^2=16= (1/5)(1/5)+(3/5)(1/5) =4/25$$

Unfortunately, this is just the beginning. What we have here is the distribution of d^2 for a single comparison, and to fully describe the relationship between constructs A and B the expression requires to be expanded four more times until d^2 varies between zero and 16n=80. But at this stage it is possible to derive the probability density associated with different values of d^2 in the single case.

$$d^2=0=5/25=0.2$$
$$d^2=1=5/25+6/25=0.44$$
$$d^2=4=5/25+6/25+5/25=0.64$$
$$d^2=9=5/25+6/25+5/25+5/25=0.84$$
$$d^2=16=5/25+6/25+5/25+5/25+4/25=1.0$$

And these values are specific to the rating distributions on constructs A and B.

(ii) The population of differences between element pairs: The distribution of $\sqrt{\Sigma d^2/n}$ between a pair of elements is a function of the distribution of ratings along each of the constructs on which that pair of elements is rated. The key variation in this case is in the origin of the distribution of $\sqrt{\Sigma d^2/n}$. Using the previous example, the number of possible differences between each and every element is defined by n(n-1)/2, which with 5 elements is 10. That is, if all the elements were rated 5 on construct A there would be 10/10 chances of obtaining a d^2 at 0, and zero chance of obtaining d^2 of 1,4,9 or 16.

Given the observed rating distributions in the example, the distribution of d^2 for any pair of elements on constructs A and B may be calculated (Table III).

d^2	Construct A	Construct B
0	3/10	0/10
1	3/10	4/10
4	0/10	3/10
9	1/10	2/10
16	3/10	1/10

TABLE III

Each of these distributions thus describes the probability of obtaining a d^2 as large as that observed between any pair of elements on each construct independently. The chance of obtaining $\Sigma d^2=0$ for any pair of elements is determined by the product of the probabilities of obtaining $d^2=0$ on construct A and $d^2=0$ on construct B. Thus

$$\Sigma d^2=(3/10)(0/10)=0$$

That is, since there are no differences of 0 on construct B, $\Sigma d^2=0$ cannot be obtained. Similarly, a Σd^2 of 1 may be obtained in two ways; a d^2 of 0 on A, and a d^2 of 1 on B, or a d^2 of 1 on A and a d^2 of 0 on B. Thus,

$$d^2=1= (3/10)(4/10)+(3/10)(0/10)=12/100$$

Combining the distributions for the two constructs obtains all possible values of d^2 and the probabilities associated with them (Table IV).

d^2		Products
0	(3/10)(0/10)	0/100
1	(3/10)(0/10)+(3/10)(4/10)	12/100
2	(3/10)(4/10)	12/100
4	(0/10)(0/10)+(3/10)(3/10)	9/100
5	(0/10)(4/10)+(3/10)(3/10)	9/100
8	(0/10)(3/10)	0/100
9	(1/10)(0/10)+(2/10)(3/10)	6/100
10	(1/10)(4/10)+(3/10)(2/10)	10/100
13	(1/10)(3/10)+(0/10)(2/10)	3/100
16	(3/10)(0/19)+(3/10)(1/10)	3/100
17	(3/10)(4/10)+(3/10)(1/10)	15/100
18	(1/10)(2/10)	2/100
20	(3/10)(3/10)+(0/10)(1/10)	9/100
25	(3/10)(2/10)+(1/10)(1/10)	7/100
32	(3/10)(1/10)	3/100

TABLE IV

It is now possible to derive the exact probability associated with a value of $\sqrt{\Sigma d^2/n}$ for any pair of elements, e.g. $\Sigma d^2_{QS} = 5, \sqrt{\Sigma d^2_{QS} / n} = 1.549$, p(QS)= 0+.12+.12+.09+.09=0.42.

(iii) The population of differences between replicated grids

In reapplying a construct on a separate occasion from that in which it was elicited, there is every opportunity for the user to totally reinterpret its meaning, and to regard it as a novel and independent construct. Because of this, the procedure for comparing a pair of constructs used on two separate occasions is equivalent to comparing two different constructs on the same occasion, and is then a subset of procedure (i). Thus, the population of differences is a function of variations in the rating distributions of the "same" construct, replicated once. However, it is desirable to make similar comparisons between elements in replicated grids. Once again, the origin of the population of differences requires careful thought. Suppose the example grid was replicated at time t+1, using the "same" elements and the "same" constructs. Any change in circumstances or subtle changes of meaning in the constructs when reapplied may be revealed in either changes in element allotment to the construct scales, or changes in the distribution of ratings on these scales, or both (Table V).

$Grid_t$

	P	Q	R	S	T
A	1	1	1	2	5
B	1	2	3	4	5

$Grid_{t+1}$

	P	Q	R	S	T
A	2	1	2	4	5
B	4	2	4	3	4

TABLE V

Whilst $Grid_{t+1}$ may be analysed in a similar way to $Grid_t$ (using procedures (i) and (ii), we may wish to know if either of the constructs, or any of the elements show systematic changes in rating allotment. That is, we wish to partition the matrix of differences in such a way as to identify the main dimensions of variation, (Table VI). The population of differences between replicated elements is a function of the variation in rating allotment along each construct. That is, if one or both constructs show considerable rating change, t e population of possible element differences will be fairly large. To identify this population we first require the distribution of d^2 obtained between each of the original and replicated pairs of constructs (Table VII).

d^2 matrix

	P	Q	R	S	T
A:	1	0	1	4	0
B:	9	0	1	1	1
d^2	10	0	2	5	1

TABLE VI

d^2

	0	1	4	9	16
A:	2/5	2/5	1/5	0/5	0/5
B:	1/5	3/5	0/5	1/5	0/5

TABLE VII

Once again, we must plot the ways in which different values of d^2 may arise by combining d^2 for a single element over both constructs A and B (Table VIII).

d^2		Products
0	(2/5)(1/5)	2/25
1	(2/5)(1/5)+(2/5)(3/5)	8/25
2	(2/5)(3/5)	6/25
4	(1/5)(1/5)+(2/5)(0/5)	1/25
5	(1/5)(3/5)+(2/5)(0/5)	3/25
8	(1/5)(0/5)	0/25
9	(0/5)(1/5)+(2/5)(1/5)	2/25
10	(0/5)(3/5)+(2/5)(1/5)	3/25
13	(0/5)(0/5)+(1/5)(1/5)	1/25
16	(0/5)(1/5)+(2/5)(0/5)	0/25
17	(0/5)(3/5)+(2/5)(0/5)	0/25
18	(0/5)(1/5)	0/25
20	(0/5)(0/5)+(1/5)(0/5)	0/25
25	(0/5)(1/5)+(0/5)(0/5)	0/25
32	(0/5)(0/5)	0/25

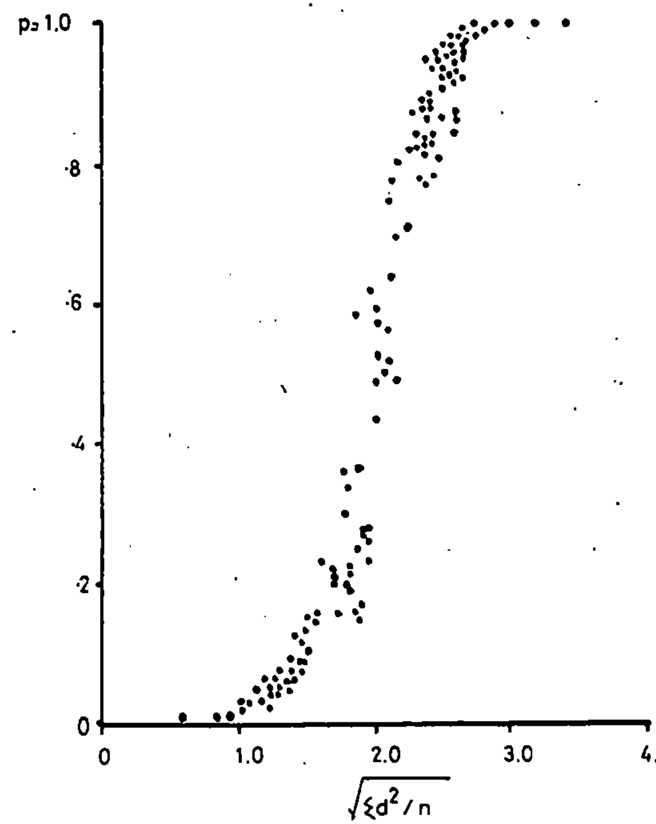
TABLE VIII

Now it is possible to specify the exact probability associated with a $\sum d^2$ as large as that observed between any pair of replicated elements, e.g.:

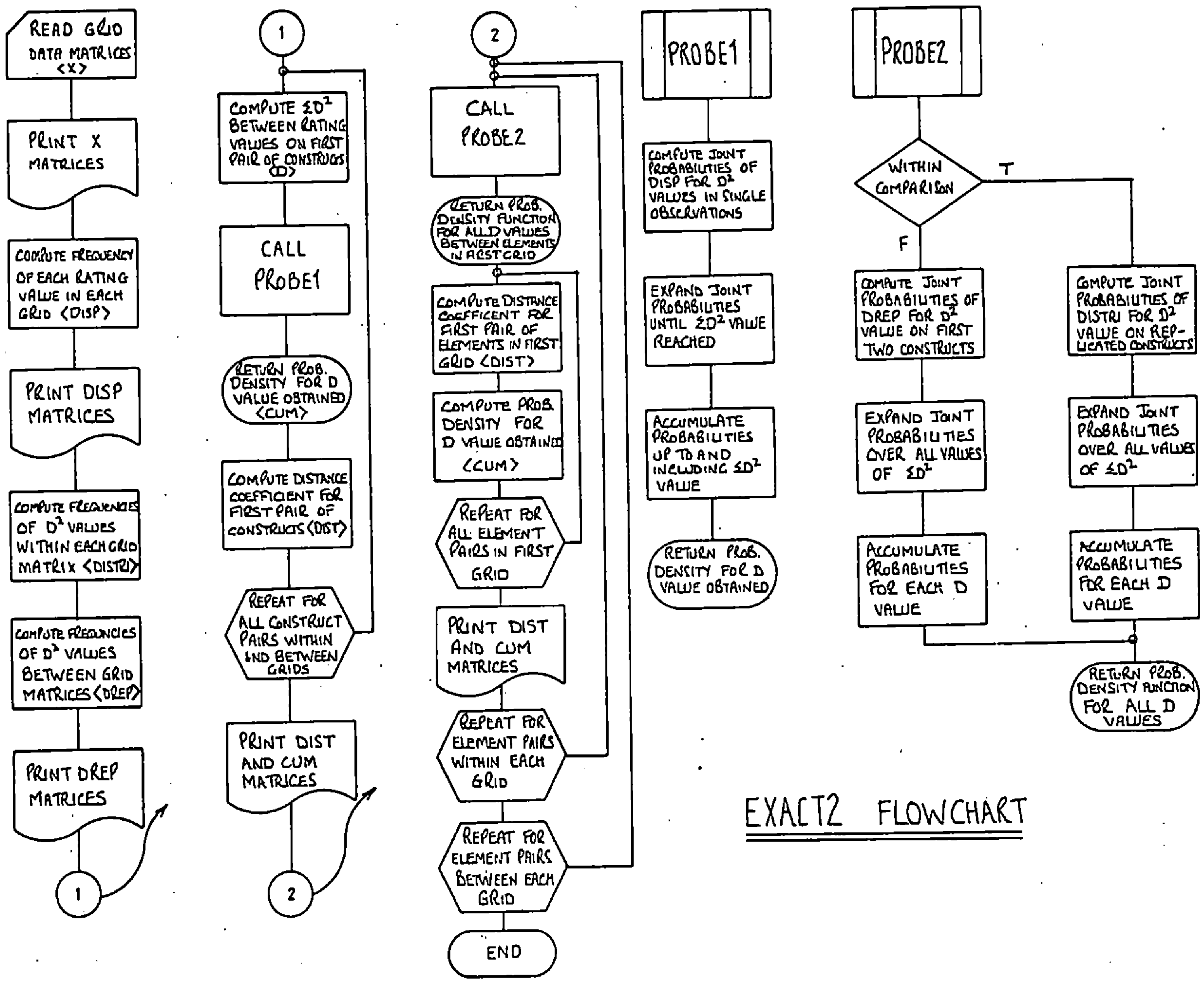
$\sum d^2_{P_tP_{t+1}} = 10$, $\sqrt{d^2_{P_tP_{t+1}}/n} = 2.236$, $p(P_tP_{t+1}) = 2/25+8/25+6/25+1/25+3/25+0/25+2/25+2/25 = 24/25 = 0.96$.

These procedures indicate that there is likely to be considerable variation in the probabilities associated with any one value of $\sqrt{\sum d^2/n}$ between elements and constructs in both single and replicated grids, and that this is a direct function of variation in rating distributions, 'lopsidedness', and interval inequality in the use of the rating scales. The scatter-plot in Fig. I shows the range of probabilities associated with values $\sqrt{\sum d^2/n}$ for a five-point scale rating form 12 x 12 grid, and as can be seen, variation in the middle range is considerable.

Figure I



The following pages firstly depict the flow chart of procedures and computations of the program EXACT, and secondly a listing of the program in CDC Extended FORTRAN.



EXACT2 FLOWCHART

PROGRAM EXACT2

```
C
C
C
C     EXACT IS A PROGRAM FOR THE ANALYSIS OF REPERTORY GRIDS.
C
C     IT IS DESIGNED TO MAKE MULTIPLE COMPARISONS BETWEEN
C           A SERIES OF REPLICATED GRIDS FROM A SINGLE INDIVIDUAL.
C                                                    TWO TYPES
C     OF SIMILARITY MEASURE ARE OBTAINED : A DISTANCE MEASURE,
C     BASED ON THE ROOT MEAN SQUARE DIFFERENCE BETWEEN RATINGS,
C     AND EXACT PROBABILITIES ASSOCIATED WITH THE OBTAINED DISTANCE
C     MEASURE, BASED ON THE OBSERVED DISTRIBUTIONS OF RATINGS ALONG
C     EACH CONSTRUCT. THE PURPOSE OF THE PROBABILITY MEASURE IS TO
C     CREATE AN INDEX OF SIMILARITY THAT IS SENSITIVE TO VARIATIONS
C     IN THE SCALAR NATURE OF CONSTRUCTS.
C
C
C     THE DATA DECK TAKES THE FOLLOWING FORM :
C
C     CARD NUMBER       1ST COLUMN                DESCRIPTION
C
C     1                 PETER"S PICTURE GRID      TITLE CARD
C     2                 (8I1)                     FORMAT CARD
C     3                  8 4 1 1 5                PARAMETER CARD
C     4                 11345432                  DATA
C     5                 52351131                  DATA
C     6                 13524414                  DATA
C     7                 31334215                  DATA
C
C
C     CARD 1 : ALPHANUMERIC TITLE FOR THIS DATA DECK, UP TO 72 COLUMNS
C
C     CARD 2 : FORTRAN FORMAT CARD USED BY THE PROGRAM TO READ EACH
C     DATA CARD. INTEGER MODE IS MANDATORY.
C
C     CARD 3 : PARAMETER CARD COMPRISING 5 PARAMETERS, FIELD WIDTH
C     BEING 2 COLUMNS, INTEGER MODE IS MANDATORY. FIRST PARAMETER
C     SPECIFIES THE NUMBER OF CONSTRUCTS, WHERE EACH CONSTRUCT IS A
C     SINGLE DATA CARD. MAXIMUM VALUE IS 24 CONSTRUCTS. SECOND PARAMETER
C     SPECIFIES THE NUMBER OF ELEMENTS, THAT IS THE NUMBER OF VALUES ON
C     EACH DATA CARD. MAXIMUM VALUE IS 15 ELEMENTS. THIRD PARAMETER
C     SPECIFIES THE NUMBER OF GRIDS IN THE SET. MAXIMUM VALUE IS
C     6 GRIDS. FOURTH PARAMETER SPECIFIES THE MINIMUM RATING VALUE,
C     WHICH MUST BE GREATER THAN OR EQUAL TO 1. FIFTH PARAMETER
C     SPECIFIES THE MAXIMUM RATING VALUE, WHICH MUST NOT BE GREATER
C     THAN 10.
C
C     CARD 4 ON : DATA CARDS, WHERE EACH CARD REPRESENTS RATINGS OF
C     ELEMENTS ON A SINGLE CONSTRUCT.
C
C
C     WHERE A SERIES OF REPLICATED GRIDS FROM A SINGLE INDIVIDUAL
C     ARE TO BE ANALYSED, PROVISION IS MADE FOR INCREMENTING THE
C     SIZE OF THE GRID BY THE ADDITION OF CONSTRUCTS ON EACH
C     SUCCESSIVE REPLICATION.
C
C     OUTPUT LISTING
C
C
C      1  RAW DATA MATRICES
C      2  RATING FREQUENCIES ON EACH CONSTRUCT
C      3  RATING DIFFERENCE FREQUENCIES ON REPLICATED CONSTRUCTS
C      4 DISTANCE MATRICES FOR CONSTRUCTS AND ELEMENTS
C      5  PROBABILITY MATRICES FOR CONSTRUCTS AND ELEMENTS
C
C
      COMMON/L2/IX(50,20,6),IXX(20,50,6),DISTRI(25,10,6),IDREP(40,10,6),
     1IDISP(50,10,6)
      COMMON/HS12/IXMAX,MIND
      COMMON/HS2/NC,DENCUM(500),DEBCUM(500)
      LEVEL 2,IX,IXX,DISTRI,IDREP,IDISP
      DIMENSION ITITLE(13),IDIST(50,50),ICUM(50,50),COUNT(10),LO(10),INF
     1MT(13)
    1 FORMAT(13A6)
    2 FORMAT(5I2)
    4 FORMAT(1H1,10X,13A6,/)
    5 FORMAT(1H ,10X,8HRAW DATA,/)
    6 FORMAT(1H0,8X,25I2,/)
    7 FORMAT(1H ,5X,I2,1X,25I2)
    8 FORMAT(1H ,10X,18HRATING FREQUENCIES,/)
    9 FORMAT(1H0,7X,10I3,/)
   10 FORMAT(1H ,5X,I2,1X,5I3)
   11 FORMAT(1H ,10X,31HDIFFERENCE FREQUENCIES ON GRID ,I2,11H CONSTR <T
     1S,/)
   12 FORMAT(1H ,10X,10HCONSTRUCTS,/)
   13 FORMAT(1H ,10X,8HELEMENTS,/)
```

```
   14 FORMAT(1H0,10X,18HDISTANCES    GRID ,I2,6H WITH ,I2,/)
   15 FORMAT(1H ,7X,24I3,/)
   16 FORMAT(1H ,5X,I2,1X,24I3)
   17 FORMAT(1H0,10X,22HPROBABILITIES    GRID ,I2,6H WITH ,I2,/)
   18 FORMAT(1H ,7X,24I5,/)
   19 FORMAT(1H ,5X,I2,1X,24I5)
C        INPUT/OUTPUT DATA MATRICES
      READ(5,1)(ITITLE(I),I=1,13)
      READ(5,1)(INFMT(I),I=1,13)
      READ(5,2)NE,NC,NG,IXMIN,IXMAX
      DO 100 K=1,NG
      NCG=NC*K
      DO 100 I=1,NCG
      READ(5,INFMT)(IX(I,J,K),J=1,NE)
      DO 100 J=1,NE
  100 IX(I+NCG,J,K)=IXMAX+1-IX(I,J,K)
      WRITE(6,4)(ITITLE(I),I=1,13)
      WRITE(6,5)
      DO 101 K=1,NG
      NCG=NC*K
      WRITE(6,6)(J,J=1,NE)
      DO 101 I=1,NCG
  101 WRITE(6,7)I,(IX(I,J,K),J=1,NE)
      MRANGE=IXMAX-IXMIN
      RANGE=MRANGE
      XNE=NE
      MIND=MRANGE*MRANGE+1
C        COMPUTE RATING FREQUENCIES
      DO 200 K=1,NG
      NCG=NC*K*2
      DO 200 I=1,NCG
      DO 201 L=1,IXMAX
  201 IDISP(I,L,K)=0
      DO 200 J=1,NE
      L=IX(I,J,K)
  200 IDISP(I,L,K)=IDISP(I,L,K)+1
C        OUTPUT RATING FREQUENCIES
      WRITE(6,4)(ITITLE(I),I=1,13)
      WRITE(6,8)
      DO 202 K=1,NG
      NCG=NC*K
      WRITE(6,9)(L,L=1,IXMAX)
      DO 202 I=1,NCG
  202 WRITE(6,10)I,(IDISP(I,L,K),L=1,IXMAX)
C        COMPUTE ELEMENT DIFFERENCES WITHIN GRIDS
      NED=(NE*(NE-1))/2
      XNED=NED
      DO 300 K=1,NG
      NCG=NC*K
      DO 300 I=1,NCG
      DO 302 LA=1,IXMAX
  302 COUNT(LA)=0.0
      NEUP=NE-1
      DO 303 JA=1,NEUP
      JAUP=JA+1
      DO 303 JB=JAUP,NE
      LA=IABS(IX(I,JA,K)-IX(I,JB,K))+1
  303 COUNT(LA)=COUNT(LA)+1.0
      DO 300 LA=1,IXMAX
  300 DISTRI(I,LA,K)=COUNT(LA)/XNED
      IF(NG.EQ.1)GO TO 5021
C        COMPUTE DIFFERENCE FREQUENCIES BETWEEN GRIDS
      DO 400 L=1,IXMAX
  400 LO(L)=L-1
      NGUP=NG-1
      DO 404 K=1,NGUP
      NCG=NC*K
      KLUP=K+1
      DO 402 KL=KLUP,NG
      DO 402 I=1,NCG
      IREP=I+((KL-K-1)*NCG)
      DO 403 L=1,IXMAX
  403 IDREP(IREP,L,K)=0
      DO 402 J=1,NE
      L=IABS(IX(I,J,K)-IX(I,J,KL))+1
  402 IDREP(IREP,L,K)=IDREP(IREP,L,K)+1
C        OUTPUT DIFFERENCE FREQUENCIES BETWEEN GRIDS
      WRITE(6,4)(ITITLE(I),I=1,13)
      WRITE(6,11)K
      DO 404 KL=KLUP,NG
      WRITE(6,9)(LO(L),L=1,IXMAX)
      DO 404 I=1,NCG
      IREP=I+((KL-K-1)*NCG)
  404 WRITE(6,10)I,(IDREP(IREP,L,K),L=1,IXMAX)
```

```
C          COMPUTE SIMILARITY MATRICES
 5021 MTYPE=0
 5000 MTYPE=MTYPE+1
      IF(MTYPE.EQ.1)GO TO 5001
      DO 500 K=1,NG
      NCG=NC*K
      DO 500 I=1,NCG
      DO 500 J=1,NE
  500 IXX(J,I,K)=IX(I,J,K)
 5001 DO 501 K=1,NG
      NCG=NC*K*2
      MAXDC=(MIND-1)*NE+1
      IDIST(NCG,NCG)=0
      IDIST(NE,NE)=0
      ICUM(NCG,NCG)=0
      ICUM(NE,NE)=0
      KL=K
      IF(MTYPE.EQ.2)GO TO 5011
      ISTOP=NCG
      GO TO 5012
 5011 ISTOP=NE
      NTYPE=1
      CALL PROBE2(NTYPE,K,KL,NE)
 5012 DO 502 I=2,ISTOP
      MSTOP=I-1
      DO 502 M=1,MSTOP
      ID=0
      NSTOP=0
      IF(MTYPE.EQ.1)NSTOP=NE
      IF(MTYPE.EQ.2)NSTOP=NC*K
      DO 503 J=1,NSTOP
      IDIFF=0
      IF(MTYPE.EQ.1)IDIFF=IX(I,J,K)-IX(M,J,K)
      IF(MTYPE.EQ.2)IDIFF=IXX(I,J,K)-IXX(M,J,K)
  503 ID=ID+IDIFF*IDIFF
      IF(MTYPE.EQ.2)GO TO 5002
      CALL PROBE1(ID,I,M,K,KL,NCG,MAXDC,NE,ZOOM)
      ICUM(I,M)=ZOOM
      D=ID
      DIST=(SQRT(D/XNE)/RANGE)*100.0
      GO TO 5003
 5002 KOUNT=ID+1
      ICUM(I,M)=DEWCUM(KOUNT)
      D=ID
      XNCG=NC*K
      DIST=(SQRT(D/XNCG)/RANGE)*100.0
 5003 ICUM(M,M)=0
      IDIST(M,M)=0
      ICUM(M,I)=ICUM(I,M)
      IDIST(I,M)=DIST
  502 IDIST(M,I)=IDIST(I,M)
      WRITE(6,4)(ITITLE(I),I=1,13)
      IF(MTYPE.EQ.2)GO TO 5007
      WRITE(6,12)
      NCG=NC*K
      ISTOP=NCG
      MSTOP=ISTOP
      DO 5050 I=1,NCG
      IPLUS=I+NCG
      DO 5050 M=1,NCG
      IF(IDIST(IPLUS,M).LT.IDIST(I,M))IDIST(I,M)=IDIST(IPLUS,M)*(-1)
      IF(ICUM(IPLUS,M).LT.ICUM(I,M))ICUM(I,M)=ICUM(IPLUS,M)*(-1)
 5050 CONTINUE
      GO TO 5008
 5007 WRITE(6,13)
      ISTOP=NE
      MSTOP=ISTOP
 5008 WRITE(6,14)K,KL
      WRITE(6,15)(M,M=1,MSTOP)
      DO 506 I=1,ISTOP
  506 WRITE(6,16)I,(IDIST(I,M),M=1,MSTOP)
      WRITE(6,17)K,KL
      WRITE(6,18)(M,M=1,MSTOP)
      DO 507 I=1,ISTOP
  507 WRITE(6,19)I,(ICUM(I,M),M=1,MSTOP)
      IF(K.EQ.NG)GO TO 5020
      KLUP=K+1
      DO 501 KL=KLUP,NG
      IF(MTYPE.EQ.2)GO TO 5013
      ISTOP=NC*K*2
      MSTOP=NC*KL
      GO TO 5014
 5013 NTYPE=2
      CALL PROBE2(NTYPE,K,KL,NE)
 5014 DO 504 I=1,ISTOP
      DO 504 M=1,MSTOP
      ID=0
```

```
      DO 505 J=1,NSTOP
      IDIFF=0
      IF(MTYPE.EQ.1)IDIFF=IX(I,J,K)-IX(M,J,KL)
      IF(MTYPE.EQ.2)IDIFF=IXX(I,J,K)-IXX(M,J,KL)
  505 ID=ID+IDIFF*IDIFF
      IF(MTYPE.EQ.2)GO TO 5005
      CALL PROBE1(ID,I,M,K,KL,NCG,MAXDC,NE,ZOOM)
      ICUM(I,M)=ZOOM
      D=ID
      DIST=(SQRT(D/XNE)/RANGE)*100.0
      GO TO 5006
 5005 KOUNT=ID+1
      ICUM(I,M)=DERCUM(KOUNT)
      D=ID
      DIST=(SQRT(D/XNCG)/RANGE)*100.0
 5006 IDIST(I,M)=DIST
  504 CONTINUE
      WRITE(6,4)(ITITLE(I),I=1,13)
      IF(MTYPE.EQ.2)GO TO 5015
      WRITE(6,12)
      NCG=NC*K
      ISTOP=NCG
      MSTOP=NC*KL
      DO 5060 I=1,NCG
      IPLUS=I+NCG
      DO 5060 M=1,MSTOP
      IF(IDIST(IPLUS,M).LT.IDIST(I,M))IDIST(I,M)=IDIST(IPLUS,M)*(-1)
      IF(ICUM(IPLUS,M).LT.ICUM(I,M))ICUM(I,M)=ICUM(IPLUS,M)*(-1)
 5060 CONTINUE
      GO TO 5016
 5015 WRITE(6,13)
      ISTOP=NE
      MSTOP=ISTOP
 5016 WRITE(6,14)K,KL
      WRITE(6,15)(M,M=1,MSTOP)
      DO 508 I=1,ISTOP
  508 WRITE(6,16)I,(IDIST(I,M),M=1,MSTOP)
      WRITE(6,17)K,KL
      WRITE(6,18)(M,M=1,MSTOP)
      DO 509 I=1,ISTOP
  509 WRITE(6,19)I,(ICUM(I,M),M=1,MSTOP)
  501 CONTINUE
 5020 IF(MTYPE.EQ.1)GO TO 5000
      STOP
      END
```

```
      SUBROUTINE PROBE1(ID,I,M,KN,KL,NCG,MAXDC,NE,ZOOM)
      COMMON/L2/IX(53,25,6),IXX(25,53,6),DISTRI(25,10,6),
     1IDREP(40,10,6),IDISP(53,10,6)
      COMMON/MS12/IXMAX,MIND
      COMMON/S12/NX(500),Y(500),YY(500)
      LEVEL 2,IX,IXX,DISTRI,IDREP,IDISP
      DIMENSION Z(10),NXX(500),NXXX(500),YYY(500)
      DO 600 KQ=1,IXMAX
  600 Z(KQ)=0.0
      XNE=NE
      DO 601 KA=1,IXMAX
      DO 601 LA=1,IXMAX
      KQ=IABS(LA-KA)+1
      DRIP=IDISP(I,KA,KN)
      DROP=IDISP(M,LA,KL)
      DISPI=DRIP/XNE
      DISPM=DROP/XNE
  601 Z(KQ)=Z(KQ)+DISPI*DISPM
      DO 602 K=1,MIND
      NX(K)=-1
  602 Y(K)=0.0
      DO 603 K=1,MAXDC
      NXX(K)=-1
      NXXX(K)=-1
      YY(K)=0.0
  603 YYY(K)=0.0
      DO 604 K=1,IXMAX
      MA=K-1
      MM=MA*MA+1
      NX(MM)=MM-1
      NXX(MM)=NX(MM)
      Y(MM)=Z(K)
  604 YY(MM)=Y(MM)
      MN=1
 6000 MN=MN+1
      KSTOP=(MIND-1)*MN+1
```

```
      DO 605 MQ=1,MIND
      IF(NX(MQ).EQ.-1)GO TO 605
      KT=0
 6001 KT=KT+1
      IF(NXX(KT).EQ.-1)GO TO 6001
      IF(KT.GT.KSTOP)GO TO 605
      KM=NXX(KT)+NX(MQ)+1
      NXXX(KM)=KM-1
      YYY(KM)=YYY(KM)+YY(KT)*Y(MQ)
      IF(NXXX(KM).GT.ID)GO TO 605
      IF(KT.LT.KSTOP)GO TO 6001
  605 CONTINUE
      DO 606 K=1,KSTOP
      NXX(K)=NXXX(K)
      YY(K)=YYY(K)
  606 YYY(K)=0.0
      IF(MN.LT.NE)GO TO 6000
      KOUNT=ID+1
      CUM=0.0
      DO 607 K=1,KOUNT
  607 CUM=CUM+YY(K)
      ZOOM=CUM*10000.0
      RETURN
      END
```

```
      SUBROUTINE PROBE2(NTYPE,K,KL,NE)
      COMMON/L2/IX(50,25,6),IXX(25,50,6),DISTRI(25,10,6),
     1IDREP(40,10,6),IDISP(50,10,6)
      COMMON/MS12/IXMAX,MIND
      COMMON/MS2/NC,DEWCUM(500),DEBCUM(500)
      COMMON/S12/NX(500),Y(500),YY(500)
      LEVEL 2,IX,IXX,DISTRI,IDREP,IDISP
      XNE=NE
      NCG=NC*K
      LSTOP=(MIND-1)*NCG+1
      DO 700 LB=1,LSTOP
      NX(LB)=-1
      Y(LB)=0.0
  700 YY(LB)=0.0
      I=1
      IREP=I+((KL-K-1)*NCG)
      DO 701 LA=1,IXMAX
      MA=(LA-1)*(LA-1)+1
      NX(MA)=MA-1
      IF(NTYPE.EQ.2)GO TO 7002
      Y(MA)=DISTRI(I,LA,K)
      GO TO 701
 7002 DREP=IDREP(IREP,LA,K)
      Y(MA)=DREP/XNE
  701 CONTINUE
      DO 702 I=2,NCG
      IREP=I+((KL-K-1)*NCG)
      KSTOP=(I-1)*(MIND-1)+1
      DO 703 LA=1,IXMAX
      MA=(LA-1)*(LA-1)+1
      DO 703 KA=1,KSTOP
      IF(NX(KA).EQ.-1)GO TO 703
      MM=MA+KA-1
      NX(MM)=MM-1
      IF(NTYPE.EQ.2)GO TO 7003
      YY(MM)=YY(MM)+DISTRI(I,LA,K)*Y(KA)
      GO TO 703
 7003 DREP=IDREP(IREP,LA,K)
      YY(MM)=YY(MM)+(DREP/XNE)*Y(KA)
  703 CONTINUE
      JSTOP=I*(MIND-1)+1
      DO 702 JA=1,JSTOP
      Y(JA)=YY(JA)
  702 YY(JA)=0.0
      ZOOM=Y(1)*10000.0
      IF(NTYPE.EQ.1)GO TO 7004
      DEBCUM(1)=ZOOM
      DO 704 LB=2,LSTOP
      ZOOM=Y(LB)*10000.0
  704 DEBCUM(LB)=ZOOM+DEBCUM(LB-1)
      GO TO 7005
 7004 DEWCUM(1)=ZOOM
      DO 705 LB=2,LSTOP
      ZOOM=Y(LB)*10000.0
  705 DEWCUM(LB)=ZOOM+DEWCUM(LB-1)
 7005 RETURN
      END
```

EXAMPLE GRIDS

RAW DATA

	1	2	3	4	5	6	7	8
1	2	1	4	5	4	2	2	3
2	2	1	4	5	3	2	3	2
3	1	1	4	5	3	2	3	4
4	4	5	2	1	3	3	2	2

	1	2	3	4	5	6	7	8
1	3	1	5	4	4	4	2	3
2	4	2	5	1	1	1	4	3
3	2	2	5	4	4	1	3	4
4	4	5	2	1	3	2	2	1
5	5	4	3	3	3	2	4	4
6	2	3	5	5	4	3	2	5
7	2	3	5	4	3	2	1	2
8	1	3	4	3	4	2	3	5

EXAMPLE GRIDS

RATING FREQUENCIES

	1	2	3	4	5
1	1	3	1	2	1
2	1	3	2	1	1
3	2	1	2	2	1
4	1	3	2	1	1

	1	2	3	4	5
1	1	1	2	3	1
2	3	1	1	2	1
3	1	2	1	3	1
4	2	3	1	1	1
5	0	1	3	3	1
6	0	2	2	1	3
7	1	3	2	1	1
8	1	1	3	2	1

EXAMPLE GRIDS

DIFFERENCE FREQUENCIES ON GRID 1

	0	1	2	3	4
1	4	3	1	0	0
2	0	5	2	0	1
3	2	6	0	0	0
4	6	2	0	0	0

EXAMPLE GRIDS

CONSTRUCTS

DISTANCES GRID 1

	1	2	3	4
1	0	15	17	-23
2	15	0	19	-21
3	17	19	0	-15
4	-23	-21	-15	0

PROBABILITIES GRID 1

	1	2	3	4
1	0	25	26	-180
2	25	0	55	-98
3	26	55	0	-15
4	-180	-98	-15	0

EXAMPLE GRIDS

CONSTRUCTS

DISTANCES GRID 1 WITH 2

	1	2	3	4	5	6	7	8
1	23	-46	21	-31	-31	27	26	33
2	27	47	26	-33	-30	36	27	38
3	31	51	21	-23	-34	27	34	27
4	-27	49	-26	12	35	-29	-39	-31

PROBABILITIES GRID 1 WITH 2

	1	2	3	4	5	6	7	8
1	180	-3966	112	-666	-2529	379	587	1754
2	549	5386	413	-738	-2950	1593	1016	3868
3	1054	-5224	104	-115	-2519	341	1650	572
4	-1016	-4954	-587	7	3005	-961	-3688	-2014

EXAMPLE GRIDS

CONSTRUCTS

DISTANCES GRID 2

	1	2	3	4	5	6	7	8
1	0	-47	31	-30	-30	29	30	38
2	-47	0	43	49	38	-45	47	48
3	31	43	0	-34	40	25	29	21
4	-30	49	-34	0	39	-29	46	-34
5	-30	38	40	39	0	-40	-30	-36
6	29	-45	25	-29	-40	0	31	25
7	30	47	29	46	-30	31	0	36
8	38	48	21	-34	-36	25	36	0

PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8
1	0	-5386	1496	-1140	-1432	961	990	4284
2	-5386	0	2796	5148	1872	-4031	5386	5244
3	1496	2796	0	-1439	-5240	290	726	179
4	-1140	5148	-1439	0	2559	-801	-4846	-1817
5	-1432	1872	-5240	2558	0	-3166	-2950	-4372
6	961	-4031	290	-801	-3166	0	759	355
7	990	5386	720	-4846	-2950	759	0	3106
8	4284	5244	179	-1817	-4372	355	3106	0

EXAMPLE GRIDS

ELEMENTS

DISTANCES GRID 1

	1	2	3	4	5	6	7	8
1	0	21	57	81	39	17	37	46
2	21	0	75	100	57	33	53	59
3	57	75	0	25	21	45	30	27
4	81	100	25	0	45	69	53	48
5	39	57	21	45	0	30	27	25
6	17	33	45	69	30	0	21	30
7	37	53	30	53	27	21	0	21
8	46	59	27	48	25	30	21	0

PROBABILITIES GRID 1

	1	2	3	4	5	6	7	8
1	0	523	8087	9984	3670	203	2868	5505
2	523	0	9889	9999	8087	2320	7271	8747
3	8087	9889	0	783	523	4959	1672	1009
4	9984	9999	783	0	4959	9708	7271	6307
5	3670	8087	523	4959	0	1672	1009	783
6	203	2320	4959	9708	1672	0	523	1672
7	2868	7271	1672	7271	1009	523	0	523
8	5505	8747	1009	6307	783	1672	523	0

EXAMPLE GRIDS

ELEMENTS

DISTANCES GRID 1 WITH 2

	1	2	3	4	5	6	7	8
1	30	21	77	59	48	37	43	55
2	48	17	94	72	58	53	59	71
3	37	63	21	39	39	53	27	21
4	59	88	12	53	58	72	48	37
5	25	48	39	37	27	37	30	30
6	30	27	66	45	37	33	30	39
7	33	43	51	39	39	43	12	21
8	43	51	46	21	21	41	30	17

PROBABILITIES GRID 1 WITH 2

	1	2	3	4	5	6	7	8
1	8115	5029	10000	10000	8750	8691	8750	9873
2	8750	2978	10000	10000	10000	9755	10000	10000
3	8691	10000	5029	8750	8750	9755	6826	5029
4	10000	10000	585	9755	10000	10000	8750	8691
5	5703	8750	8750	8691	6806	8691	8115	8115
6	8115	6806	10000	8750	8691	8437	8115	8750
7	8437	8750	9345	8750	8750	8750	585	5029
8	8750	9345	8750	5029	5029	8750	8115	2978

EXAMPLE GRIDS

ELEMENTS

DISTANCES GRID 2

	1	2	3	4	5	6	7	8
1	0	35	61	58	50	45	30	55
2	35	0	64	53	40	45	39	51
3	61	64	0	40	43	63	56	40
4	58	53	40	0	23	39	51	33
5	50	40	43	23	0	36	44	31
6	45	45	63	39	36	0	43	50
7	30	39	56	51	44	43	0	37
8	55	51	40	33	31	50	37	0

PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8
1	0	1552	9673	9284	7274	4948	660	8766
2	1552	0	9837	7999	3168	4948	2775	7509
3	9673	9837	0	3168	4220	9761	8929	3168
4	9284	7999	3168	0	106	2775	7509	1048
5	7274	3168	4220	106	0	1852	4627	865
6	4948	4948	9761	2775	1852	0	4220	6948
7	660	2775	8929	7509	4627	4220	0	2137
8	8766	7509	3168	1048	865	6948	2137	0

Appendix E The Core Grid.

E·1 The serial grid sample

Serial repertory grids were obtained from 5 subjects, all of whom were male postgraduates attending Brunel University. The testing series varied both in format and in periods covered, as follows:-

Subject	Age	Number of testings occasions	Size of element sample	Number of constructs elicited each occasion	Time period (wks)
S1	24	3	12	6	10
S2	22	3	12	6	6
S3	27	4	12	6	12
S4	26	6	9	4	11
S5	23	6	9	4	11

In all cases element samples were nominated by the subjects in response to a request to list the names of persons considered significant to their lives. Every subject included their own name in the element list S1 and S2 also included the element SELF. These names were then transferred to 6" x 4" cards and numbered in random order. Constructs were elicited using the modified Full Context Form, in which subjects selected two cards from the entire element sample (displayed on a table) to represent anchor elements for opposite poles of each construct. Subjects were instructed to survey the entire element sample and select two persons who were opposite in some <u>immediately observable and important</u> respect. Subjects were encouraged to make this selection as quickly as possible and to note immediately on a separate 6" x 4" card, divided by a line in the middle, a word or phrase describing the opposing attributes of the two anchor elements. Care was taken to ensure that attributes were antonymous. Following this, a set of cards numbered between 1 and 5 were arranged in order on the table, and anchor elements initially placed under the two extreme cards. Subjects were instructed to ensure that the left-hand attribute on their construct cards corresponded to the anchor element located at position 1, and that located at position 5 with the right-hand attribute. Subjects then sorted the remaining element cards into any of the five positions in accordance with their perception of the extent to which each element displayed the attributes named. No restriction was placed on the number of elements assigned to each position. The indifference category (position 3) was defined as "a neutral position", in which either both attributes apply equally, or in which neither attribute applies". Subjects were instructed to ensure that the final distribution of cards was in accord with their views of the attribute named, and to make any changes they now felt necessary. In some cases this entailed the re-positioning of anchor stimuli away from extreme positions. Finally, subjects were requested to ensure that their attribute descriptions conveyed the distinction embodied in the element sort, and to make any changes to the wording they felt necessary. This procedure was repeated for each construct elicited, and element positions were recorded on a grid form.

Initially, subjects were instructed in the procedure by E. After 2 or 3 such elicitations, however, subjects were left to elicit and record constructs on their own. On every testing occasion following the first, subjects began by eliciting and recording a fixed number of constructs. Subsequently, subjects were instructed to take each construct card produced on previous occasions and locate elements on the five-point scale without reference to their previous allocations. Attempted reproduction of previous allocations was discouraged by pointing out that the exercise was not a test of memory or consistency, but an attempt to record their perceptions of persons <u>at the time of testing.</u>

The following tables record the grid matrices produced by the five subjects (elements columnwise, SELF and IDEAL SELF denoted by • and •• respectively; constructs rowwise).

<u>S1</u>

	1	2	3	4	5•	6••	7	8	9	10	11	12
T_1 1	4	5	1	3	1	1	4	2	2	3	4	3
2	2	2	1	2	1	1	2	4	5	3	4	2
3	5	4	4	3	1	1	3	2	1	3	4	3
4	1	4	2	3	1	3	4	2	3	3	1	5

		1	2	3	4	5•	6••	7	8	9	10	11	12
	5	4	4	2	3	1	1	4	1	3	2	5	3
	6	2	3	2	4	1	5	2	1	5	3	3	2
T_2	1	5	3	1	4	1	1	5	1	2	1	3	2
	2	3	4	1	4	1	1	3	5	5	3	4	2
	3	5	3	4	3	2	1	3	1	1	3	4	4
	4	1	1	3	2	5	5	2	2	3	4	1	3
	5	5	5	1	4	1	1	5	1	4	2	4	3
	6	1	2	3	4	1	5	1	5	5	1	3	3
	7	4	4	1	2	1	1	4	2	2	5	3	2
	8	5	2	1	4	1	3	4	2	3	5	4	1
	9	3	1	4	2	5	1	3	2	1	3	3	1
	10	1	2	2	1	5	5	5	4	4	1	2	3
	11	5	4	3	1	1	1	4	3	2	5	4	2
	12	5	3	2	4	1	1	5	2	2	1	3	3
T_3	1	4	5	2	2	1	1	5	1	3	2	4	4
	2	2	4	3	4	1	1	3	5	5	3	4	2
	3	4	2	4	3	2	4	3	2	1	2	3	3
	4	2	3	4	2	4	5	2	2	3	5	1	3
	5	5	4	1	3	1	1	5	1	2	1	3	4
	6	5	4	3	2	3	5	4	2	1	3	2	3
	7	5	5	2	1	1	1	5	2	3	5	4	2
	8	5	3	1	5	3	3	2	2	2	5	2	2
	9	4	1	5	2	3	1	1	3	1	2	2	1
	10	1	4	3	2	5	5	5	4	5	1	4	4
	11	5	5	3	1	3	1	5	2	2	5	4	3
	12	4	5	3	3	2	1	5	2	4	1	2	2
	13	4	4	1	2	3	3	2	2	5	1	4	4
	14	5	5	2	1	3	1	5	1	4	1	2	3
	15	5	4	3	4	1	2	4	2	5	1	3	2
	16	4	4	3	2	2	1	5	3	4	1	3	4
	17	5	3	2	3	2	1	4	3	4	3	2	1
	18	4	5	1	5	1	3	4	4	3	4	5	4

S2		1	2	3	4	5	6•	7••	8	9	10	11	12
T_1	1	5	4	5	4	4	4	5	2	5	1	5	4
	2	5	2	5	2	4	5	3	1	5	2	5	4
	3	2	1	2	2	1	2	1	5	1	5	2	1
	4	2	4	2	3	2	2	2	4	2	1	3	1
	5	3	1	3	4	2	1	2	5	2	4	3	1
	6	4	5	3	1	2	1	1	3	2	1	5	2
T_2	1	4	2	4	4	3	4	4	2	4	2	4	4
	2	5	3	3	2	2	5	5	1	5	1	5	5
	3	2	3	3	2	3	2	2	4	2	5	2	2
	4	2	4	3	4	2	3	2	3	2	4	2	2
	5	2	3	3	3	3	2	1	5	1	5	2	1
	6	4	5	2	2	2	2	3	3	2	3	4	3
	7	4	3	1	3	2	1	1	3	1	3	4	1
	8	3	4	5	2	3	2	2	5	2	3	2	3
	9	3	1	3	5	3	1	2	5	1	5	3	2
	10	2	3	2	3	1	1	1	3	1	4	2	2
	11	3	2	3	4	2	2	2	5	2	2	3	1
	12	3	2	2	5	5	3	4	2	3	1	5	4
T_3	1	5	2	4	4	3	4	5	1	5	1	5	5
	2	5	2	3	3	3	4	4	1	5	1	5	5
	3	1	3	3	1	2	2	1	5	1	5	1	1
	4	1	4	3	4	2	2	3	4	2	4	2	3
	5	2	2	3	3	2	1	1	5	1	4	1	1
	6	5	5	1	2	1	1	1	4	1	3	5	2
	7	5	3	2	4	2	2	1	3	2	3	5	2
	8	4	4	5	2	3	2	2	5	2	4	2	2
	9	3	2	4	4	3	1	1	5	1	5	3	2
	10	3	4	2	4	2	2	2	4	2	4	4	2
	11	3	3	3	3	2	2	2	5	2	4	2	1
	12	3	3	2	5	4	2	3	2	2	2	5	4
	13	4	4	1	3	2	2	1	2	5	1	5	3

	1	2	3	4	5	6•	7••	8	9	10	11	12
14	4	4	2	4	3	2	1	5	2	4	5	3
15	5	3	3	4	2	3	3	2	4	2	4	4
16	5	4	2	2	5	5	5	2	4	1	5	4
17	5	2	3	4	3	3	1	1	3	1	5	4
18	3	4	1	3	2	2	1	3	1	5	3	2

S3

		1	2	3	4	5	6	7	8	9•	10	11	12
T_1	1	3	5	5	5	3	2	4	2	1	1	5	4
	2	3	5	5	5	5	2	4	1	1	3	2	5
	3	1	1	1	2	1	2	5	1	1	1	4	2
	4	4	1	1	5	5	4	4	2	1	2	5	2
	5	1	2	1	5	2	4	1	1	1	1	1	3
	6	5	4	3	4	1	1	1	1	1	1	2	4
T_2	1	3	3	3	4	2	3	5	2	3	1	2	5
	2	3	4	5	2	5	2	1	2	3	2	2	5
	3	2	1	1	3	1	5	5	4	3	1	4	3
	4	2	4	1	3	2	5	2	5	3	4	5	1
	5	5	2	1	3	1	5	4	5	5	1	1	4
	6	5	1	5	4	2	2	5	1	3	2	5	5
	7	1	1	3	5	1	4	2	2	1	4	2	5
	8	1	5	1	2	5	4	1	3	1	2	3	4
	9	5	5	1	2	1	2	3	5	1	4	1	2
	10	2	2	2	5	4	2	3	4	1	3	3	5
	11	1	1	3	5	1	4	2	1	1	1	5	5
	12	2	1	1	5	5	5	5	2	1	2	5	5
T_3	1	3	5	5	2	2	4	5	2	1	1	4	3
	2	3	5	5	4	2	1	3	2	4	4	1	5
	3	2	1	1	3	2	5	4	3	3	1	3	2
	4	5	2	1	5	1	5	2	3	2	2	4	1

		1	2	3	4	5	6	7	8	9•	10	11	12
	5	5	1	1	2	1	5	1	2	4	2	1	2
	6	5	1	5	1	1	5	5	1	3	2	5	4
	7	3	1	5	4	4	5	5	1	1	4	5	5
	8	1	5	1	1	5	1	1	3	3	3	1	2
	9	3	5	1	4	2	3	1	4	2	4	1	2
	10	3	3	3	5	4	5	5	4	1	4	4	5
	11	2	1	5	5	2	5	4	1	1	2	5	4
	12	4	1	1	5	4	5	5	2	1	4	5	5
	13	2	4	5	2	4	2	3	3	1	1	4	2
	14	5	2	1	3	4	2	4	5	4	4	4	2
	15	2	3	5	4	5	4	4	4	1	3	5	2
	16	3	4	1	2	2	4	2	5	5	3	2	2
	17	4	1	5	2	3	4	3	3	1	2	5	5
	18	5	3	5	5	2	4	5	1	1	4	5	3
T_4	1	3	5	5	5	3	2	4	4	1	1	5	3
	2	3	5	5	2	2	4	1	2	4	4	1	4
	3	1	1	1	1	1	2	4	2	1	1	2	5
	4	2	1	1	4	2	5	5	4	5	5	5	1
	5	5	1	1	3	1	4	1	2	1	1	1	2
	6	3	3	5	2	1	1	1	1	5	3	5	2
	7	3	1	4	5	2	5	5	1	3	3	5	5
	8	1	5	1	1	4	1	1	1	3	1	4	4
	9	2	5	1	3	1	1	1	5	3	1	5	5
	10	1	2	1	5	5	5	5	5	2	4	5	5
	11	1	1	5	5	1	3	4	2	4	4	5	3
	12	4	1	1	4	5	3	5	4	2	4	5	5
	13	5	2	5	4	2	5	4	2	1	1	5	1
	14	4	2	1	4	3	1	5	5	2	2	3	2
	15	3	5	1	1	1	1	1	5	1	4	5	1
	16	1	5	1	3	3	2	5	5	5	5	1	5
	17	1	1	5	4	2	3	5	2	1	1	5	1
	18	5	1	5	5	5	5	5	1	1	1	5	1
	19	4	1	5	4	5	5	2	2	1	2	5	2
	20	1	5	2	2	2	2	1	2	5	4	2	3

	1	2	3	4	5	6	7	8	9•	10	11	12
21	1	5	5	4	4	5	2	1	5	5	1	3
22	1	3	4	5	1	4	4	2	5	5	3	5
23	1	2	5	5	5	3	2	1	1	1	5	1
24	4	4	3	1	5	2	5	4	5	5	1	3

S4

	1	2	3	4	5	6	7	8	9•
T_1 1	1	3	1	1	2	4	2	2	5
2	1	5	2	4	1	1	1	4	2
3	3	5	5	4	2	1	4	5	1
4	5	2	5	5	2	5	1	2	1
T_2 1	2	1	4	2	2	4	2	1	5
2	1	5	1	2	4	1	1	4	1
3	4	5	5	4	4	1	4	4	2
4	1	2	5	4	1	5	4	4	1
5	2	2	5	1	1	4	4	2	4
6	4	1	5	4	3	5	4	2	4
7	2	1	1	2	4	4	2	2	5
8	2	5	1	4	4	1	2	5	1
T_3 1	1	1	2	1	1	2	1	1	5
2	1	5	1	4	4	1	2	5	2
3	4	5	5	4	2	1	5	4	2
4	2	2	5	2	1	5	2	2	1
5	4	4	5	2	1	4	1	4	1
6	3	2	2	3	3	4	5	1	5
7	2	1	1	1	4	4	5	4	4
8	2	5	1	4	4	1	2	5	1
9	1	2	1	2	4	1	1	1	5
10	1	1	1	1	1	2	1	1	5

	1	2	3	4	5	6	7	8	9•
11	1	3	5	3	5	2	3	2	5
12	1	4	2	3	3	2	1	2	5
T_4 1	1	1	2	1	2	4	1	1	5
2	1	4	1	4	2	5	5	2	4
3	4	5	3	4	3	4	3	4	5
4	2	2	5	3	2	2	1	4	2
5	1	1	4	1	4	2	1	1	1
6	2	1	4	3	2	4	2	1	5
7	2	3	1	4	4	2	1	4	5
8	2	5	1	4	4	1	2	5	1
9	1	4	1	1	4	1	1	2	5
10	2	1	1	2	1	4	2	1	5
11	5	3	1	4	1	4	1	2	4
12	1	5	5	2	3	4	1	1	5
13	1	4	4	2	1	4	2	2	5
14	1	1	1	1	2	5	2	1	5
15	1	1	5	2	2	5	5	1	4
16	1	5	1	3	4	4	5	1	5
T_5 1	2	1	3	1	1	4	2	1	5
2	1	5	1	4	2	1	1	4	4
3	4	5	5	4	2	1	4	5	4
4	4	5	5	4	5	5	4	4	4
5	1	1	5	1	1	1	1	1	1
6	4	1	5	2	4	5	4	1	4
7	4	2	1	4	2	1	1	4	5
8	2	4	1	2	4	1	2	5	2
9	2	1	1	2	4	2	2	1	4
10	2	1	1	1	2	3	2	1	4
11	3	1	1	4	1	4	5	3	2
12	1	2	1	2	2	5	3	2	5

	1	2	3	4	5	6	7	8	9•
13	2	4	5	4	1	3	4	4	5
14	1	1	1	1	4	4	2	1	5
15	1	2	5	2	2	5	5	1	5
16	5	1	5	2	4	5	5	2	5
17	4	1	1	2	2	4	4	5	3
18	3	1	3	1	2	4	5	3	3
19	4	1	1	1	5	2	1	2	2
20	1	1	1	2	5	2	1	4	5
T_6 1	3	1	1	4	1	4	2	1	4
2	1	2	2	4	3	1	2	5	4
3	3	4	5	4	3	4	3	2	5
4	2	2	5	3	4	4	2	2	1
5	1	1	5	3	1	2	1	3	3
6	2	2	2	4	3	4	4	3	4
7	3	1	1	3	3	2	2	3	4
8	1	4	2	3	3	1	2	5	3
9	1	1	3	2	4	1	4	4	5
10	1	1	1	1	1	2	2	1	4
11	1	3	1	1	4	2	1	3	5
12	1	3	2	3	2	4	2	1	4
13	1	5	4	5	1	3	3	4	5
14	1	1	1	2	5	4	2	1	5
15	1	1	5	2	1	5	4	1	5
16	5	1	5	2	2	4	5	1	5
17	2	1	1	2	3	4	4	2	2
18	4	3	3	2	2	4	5	2	5
19	1	2	1	1	4	2	2	4	2
20	1	4	1	4	3	1	1	3	3
21	1	2	3	2	4	4	3	3	5
22	2	1	4	2	3	5	4	4	5
23	2	2	1	2	4	1	2	3	4
24	3	3	1	2	1	1	1	1	5

	1	2	3	4	5	6	7	8	9•
T_1 1	1	1	2	2	5	1	4	5	1
2	4	1	5	1	2	4	1	3	5
3	1	1	5	1	4	1	3	5	1
4	4	2	4	1	1	4	3	1	5
T_2 1	1	1	2	4	4	1	4	5	1
2	5	2	4	1	4	5	1	1	5
3	1	1	5	1	1	1	2	5	1
4	4	1	2	1	4	4	2	1	5
5	5	4	5	3	2	4	1	5	2
6	1	1	4	3	2	2	4	5	1
7	5	4	5	2	1	4	2	4	1
8	5	5	3	5	4	2	4	1	1
T_3 1	1	1	4	5	5	1	3	5	2
2	2	1	5	4	4	2	1	1	5
3	1	1	5	2	4	1	3	5	2
4	1	1	2	1	5	5	3	2	5
5	5	4	5	3	1	4	1	5	2
6	1	2	3	3	2	1	2	5	1
7	4	2	5	3	2	4	3	4	1
8	4	5	5	5	2	2	3	5	1
9	1	5	2	3	5	1	4	4	5
10	5	5	5	3	1	4	2	3	2
11	1	4	1	2	5	1	2	4	4
12	1	5	2	2	2	4	3	1	5
T_4 1	1	5	5	4	4	1	2	5	2
2	4	1	4	5	2	4	1	2	5
3	1	1	5	1	2	1	2	5	1
4	4	1	2	1	2	5	3	1	5
5	4	5	5	2	2	4	1	5	3
6	1	1	4	4	4	1	3	5	1
7	5	2	5	1	2	3	3	5	1

		1	2	3	4	5	6	7	8	9•
	8	2	5	5	5	4	2	3	2	1
	9	1	4	1	5	5	2	2	4	5
	10	5	5	5	2	2	4	1	3	2
	11	1	1	2	2	2	1	1	5	4
	12	1	5	2	1	4	2	3	1	5
	13	4	5	5	1	1	2	4	4	1
	14	1	5	1	2	3	3	4	1	4
	15	5	1	3	1	2	5	4	2	5
	16	1	5	4	4	3	1	2	3	4
T_5	1	1	2	5	5	4	1	2	5	2
	2	4	1	4	5	1	2	1	4	5
	3	1	1	5	1	2	1	2	5	2
	4	4	1	1	1	2	4	3	2	5
	5	4	5	5	2	1	4	1	5	4
	6	1	2	4	4	2	2	3	5	1
	7	5	1	5	2	1	3	3	5	1
	8	2	5	5	5	4	1	4	2	1
	9	1	4	1	2	4	2	2	5	5
	10	4	5	5	1	2	4	1	2	2
	11	1	1	2	1	5	2	1	4	4
	12	1	4	2	2	5	2	2	1	5
	13	2	4	5	1	2	2	4	4	2
	14	2	2	1	1	4	5	2	1	5
	15	5	1	4	2	2	5	4	1	4
	16	1	5	3	4	4	2	1	2	5
	17	5	1	1	2	2	5	5	1	4
	18	5	4	4	1	2	4	3	2	1
	19	1	1	2	1	2	2	4	2	1
	20	3	1	1	2	4	5	5	1	2
T_6	1	1	1	5	5	2	1	2	5	1
	2	5	4	2	4	2	2	1	1	5

	1	2	3	4	5	6	7	8	9•
3	1	1	5	1	2	2	2	5	2
4	4	1	2	1	2	5	2	1	5
5	5	5	5	2	1	4	2	5	2
6	1	2	3	4	4	2	4	5	1
7	5	2	5	2	1	3	3	5	1
8	2	5	5	5	4	2	4	5	1
9	1	5	1	1	5	2	1	4	5
10	4	4	5	1	1	2	2	2	1
11	1	5	3	4	4	2	1	4	4
12	1	5	1	1	4	1	1	1	5
13	2	4	5	1	1	2	4	2	2
14	1	1	1	1	4	4	2	1	5
15	5	1	5	1	2	4	4	2	4
16	1	5	3	2	2	1	1	4	2
17	5	1	1	1	2	4	4	1	2
18	5	2	4	2	2	4	3	4	2
19	1	1	1	2	4	5	4	4	1
20	1	1	1	2	4	4	5	1	2
21	2	2	1	1	2	4	4	1	5
22	1	1	1	2	4	1	2	1	5
23	2	2	4	4	1	2	2	5	1
24	4	5	5	4	1	2	1	5	2

To save space, constructs for these grids will not be listed. However, S3, S4 and S5 were used as test cases for some aspects of the procedures and full details will be reported in the relevant appendices.

Prior to further analysis, the 22 individual grids in the sample were processed by the program EXACT. Exact probabilities of associations between constructs in each grid are listed in the following matrices. Probabilities are given to four places, decimal point omitted. Negative signs indicate that optimal association is obtained when one member of the pair is reversed.

S1 GRID 1

	2	3	4	5	6
1	3015	0108	2583	0003	-5024
2		-4301	-4701	2491	3173
3			-4602	0108	-2526
4				4301	2709
5					4219

S1 GRID 2

	2	3	4	5	6	7	8	9	10	11	12
1	1932	0570	-0194	0006	-1618	0630	0432	-4850	-2304	1506	0000
2		-3379	-0210	0525	1967	1240	1414	-1445	-2677	2134	2087
3			-0807	0899	-0314	1210	2905	2229	-0107	0468	0302
4				-0054	4316	-0900	-2052	3566	0656	-0440	-0063
5					-1950	0223	0552	-2408	-1587	0917	0010
6						-0358	-2704	-0481	2560	-0370	-2123
7							0113	-4924	-0842	0005	1103
8								-5110	-1029	0492	1176
9									-5082	3682	-4747
10										-0616	-2147
11											1495

S1 GRID 3

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	3295	5118	-0548	0002	3174	0047	-4268	-2135	5222	0132	0067	0861	0025	0268	0016	1520	0706
2		-0695	-0612	5152	-0096	2613	-3333	-4340	-5086	-4785	1762	4832	-5019	1098	2099	1471	1142
3			-5525	2930	0410	-4126	5044	1680	-2566	-5279	-4427	-3113	-4334	4796	-4837	-3501	-4621
4				-0241	2365	-2461	4277	-5393	-5390	-3876	-0873	-1897	-1999	-0413	-0267	-1310	-0620
5					1900	0390	3753	-2900	-3999	0656	0102	1114	0050	0200	0051	0911	0634
6						2401	2479	4994	-4079	1507	4208	-4918	1925	5478	-5504	5384	-5120
7							3041	-4021	-1921	0001	0605	3880	0290	1262	0766	0247	0864
8								5324	-0156	3747	-4256	-4212	-4275	4888	-1242	1780	1560
9									-1191	4689	-4541	-1764	-3853	-4882	-4413	4044	-1065
10										-2197	4292	1829	3350	-4400	2894	-1695	-2617
11											1277	5271	0301	3928	1215	1289	2941
12												2192	0006	0007	0008	0143	3261
13													0445	0953	1052	4379	3009
14														0200	0010	0424	4535
15															0142	0113	2018
16																0915	3308
17																	2855

S2 GRID 1

	2	3	4	5	6
1	0194	-0175	5289	-0856	3168
2		-0719	-1061	-0527	4399
3			4470	0082	-4219
4				2685	0668
5					-5073

S2 GRID 2

	2	3	4	5	6	7	8	9	10	11	12
1	0095	-0049	-0559	-0095	-2126	-1981	-1120	-2071	-0593	-3829	0454
2		-0012	-0221	-0000	3769	-2211	-0679	-0044	-0305	-0849	1594
3			0856	0009	4978	3660	0843	0653	0727	3756	-0130
4				0359	4847	3158	2883	1771	0348	2923	-0901
5					5124	1299	0603	0064	0260	0779	-0581
6						0704	3846	-4027	2829	-5263	-3602
7							5023	0990	0338	0954	5281
8								2635	2713	2153	-0376
9									0714	0266	-4678
10										2559	-1272
11											-5060

S2 GRID 3

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0000	-0002	-0201	-0055	-2438	5169	-0366	-0265	-0616	-0057	1534	1462	-1160	0050	0310	0226	-0197
2		-0004	-0047	-0018	-3706	4417	-0256	-0134	-0700	-0024	1692	0577	-1921	0036	0092	0084	-0487
3			0431	0032	3123	-4479	0209	0238	1373	0054	-0426	-0950	2047	-0091	-0175	-0264	0730
4				0438	4645	-3728	2371	0934	0521	0673	-4775	-1555	2987	-0695	-0076	-0333	1309
5					2934	3757	0289	0014	0804	0005	-2208	-1514	1221	-0795	-0022	-1368	0957
6						0024	1601	1687	0061	1288	3147	0650	0026	2914	5083	2934	0108
7							4026	1154	0111	2665	1180	0458	0019	0984	-5086	0309	0586
8								0169	2087	0100	-0595	-1677	1756	-1648	-0847	-1615	2378
9									0305	0042	5379	-1981	0205	-1816	-0046	-3873	0550
10										0227	2800	2790	0011	-4742	-1084	-4619	0021
11											-1218	-2496	0815	-1301	-0119	-1006	0729
12												1559	1660	1468	2190	0320	4620
13													1591	0242	1512	0191	4657
14														5337	-2503	3151	0142
15															1459	0061	-3555
16																1443	-1413
17																	-4158

S3 PROBABILITIES GRID 1

	1	2	3	4	5	6
1	0	126	2141	2802	3238	546
2	126	0	-5230	4456	2347	876
3	2141	-5230	0	1236	-5020	-3654
4	2802	4456	1236	0	1982	-4854
5	3238	2347	-5020	1982	0	2561
6	546	876	-3654	-4854	2561	0

S3 PROBABILITIFS GRID 2

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	4865	1463	-439	980	437	2353	-3785	-3836	2957	1132	1341
2	4865	0	-120	-249	-1668	4828	-4355	1510	-2177	4851	-4835	-2823
3	1463	-120	0	1524	229	3296	3230	-4045	-4054	4386	1019	479
4	-439	-249	1524	0	4484	-292	-4613	2200	2296	-3796	-5071	-5159
5	980	-1668	229	4484	0	-5102	-5034	-2704	1965	-3901	-4325	-5085
6	437	4828	3296	-292	-5102	0	3056	-368	-1220	4336	604	1812
7	2353	-4355	3230	-4613	-5034	3056	0	5182	-3002	518	92	1089
8	-3785	1510	-4045	2200	-2704	-368	5182	0	5025	1976	4086	1811
9	-3836	-2177	-4054	2296	1965	-1220	-3002	5025	0	-4862	-557	-958
10	2957	4851	4386	-3796	-3901	4336	518	1976	-4862	0	989	192
11	1132	-4835	1019	-5071	-4325	604	92	4086	-557	989	0	208
12	1341	-2823	479	-5159	-5085	1812	1089	1811	-958	192	208	0

S3 PROBABILITIES GRID 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	5006	4663	-4996	-2256	442	1633	-2303	-2100	3322	747	-5066	151	-601	1384	-1482	1143	578
2	5006	0	-177	-584	-2854	-3083	-3321	3541	3406	-2819	-3493	-959	-4735	-912	-1213	-3421	-2371	5230
3	4663	-177	0	683	1460	2006	3311	-1543	-3365	2530	1704	1077	-2942	3756	4365	2943	4412	5111
4	-4996	-584	683	0	484	3171	4949	-704	2152	3256	2123	1067	-2074	2417	5089	3006	4657	1349
5	-2256	-2854	1460	484	0	2041	-3516	-2447	3425	-3300	-3980	4256	-349	3414	-532	863	-5112	-4611
6	442	-3083	2006	3171	2041	0	325	-86	-85	4754	288	1962	4617	-3199	-5281	-1612	73	398
7	1633	-3321	3311	4949	-3516	325	0	-440	-341	453	11	120	3553	-1741	888	-40	103	149
8	-2303	3541	-1543	-704	-2447	-86	-440	0	1127	-2380	-77	-986	3997	4371	-4184	1776	-430	-133
9	-2100	3406	-3365	2152	3425	-85	-341	1127	0	5189	-631	-3072	-2231	4676	-2635	536	-260	-2654
10	3322	-2819	2530	3256	-3300	4754	453	-2380	5189	0	610	106	5131	-4151	1278	-1889	1893	1692
11	747	-3493	1704	2123	-3980	288	11	-77	-631	610	0	343	2841	-643	649	-89	141	84
12	-5066	-959	1077	1067	4256	1962	120	-986	-3072	106	343	0	-2325	3447	3093	-1102	1191	739
13	151	-4735	-2942	-2074	-349	4617	3553	3997	-2231	5131	2841	-2325	0	-1909	180	-975	1659	3545
14	-601	-912	3756	2417	3414	-3199	-1741	4371	4676	-4151	-643	3447	-1909	0	-3752	1756	-2968	-2846
15	1384	-1213	4365	5089	-532	-5281	888	-4184	-2635	1278	649	3093	180	-3752	0	-866	1529	1897
16	-1482	-3421	2943	3006	863	-1612	-40	1776	536	-1889	-89	-1102	-975	1756	-866	0	-448	-177
17	1143	-2371	4412	4657	-5112	73	103	-430	-260	1893	141	1191	1659	-2968	1529	-448	0	1273
18	578	5230	5111	1349	-4611	398	149	-133	-2654	1692	84	739	3545	-2846	1897	-177	1273	0

S3 PROBABILITIES GRID 4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	0	-2387	4900	-1506	-4232	4614	4706	3821	1388	5197	3960	-4480	700	2191	2756	-2010	363	1316	2275	-1799	-1925	-3002	443	-860
2	-2387	0	-3220	-670	5244	1772	-2863	4075	-4541	-304	-3835	-53	-2265	-14	-4263	4181	-790	-752	-2528	264	75	1999	-2201	3741
3	4900	-3220	0	-5133	-4662	-2135	1624	4223	2981	1530	4296	1418	-4119	3717	-3143	2342	4075	-4166	-2972	-3085	-2051	2947	-2580	-4923
4	-1506	-670	-5133	0	-4996	-4628	1976	-1302	-3133	899	723	2037	4232	2459	4385	3682	2291	4350	-4603	-4721	-3877	1908	-4263	-4454
5	-4232	5244	-4662	-4996	0	-2548	3585	-1883	-4053	-4393	-2667	4193	1362	4086	-3954	-1373	-3618	2101	2347	-1513	-2837	-3018	-3655	-2257
6	4614	1772	-2135	-4628	-2548	0	4493	2956	3431	-250	858	-869	3960	-1036	3227	-1699	3993	-4314	5096	1483	3474	2852	3546	-3652
7	4706	-2863	1624	1976	3585	4493	0	-2638	-2891	1813	110	1886	659	-3969	-510	-1774	418	528	1204	-1366	-4673	509	1842	-562
8	3821	4075	4223	-1302	-1883	2956	-2638	0	468	4891	-2078	-5006	-1219	-2532	2823	3289	-2299	-1876	-3027	726	4225	-3820	4167	5026
9	1388	-4541	2981	-3133	-4053	3431	-2891	468	0	3753	-3923	4941	-1937	3376	399	2253	-2741	-476	-1145	1855	-1301	-5094	-2881	-1843
10	5197	-304	1530	899	-4393	-250	1813	4891	3753	0	3545	96	-3875	1890	-4565	2436	2621	4282	3837	-2344	-2621	3883	3191	-2534
11	3960	-3835	4296	723	-2667	858	110	-2078	-3923	3545	0	-5228	2225	-3616	-2439	-3403	149	2696	3320	-4836	3638	86	1294	-915
12	-4480	-53	1418	2037	4193	-869	1886	-5006	4941	96	-5228	0	-5019	469	-4911	4863	4384	2612	3214	-695	-323	-3385	5488	-4634
13	700	-2265	-4119	4232	1362	3960	659	-1219	-1937	-3875	2225	-5019	0	4330	-3976	-15	84	9	47	-81	-1995	-2719	426	-385
14	2191	-14	3717	2459	4086	-1036	-3969	-2532	3376	1890	-3616	469	4330	0	2884	3232	3487	3365	-3595	-543	-41	-1432	-3704	3948
15	2756	-4263	-3143	4385	-3954	3227	-510	2823	399	-4565	-2439	-4911	-3976	2884	0	4272	-2916	-1244	-2363	2821	-1285	-1588	-2558	-5087
16	-2010	4181	2342	3682	-1373	-1699	-1774	3289	2253	2436	-3403	4863	-15	3232	4272	0	-709	-44	-6	484	3145	1503	-195	387
17	363	-790	4075	2291	-3618	3993	418	-2299	-2741	2621	149	4384	84	3487	-2916	-709	0	93	459	-133	-3106	3876	91	-625
18	1316	-752	-4166	4350	2101	-4314	528	-1876	-476	4282	2696	2612	9	3365	-1244	-44	93	0	11	-36	-2734	-1932	79	-1061
19	2275	-2528	-2972	-4603	2347	5096	1204	-3027	-1145	3837	3320	3214	47	-3595	-2363	-6	459	11	0	-145	-4135	-1341	36	-520
20	-1799	264	-3085	-4721	-1513	1483	-1366	726	1855	-2344	-4836	-695	-81	-543	2821	484	-133	-36	-145	0	208	1283	-1522	2336
21	-1925	75	-2051	-3877	-2837	3474	-4673	4225	-1301	-2521	3638	-328	-1995	-41	-1285	3145	-3106	-2734	-4135	208	0	625	3558	3880
22	-3002	1999	2947	1908	-3018	2852	509	-3820	-5094	3883	86	-3385	-2719	-1432	-1588	1503	3876	-1932	-1341	1283	625	0	-4114	-3187
23	443	-2201	-2580	-4263	-3655	3546	1842	4167	-2881	3191	1294	5488	426	-3704	-2558	-195	91	79	36	-1522	3558	-4114	0	-436
24	-860	3741	-4923	-4454	-2257	-3652	-562	5026	-1843	-2534	-915	-4634	-385	3948	-5087	387	-625	-1061	-520	2336	3880	-3187	-436	0

S4 PROBABILITIES GRID 1

	1	2	3	4
1	0	-4805	-515	-1245
2	-4805	0	661	-4216
3	-515	661	0	5004
4	-1245	-4216	5004	0

S4 PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8
1	0	-548	-699	4281	191	382	723	-62
2	-548	0	1898	-2839	-615	-11	-3290	43
3	-699	1898	0	-4806	-2670	-1837	-143	1167
4	4281	-2839	-4806	0	1207	1948	-1971	-3520
5	191	-615	-2670	1207	0	873	4769	-75
6	382	-11	-1837	1948	873	0	2912	-44
7	723	-3290	-143	-1971	4769	2912	0	-2010
8	-62	43	1167	-3520	-75	-44	-2010	0

S4 PROBABILITIES GRID 3

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	-2666	-2085	-4845	-3514	2028	3505	-1459	1314	252	1601	1252
2	-2666	0	3366	-873	-3792	-775	-4286	2	3558	-3385	-5048	1748
3	-2085	3366	0	-5262	2720	-1934	-960	2480	-1274	-1702	-2704	-2639
4	-4845	-873	-5262	0	204	-4043	-3010	-1080	-919	-3673	-5264	-1983
5	-3514	-3792	2720	204	0	-242	-730	-5203	-791	-2611	-4192	-2520
6	2028	-775	-1934	-4043	-242	0	918	-344	2476	1696	-5008	4648
7	3505	-4286	-960	-3010	-730	918	0	-3331	3311	2741	-5233	-4104
8	-1459	2	2480	-1080	-5203	-344	-3331	0	-5270	-2041	-3327	3705
9	1314	3558	-1274	-919	-791	2476	3311	-5270	0	1127	678	172
10	252	-3385	-1702	-3673	-2611	1696	2741	-2041	1127	0	2350	1146
11	1601	-5048	-2704	-5264	-4192	-5008	-5233	-3327	678	2350	0	673
12	1252	1748	-2639	-1983	-2520	4648	-4104	3705	172	1146	673	0

S4 PROBABILITIES GRID 4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	2607	3694	-4153	4351	161	2746	-813	1844	184	2847	832	516	97	1081	2074
2	2607	0	3536	-643	-1970	3532	4767	-4483	4474	1128	3677	3940	1714	899	1522	62
3	3694	3536	0	-4650	-507	5069	2455	4382	2684	3357	1777	3099	2484	3602	-3083	3609
4	-4153	-643	-4650	0	2536	4436	-5134	4781	-3055	-2215	-3103	3735	4060	-1934	-5116	-227
5	4351	-1970	-507	2536	0	3563	-3795	-3797	5096	-3216	-1643	2479	-5096	-4695	2968	-3848
6	161	3532	5069	4436	3563	0	5043	-92	5025	270	2888	747	432	357	204	3968
7	2746	4767	2455	-5134	-3795	5043	0	1195	309	3096	2677	4323	4976	3270	-995	3221
8	-813	-4483	4382	4781	-3797	-92	1195	0	2926	-713	-3680	-2338	-1443	-782	-62	-5064
9	1844	4474	2684	-3065	5096	5025	309	2926	0	3564	-5075	1048	2145	2562	-2895	933
10	184	1128	3057	-2215	-3216	270	3096	-713	3564	0	805	2738	1025	125	1430	1698
11	2847	3677	1777	-3103	-1643	2888	2677	-3680	-5075	805	0	5312	3919	2442	-2486	-5079
12	832	3940	3099	3735	2479	747	4323	-2338	1048	2738	5312	0	42	1647	1794	1776
13	516	1714	2484	4060	-5096	432	4976	-1443	2145	1025	3919	42	0	817	878	1870
14	97	899	3602	-1934	-4695	357	3270	-782	2562	125	2442	1647	817	0	767	939
15	1081	1522	-3083	-5116	2968	204	-995	-62	-2895	1430	-2486	1794	878	767	0	2384
16	2074	62	3609	-227	-3848	3968	3221	-5064	933	1698	-5079	1776	1870	939	2384	0

S4 PROBABILITIES GRID 5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	-3555	-3044	5131	3983	578	5019	-757	2456	306	5071	380	2393	479	295	795	4161	1342	-4219	3904
2	-3555	0	2235	-4008	-2893	-62	321	578	4966	-4617	-3597	4517	2493	-4884	-1686	-114	-4053	-710	-3341	1260
3	-3044	2235	0	-4118	3036	-1107	2762	3145	-1402	-1764	-3352	-1304	817	-397	-3268	-2109	-3528	-3394	-1615	-2997
4	5131	-4008	-4118	0	3839	4658	-2686	-5331	-5224	-5150	-3176	-5403	-4616	4610	4521	-5011	-3257	-4821	4886	-5092
5	3983	-2893	3036	3839	0	2473	-2640	-2504	-3086	-3531	-2632	-2506	2589	-3294	2785	3294	-2177	5001	-3306	-3065
6	578	-62	-1107	4658	2473	0	-1566	-171	2334	1770	4830	2596	-3857	1195	218	13	5190	675	3033	-4671
7	5019	321	2762	-2686	-2640	-1566	0	2742	2778	3834	-5384	5072	4460	4951	-980	-2998	2762	-2331	3644	1081
8	-757	578	3145	-5331	-2504	-171	2742	0	-5009	-3013	-2580	-2719	-3145	-3753	-198	-320	4456	-2040	3019	1384
9	2456	4966	-1402	-5224	-3086	2334	2778	-5009	0	445	-4505	1989	-2545	141	4006	2516	5382	5401	1000	485
10	306	-4617	-1764	-5150	-3531	1770	3834	-3013	445	0	4451	658	-5333	178	2033	1809	3047	2430	3575	2209
11	5071	-3597	-3352	-3176	-2632	4830	-5384	-2580	-4505	4451	0	2453	5033	-4720	3812	3831	279	844	-3151	-2765
12	380	4517	-1304	-5403	-2506	2596	5072	-2719	1989	658	2453	0	3505	134	582	2517	2353	1978	-3987	1931
13	2393	2493	817	-4616	2589	-3857	4460	-3145	-2545	-5333	5033	3505	0	-3742	1020	-4345	-3935	4812	-84	-3730
14	479	-4884	-397	4610	-3294	1195	4951	-3753	141	178	-4720	134	-3742	0	1243	1578	4161	2928	2202	403
15	295	-1686	-3268	4521	2785	218	-980	-198	4006	2033	3812	582	1020	1243	0	451	-4356	573	-1514	-4219
16	795	-114	-2109	-5011	3294	13	-2998	-320	2516	1809	3831	2517	-4345	1578	451	0	3040	397	3094	5304
17	4161	-4053	-3528	-3257	-2177	5190	2762	4456	5382	3247	279	2353	-3935	4161	-4356	3040	0	345	3674	3550
18	1342	-710	-3394	-4821	5001	675	-2331	-2040	5401	2430	844	1978	4812	2928	573	397	345	0	-5011	-4298
19	-4219	-3341	-1615	4886	-3306	3033	3644	3019	1000	3575	-3151	-3987	-84	2202	-1514	3094	3674	-5011	0	1477
20	3904	1260	-2997	-5092	-3065	-4671	1081	1384	485	2209	-2765	1931	-3730	403	-4219	5304	3550	-4298	1477	0

S4 PROBABILITIES GRID 6

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	0	-4834	3264	-3404	5260	878	947	-1863	-3768	1387	-4872	465	4049	1724	1630	1986	2248	2267	-2411	-4883	4222	3308	-4831	1498
2	-4834	0	-4103	-2429	2302	2533	966	53	330	4498	1285	-5051	1391	4140	-3079	-933	-3588	-1433	1606	343	2808	4244	609	4335
3	3264	-4103	0	3793	2385	5333	-3734	-3293	-5044	3435	4862	1620	1570	3521	702	1776	-2454	2613	-611	5419	3281	4103	-3497	2769
4	-3404	-2429	3793	0	2266	-3741	-1872	-2418	-3336	-2674	-2381	-5443	-3092	4886	2972	4982	5111	-1610	-4876	-2869	4829	4383	-1868	-769
5	5260	2302	2385	2266	0	-5257	-4931	4560	3001	5021	-4537	4733	1468	-3984	1249	3841	-2426	-3579	-3698	-5074	3630	2238	-3951	-4866
6	878	2533	5333	-3741	-5257	0	2136	-4920	2112	2161	4117	1437	3412	729	1283	4060	809	2759	4631	4885	989	975	3901	5324
7	947	966	-3734	-1872	-4931	2136	0	4666	1397	1966	1349	5400	-4408	1068	-4222	5081	3811	5176	2936	2922	3293	3795	132	1702
8	-1863	53	-3293	-2418	4560	-4920	4666	0	1796	-4667	1143	-4442	1283	-4006	-1106	-60	-2369	-828	979	86	4924	-3580	1334	4954
9	-3768	330	-5044	-3336	3001	2112	1397	1796	0	2212	918	-4841	4443	1406	2811	4080	4288	4498	1318	4412	343	884	342	4833
10	1387	4498	3435	-2674	5021	2161	1966	-4667	2212	0	2028	1190	3564	1773	1596	2490	3546	1982	-4893	-4949	1621	1995	2839	1712
11	-4872	1285	4862	-2381	-4537	4117	1349	1143	918	2028	0	2223	4086	418	-4698	-2600	-4847	5402	677	945	450	3314	82	1567
12	465	-5051	1620	-5443	4733	1437	5400	-4442	-4841	1190	2223	0	1585	669	742	4464	3958	3159	-3973	3150	1270	3155	-5281	2054
13	4049	1391	1570	-3092	1468	3412	-4408	1283	4443	3564	4086	1585	0	-3639	2464	-2995	-1781	-5241	-3572	1529	4250	5058	-4647	2702
14	1724	4140	3521	4886	-3984	729	1068	-4006	1406	1773	418	669	-3639	0	2048	3640	1255	3410	2520	4529	65	1151	939	3541
15	1630	-3079	702	2972	1249	1283	-4222	-1106	2811	1596	-4698	742	2464	2048	0	198	2816	498	-2282	-1214	480	129	-2596	4821
16	1986	-933	1776	4982	3841	4060	5081	-60	4080	2490	-2600	4464	-2995	3640	198	0	3258	68	-1031	-111	3687	933	-3025	3597
17	2248	-3588	-2454	5111	-2426	809	3811	-2369	4288	3546	-4847	3958	-1781	1255	2816	3258	0	2941	3161	-2807	2580	1872	-5447	-2803
18	2267	-1433	2613	-1610	-3579	2759	5176	-828	4498	1982	5402	3159	-5241	3410	498	68	2941	0	-1978	-802	3279	1433	-4614	2403
19	-2411	1606	-611	-4876	-3698	4631	2936	979	1318	-4893	677	-3973	-3572	2520	-2282	-1031	3161	-1978	0	2519	2173	3855	579	-3447
20	-4883	343	5419	-2869	-5074	4885	2922	86	4412	-4949	945	3150	1529	4529	-1214	-111	-2807	-802	2519	0	5532	-1348	904	2275
21	4222	2808	3281	4829	3630	989	3293	4924	343	1621	450	1270	4250	65	480	3687	2580	3279	2173	5532	0	79	1897	4854
22	3308	4244	4103	4383	2238	975	3795	-3580	884	1995	3314	3155	5058	1151	129	933	1872	1433	3855	-1348	79	0	4840	-4335
23	-4831	609	-3497	-1868	-3951	3901	132	1334	342	2839	82	-5281	-4647	939	-2596	-3025	-5447	-4614	579	904	1897	4840	0	2126
24	1498	4335	2769	-769	-4866	5324	1702	4954	4833	1712	1567	2054	2702	3541	4821	3597	-2803	2403	-3447	2275	4854	-4335	2126	0

S5 PROBABILITIES GRID 1

	1	2	3	4
1	0	-1845	150	-476
2	-1845	0	4203	114
3	150	4203	0	-2355
4	-476	114	-2355	0

S5 PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8
1	0	-191	1768	-1170	-2662	105	-1898	-4987
2	-191	0	-2770	35	3653	-458	3942	-2992
3	1768	-2770	0	-1643	1517	133	1374	-1558
4	-1170	35	-1643	0	-2868	-740	-2523	-2448
5	-2662	3653	1517	-2868	0	4468	17	-4667
6	105	-458	133	-740	4468	0	4092	-2582
7	-1898	3942	1374	-2523	17	4092	0	4532
8	-4987	-2992	-1558	-2448	-4667	-2582	4532	0

S5 PROBABILITIES GRID 3

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	1994	79	-4824	-3115	346	4249	2713	2325	-884	2240	-532
2	1994	0	2863	2151	-3324	-4102	-3755	-2630	4985	-3199	5119	5075
3	79	2863	0	4719	5319	349	2343	3219	3020	-2397	2893	-866
4	-4824	2151	4719	0	-627	-1894	-1805	-12	3238	-419	2496	1655
5	-3115	-3324	5319	-627	0	2771	244	425	-571	19	-1322	-2361
6	346	-4102	349	-1894	2771	0	2484	985	3704	-5127	3352	-1273
7	4249	-3755	2343	-1805	244	2484	0	966	-91	694	-153	-483
8	2713	-2630	3219	-12	425	985	966	0	-3632	513	-3116	-1347
9	2325	4985	3020	3238	-571	3704	-91	-3632	0	-620	37	1804
10	-884	-3199	-2397	-419	19	-5127	694	513	-620	0	-530	-5272
11	2240	5119	2893	2496	-1322	3352	-153	-3116	37	-530	0	3124
12	-532	5075	-866	1655	-2361	-1273	-483	-1347	1804	-5272	3124	0

S5 PROBABILITIES GRID 4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	-2031	782	-15	1975	389	4850	219	1711	4054	2393	4534	2267	-4189	-28	88
2	-2031	0	-3493	1290	5072	-3533	-3873	-3222	-5194	4454	3918	-2239	-862	-1626	1741	-4843
3	782	-3493	0	-1594	1835	209	508	4088	-3125	4088	1423	-2186	1213	-989	-3104	3785
4	-15	1290	-1594	0	-4009	-344	-4867	-117	-2091	-5215	-4044	3922	-2289	3840	5	-614
5	1975	5072	1835	-4009	0	-3922	721	5323	-2585	26	3624	-4009	660	-2327	-4668	3782
6	389	-3533	209	-344	-3922	0	3077	1964	3226	-1760	1473	-1607	5302	-1155	-576	3162
7	4850	-3873	508	-4867	721	3077	0	-3910	-126	754	4868	-488	182	-205	3003	-1402
8	219	-3222	4088	-117	5323	1964	-3910	0	4564	3438	-1767	4999	2970	5047	-105	660
9	1711	-5194	-3125	-2091	-2585	3226	-126	4564	0	-786	1423	1375	-318	1865	-753	615
10	4054	4454	4088	-5215	26	-1760	754	3438	-786	0	-2638	-3657	464	-2478	4976	-5407
11	2393	3918	1423	-4044	3624	1473	4868	-1767	1423	-2638	0	-4936	-3574	-3151	-4335	2610
12	4534	-2239	-2186	3922	-4009	-1607	-488	4999	1375	-3657	-4936	0	-3963	19	-5022	1045
13	2267	-862	1213	-2289	660	5302	182	2970	-318	464	-3574	-3963	0	-3916	-4336	4836
14	-4189	-1626	-989	3840	-2327	-1155	-205	5047	1865	-2478	-3151	19	-3916	0	-5047	2554
15	-28	1741	-3104	5	-4668	-576	3003	-105	-753	4976	-4335	-5022	-4336	-5047	0	-236
16	88	-4843	3785	-614	3782	3162	-1402	660	615	-5407	2610	1045	4836	2554	-236	0

S5 PROBABILITIES GRID 5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	1916	527	-187	-4877	75	3561	805	3877	-2525	2317	-4364	3112	-585	-486	2930	-65	-881	5307	-739
2	1916	0	2681	3825	1977	3250	1991	-2589	-4783	-3877	4827	-2560	-2631	-3124	3877	4359	-4449	-1898	-2284	-813
3	527	2681	0	-2597	1952	382	793	4487	3868	4670	1810	-2807	417	-1634	-3425	-3927	-909	-4457	3801	-1290
4	-187	3825	-2597	0	-5264	-511	-5130	-25	4573	-4092	3622	4513	-1756	226	286	-2805	56	5076	-5316	1078
5	-4877	1977	1952	-5264	0	4661	1507	-2707	4143	201	-4738	-3152	1532	-3895	-5088	4359	-2122	1753	-2435	-331
6	75	3250	382	-511	4661	0	1369	1656	-5200	-2992	-5333	-1005	1430	-300	-1126	-3705	-500	-2906	3436	-1898
7	3561	1991	793	-5130	1507	1369	0	-3657	-921	2668	-3260	-28	1508	-786	2152	-93	4865	996	4058	-3802
8	805	-2589	4487	-25	-2707	1656	-3657	0	-2632	4681	-1968	4456	2009	-418	-1087	2498	-478	5265	4599	-2495
9	3877	-4783	3868	4573	4143	-5200	-921	-2632	0	-2325	304	595	-5326	2314	-402	678	-1848	-510	-4175	-2356
10	-2525	-3877	4670	-4092	201	-2992	2668	4681	-2325	0	-2614	-4655	1575	-5088	3251	4831	-3428	62	-3163	-2356
11	2317	4827	1810	3622	-4738	-5333	-3260	-1968	304	-2614	0	1109	-4407	1421	-2829	2498	-2854	-1066	-5024	-4840
12	-4364	-2560	-2807	4513	-3152	-1005	-28	4456	595	-4655	1109	0	-3367	567	-3022	75	-3743	-1652	-3872	-5314
13	3112	-2631	417	-1756	1532	1430	1508	2009	-5326	1575	-4407	-3367	0	-1145	-3648	-3618	-1422	1819	2630	-1991
14	-585	-3124	-1634	226	-3895	-300	-786	-418	2314	-5088	1421	567	-1145	0	1587	2930	834	-4092	-4815	829
15	-486	3877	-3425	286	-5088	-1126	2152	-1087	-402	3251	-2829	-3022	-3648	1587	0	-937	54	1315	4175	768
16	2930	4359	-3927	-2805	4359	-3705	-93	2498	678	4831	2498	75	-3618	2930	-937	0	-739	-972	-1926	-1047
17	-65	-4449	-909	56	-2122	-500	4865	-478	-1848	-3428	-2854	-3743	-1422	834	54	-739	0	2921	3630	110
18	-881	-1898	-4457	5076	1753	-2906	996	5265	-510	62	-1066	-1652	1819	-4092	1315	-972	2921	0	4941	3956
19	5307	-2284	3801	-5316	-2435	3436	4058	4599	-4175	-3163	-5024	-3872	2630	-4815	4175	-1926	3630	4941	0	1850
20	-739	-813	-1290	1078	-331	-1898	-3802	-2495	-2356	-2356	-4840	-5314	-1991	829	768	-1047	110	3956	1850	0

S5 PROBABILITIES GRID 6

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	0	-1526	424	-412	4054	167	1514	344	-2160	4947	2674	-886	4707	-1053	-2967	2574	-633	4482	5108	-2202	-308	-2911	43	919
2	-1526	0	-531	1925	5079	-116	-2466	-1333	4026	4613	3649	1464	-2929	4691	5283	-5024	4708	-3415	-146	-1199	4085	2998	-1987	3289
3	424	-531	0	-3110	2156	1295	814	2229	-5098	3100	4437	-2144	2248	-3661	3066	2518	-1921	2054	3745	-3028	-2345	-3437	612	2115
4	-412	1925	-3110	0	-4739	-185	-4378	-4	-4934	-4212	-1388	4561	-3375	371	301	-724	496	2629	5191	3301	198	2777	-774	-1222
5	4054	5079	2156	-4739	0	-2888	114	3621	-3489	233	-4527	-2587	1411	-526	3117	1673	-5122	268	-2393	-274	-1644	-155	1411	73
6	167	-116	1295	-185	-2888	0	4336	279	-4713	-2472	3540	-1956	-4598	-2627	-1041	3485	-1726	-4053	667	2990	-1247	-4372	595	5265
7	1514	-2466	814	-4378	114	4336	0	3404	-586	484	-1147	-202	1989	-449	1041	4894	3517	14	-4826	-1434	-1296	-309	501	532
8	344	-1333	2229	-4	3621	279	3404	0	-4573	3269	1871	-3517	2538	-326	-740	982	-414	-3753	4927	-3385	-145	-1784	674	1057
9	-2160	4026	-5098	-4934	-3489	-4713	-586	-4573	0	-2357	138	78	-3055	1283	-898	882	-1460	-609	5166	-4225	3563	1193	-1852	-4199
10	4947	4613	3100	-4212	233	-2472	484	3269	-2357	0	-3554	-3715	186	-973	1746	2353	5019	1064	-1232	-1182	-2154	-909	3238	525
11	2674	3649	4437	-1388	-4527	3540	-1147	1871	138	-3554	0	413	-3966	4851	-98	178	-44	-323	-3050	-1871	-2541	2700	3883	2003
12	-886	1464	-2144	4561	-2587	-1956	-202	-3517	78	-3715	413	0	-4879	1106	-1908	1736	-2268	-239	-2347	-4600	2305	636	-733	-3542
13	4707	-2929	2248	-3375	1411	-4598	1989	2538	-3055	186	-3966	-4879	0	-2077	1987	2425	-4431	3729	-2547	-3965	-5189	-2091	4114	2429
14	-1053	4691	-3661	371	-526	-2627	-449	-326	1283	-973	4851	1106	-2077	0	3523	-2092	3249	-2060	2213	766	150	231	-548	-169
15	-2967	5283	3066	301	3117	-1041	1041	-740	-898	1746	-98	-1908	1987	3523	0	-834	558	312	-4080	4456	1746	-4788	-3422	-3289
16	2574	-5024	2518	-724	1673	3485	4894	982	882	2353	178	1736	2425	-2092	-834	0	-441	-2961	-2761	-982	-1545	-3418	1922	451
17	-633	4708	-1921	496	-5122	-1726	3517	-414	-1460	5019	-44	-2268	-4431	3249	558	-441	0	1219	2752	1337	976	-4275	-1429	-1057
18	4482	-3415	2054	2629	268	-4053	14	-3753	-609	1064	-323	-239	3729	-2060	312	-2961	1219	0	4550	-3043	-3596	-590	2388	2346
19	5108	-146	3745	5191	-2393	667	-4826	4927	5166	-1232	-3050	-2347	-2547	2213	-4080	-2761	2752	4550	0	183	3413	-4796	5259	-734
20	-2202	-1199	-3028	3301	-274	2990	-1434	-3385	-4225	-1182	-1871	-4600	-3965	766	4456	-982	1337	-3043	183	0	758	2455	-1429	-33
21	-308	4085	-2345	198	-1644	-1247	-1296	-145	3563	-2154	-2541	2305	-5189	150	1746	-1545	976	-3596	3413	758	0	1274	-423	-216
22	-2911	2998	-3437	2777	-155	-4372	-309	-1784	1193	-909	2700	636	-2091	231	-4788	-3418	-4275	-590	-4796	2455	1274	0	-1157	-684
23	43	-1987	612	-774	1411	595	501	674	-1852	3238	3883	-733	4114	-548	-3422	1922	-1429	2388	5259	-1429	-423	-1157	0	282
24	919	3289	2115	-1222	73	5265	532	1057	-4199	525	2003	-3542	2429	-169	-3289	451	-1057	2346	-734	-33	-216	-684	282	0

E2 Coding sample grids.

The sample grids comprised 3096 individual element rating decisions. Elements and constructs in each grid were classified according to the scheme described in Chapter 3.2. This scheme entailed classifying constructs in terms of three operational definitions of centrality, and elements by two, as follows:-

(a) Constructs

(i) Self-examining: all constructs locating the element SELF at position 1 or 5 were denoted +SE, all others -SE.

(ii) Average extremity: all constructs were scored for average extremity by computing root mean square deviations ($\sqrt{(\sum d^2/n)}$) of elements from the midpoint, or indifference position (3). The median score was found for each subject, and constructs exceeding the median denoted +AE, all others -AE.

(iii) Stability of interpretation: the exact probability of association between construct replications was obtained for each construct using the program EXACT (Appendix D). In addition, for those constructs displaying exact probabilities of association greater than .05, probabilities for those constructs were ranked within grids and Spearman rho correlatión coefficients obtained between rankings obtained on successive occasions. Significant values of rho were interpreted as indicating pattern consistency. All constructs obtaining either an exact probability $\leq .05$ or rho $\leq .01$ (one-tailed) were denoted as +SI, all others -SI.

(b) Elements

(i) Element extremity: all elements were scored for average extremity over self-relevant constructs (where SELF is located at position 1 or 5) produced by each subject (including retested constructs) by computing root mean square deviations from the midpoint. The median score was found for each subject, and elements exceeding the median denoted +EE, all others -EE. The elements SELF and IDEAL SELF were omitted in this analysis.

(ii) Element stability: all elements were scored for stability by computing the root mean square difference score for each element over replicated constructs. Only those constructs displaying stability of interpretation were utilised for these comparisons. The median score for each subject was found, and elements exceeding the median denoted -ES, all others as ?ES. The elements SELF and IDEAL SELF were omitted from this analysis.

Of the 300 construct sorts in the grid sample, only those for which a stability score could be obtained were employed in the coding scheme. That is, all sorts with the exception of those in the final grid in each series were coded, totalling 192 constructs. After the elements SELF and IDEAL SELF had been removed from the element samples for each subject, 47 elements remained to be coded.

(a) Construct classifications

The following table codes each of the 192 sample constructs according to the extent to which each displays self extremity of rating, average extremity of rating, and stabiltiy of interpretation. Each variable is dichotomised, thus constructs may fall into one of eight classes:- -851-

Code	Class	Function
A	+SE, +AE, +SI	Central
B	+SE, +AE, -SI	Peripheral
C	+SE, -AE, +SI	Peripheral
D	+SE, -AE, -SI	Peripheral
E	-SE, +AE, +SI	Peripheral
F	-SE, +AE, -SI	Peripheral
G	-SE, -AE, +SI	Peripheral
H	-SE, -AE, -SI	Peripheral

The table below provides the data and code for each construct. It should be noted that the definition of stability has two components; the exact probability of association (PA) and (PC), the latter being computed only for those constructs displaying -PA ($p > .05$). In fact, in no case did a -PA construct attain a significant level of pattern consistency. All values of PA are given to three places, decimal point omitted. Subscripts refer to notes at the foot of the table.

Construct	SE	AE	PA	PC	Code
S1 T$_1$ 1	1+	1.32$_a$ -	005+		C
2	1+	1.38 -	002+		C
3	1+	1.29 -	000+		C
4	1+	1.29 -	511-	.100$_b$ -	D
5	1+	1.32 -	000+		C
6	1+	1.32 -	059-	0.0$_b$ -	D
S1 T$_2$ 1	1+	1.61 +	009+		A
2	1+	1.41 +	000+		A
3	2-	1.29 -	064-	-.109$_c$ -	H
4	5+	1.41 +	001+		A
5	1+	1.63 +	000+		A
6	1+	1.58 +	904-	.255$_c$ -	B
7	1+	1.38 -	000+		C
8	3-	1.44 +	013+		E
9	1+	1.38 -	016+		C
10	5+	1.56 +	001+		A
11	1+	1.44 +	000+		A
12	1+	1.41 +	011+		A
S2 T$_1$ 1	4-	1.58$_d$ +	023+		E
2	5+	1.55 +	005+		A
3	2-	1.29 -	022+		G
4	2-	1.15 -	244-	-.100$_b$ -	H
5	1+	1.66+	016+		A
6	1+	1.55 +	006+		A
S2 T$_2$ 1	4-	.96 -	001+		G
2	5+	1.68 +	000+		A
3	2-	1.00 -	001+		G
4	3-	.87 -	004+		G
5	2-	1.38 +	000+		E
6	2-	.96 -	001+		G
7	1+	1.38 +	001+		A
8	2-	1.08 -	000+		G
9	1+	1.47 +	000+		A
10	1+	1.32 +	027+		A
11	2-	1.12 -	016+		G
12	3-	1.32 +	001+		E
S3 T$_1$ 1	1+	1.53$_a$ -	104-	-.500$_b$ -	D
2	1+	1.61 +	037		A
3	1+	1.73 +	037+		A
4	1+	1.58 +	039+		A
5	1+	1.71 +	373-	-.700$_b$ -	B
6	1+	1.63 +	043+		A
S3 T$_2$ 1	3-	1.15 -	129-	.273$_c$ -	H
2	3-	1.35 -	068-	.435$_c$ -	H
3	3-	1.50 -	000+		G
4	3-	1.44 -	060-	.045$_c$ -	H
5	5+	1.71 +	013+		A
6	3-	1.63 +	006+		E
7	1+	1.55 -	054-	.677$_c$ -	D
8	1+	1.73 +	033+		A
9	1+	1.63 +	008+		A
10	1+	1.22 -	026+		C
11	1+	1.78 +	001+		A
12	1+	1.80 +	001+		A
S3 T$_3$ 1	1+	1.44 -	021+		C
2	4-	1.44 -	020+		G
3	3-	1.29 -	239-	-.049$_f$ -	H
4	2-	1.55 -	099-	-.096$_f$ -	H
5	4-	1.66 +	016+		E
6	3-	1.78 +	192-	-.238$_f$ -	F
7	1+	1.71 +	002+		A
8	3-	1.66 +	033+		E
9	2-	1.22 -	237-	.348$_f$ -	H
10	1+	1.41 -	007+		C
11	1+	1.66 +	011+		A
12	1+	1.73 +	003+		A
13	1+	1.26 -	134-	.086$_f$ -	D
14	4-	1.29 -	008+		G
15	1+	1.35 -	463-	.005$_f$ -	D
16	5+	1.26 -	086-	.405$_f$ -	D
17	1+	1.41 -	105-	.279$_f$ -	D
18	1+	1.61+	014+		A
S4 T$_1$ 1	5+	1.49$_g$ -	122-	h	D
2	2-	1.63 +	046+		E
3	1+	1.60 +	010+		A
4	1+	1.73 +	044+		A
S4 T$_2$ 1	5+	1.41 -	038+		C
2	1+	1.73 +	004+		A
3	2-	1.41 -	007+		G
4	1+	1.63 +	012+		A
5	4-	1.41 -	322-	.679$_i$ -	H
6	4-	1.37 -	108-	.429$_i$ -	H
7	5+	1.41 -	036+		C
8	1+	1.63 +	000+		A
S4 T$_3$ 1	5+	1.83 +	046+		A
2	2-	1.63 +	468-	.136$_c$ -	F
3	2-	1.53 -	547-	.136$_c$ -	H
4	1+	1.53 -	172-	-.164$_c$ -	D
5	1+	1.53 -	429-	-.136$_c$ -	D
6	5+	1.29 -	096-	.645$_c$ -	D
7	4-	1.53 -	430-	.464$_c$ -	H
8	1+	1.63 +	000+		A
9	5+	1.73 +	012+		A
10	5+	1.91 +	050+		A
11	5+	1.41 -	831-	.155$_c$ -	D
12	5+	1.33 -	033+		C
S4 T$_4$ 1	5+	1.73 +	006+		A
2	4-	1.53 +	351-	-.100$_j$ -	F
3	5+	1.15 -	436-	-.004$_j$ -	D
4	2-	1.25 -	487-	-.036$_j$ -	H
5	1+	1.73 +	161-	.146$_j$ -	B
6	5+	1.37 -	035+		C
7	5+	1.37 -	012+		C
8	1+	1.63 +	003+		A
9	5+	1.73 +	087-	.341$_j$ -	B
10	5+	1.63 +	013+		A
11	4-	1.49 -	302-	-.129$_j$ -	H
12	5+	1.70 +	219-	.311$_j$ -	B
13	5+	1.41 -	041+		C
14	5+	1.83 +	009+		A
15	4-	1.73 +	000+		E
16	5+	1.70 +	499-	-.057$_j$ -	B
S4 T$_5$ 1	5+	1.60 +	071-	.500$_k$ -	B
2	4-	1.63 +	008+		E
3	4-	1.53 +	537-	.023$_k$ -	F
4	4-	1.53 +	301-	.224$_k$ -	F
5	1+	2.00 +	045+		A
6	4-	1.53+	405-	.102$_k$ -	F
7	5+	1.53 +	008+		A
8	2-	1.41 -	003+		G
9	4-	1.41 -	132-	-.027$_k$ -	H
10	4-	1.49 -	019+		G
11	2-	1.45 -	854-	-.224$_k$ -	H
12	5+	1.49 -	014+		C
13	5+	1.37 -	004+		C

Construct	SE	AE	PA	FC	Code
14	5+	1.73 +	001+		A
15	5+	1.73 +	001+		A
16	5+	1.73 +	004+		A
17	3-	1.37 -	092-	.021$_k$-	H
18	3-	1.25 -	055-	.272$_k$-	H
19	2-	1.63 +	195-	.027$_k$-	F
20	5+	1.73+	049+		A
S5 T_1 1	1+	1.73$_i$+	003+		A
2	5+	1.60 +	009+		A
3	1+	1.80 +	014+		A
4	5+	1.49 -	036+		C
S5 T_2 1	1+	1.63 +	004+		A
2	5+	1.73 +	012+		A
3	1+	1.91 +	016+		A
4	5+	1.45 -	017+		C
5	2-	1.63 +	000+		E

Construct	SE	AE	PA	FC	Code
6	1+	1.49 -	009+		C
7	1+	1.53 -	008+		C
8	1+	1.60 +	044+		A
1	2-	1.70 +	041+		E
2	5+	1.63 +	023+		A
3	2-	1.53 -	006+		G
4	5+	1.70 +	047+		A
5	2-	1.60 +	002+		E
6	1+	1.45 -	004+		C
7	1+	1.20 -	003+		C
8	1+	1.60 +	048+		A
9	5+	1.60 +	011+		A
10	2-	1.45 -	000+		G
11	4-	1.53 -	111-	.118$_c$-	H
12	5+	1.49 -	009+		C
S5 T_4 1	2-	1.63 +	006+		E

Construct	SE	AE	PA	FC	Code
2	5+	1.67 +	006+		A
3	1+	1.83 +	001+		A
4	5+	1.60 +	000+		A
5	3-	1.49 -	000+		G
6	1+	1.60 +	002+		A
7	1+	1.56 -	000+		C
8	1+	1.49 -	000+		C
9	5+	1.63 +	009+		A
10	2-	1.49 -	000+		G
11	4-	1.63 +	042+		E
12	5+	1.60 +	001+		A
13	1-	1.63 +	003+		A
14	4-	1.45 -	105-	-.239$_j$-	H
15	5+	1.60 +	001+		A
16	4-	1.33 -	002+		G
S5 T_5 1	2-	1.63 +	003+		E
2	5+	1.63+	013+		A

Construct	SE	AE	PA	FC	Code
3	2-	1.73 +	001+		E
4	5+	1.49 -	001+		C
5	4-	1.63 +	003+		E
6	1+	1.37 -	004+		C
7	1+	1.67+	000+		A
8	1+	1.63 +	009+		A
9	5+	1.53 -	002+		C
10	2-	1.53 -	007+		G
11	4-	1.63 +	151-	.272$_k$-	F
12	5+	1.53 -	004+		C
13	2-	1.29 -	004+		G
14	5+	1.63 +	001+		A
15	4-	1.53 -	001+		G
16	5+	1.49 -	118-	.309$_k$-	D
17	4-	1.73 +	004+		E
18	1+	1.37 -	031+		C
19	1+	1.53 -	116-	.511$_k$-	D
20	2-	1.53 -	002+		G

Notes

a: Median AE score = 1.395

b: N = 5, α = .01 (one-tailed), r_s = 1.0

c: N = 11, α =.01 (One-tailed), r_s = .729

d: Median AE score = 1.32. Two constructs tied at median, both assigned to +AE.

e: Median AE score = 1.565

f: n = 17, α = .01 (one-tailed), r_s = .583

g: Median AE score = 1.53. Nine constructs tied at median, 4 randomly assigned to +AE, 5 to -AE.

h: N = 3, Spearman rho coefficient inapplicable.

i: N = 7, α = .01 (one-tailed), r_s = .893

j: N = 15, α = .01 (one-tailed), r_s = .623

k: N = 19, α = .01 (one-tailed), r_s = .549

l: Median AE score = 1.60. Nine constructs tied at median, all assigned to +AE.

Tabulating these data by class and subject, the following frequencies are obtained:-

Subject	S1	S2	S3	S4	S5	Total
Code A	7	7	13	19	23	69
B	1	-	1	5	-	7
C	6	-	3	8	14	31
D	2	-	6	6	2	16
E	1	3	3	3	9	19
F	-	-	1	6	1	8
G	-	7	3	3	9	22
H	1	1	6	10	2	20
Total	18	18	36	60	60	192

(b) Element classifications

The following table codes each of the 47 sample elements (IDEAL SELF and SELF elements removed) according to the extent to which each displays overall extremity of rating, and overall stability. Each variable is dichotomised, thus elements fall into one of four classes:-

Code	Class	Function
A	+EE, +ES	Central
B	+EE, -ES	Incidental
C	-EE, +ES	Incidental
D	-EE, -ES	Incidental

The table below lists the data and the coding for each element. Since values of element constructs in each subject's sample, and values for stability depend on the number of stable constructs for each subject, EE and ES score vary in the number of observations on which they are based. Subscripts refer to the details in the notes at the foot of the table.

Element		EE	ES	Code
S1	1	1.63_a +	1.96_b -	B
	2	1.32 -	2.41 -	D
	3	1.37 +	1.67 +	A
	4	1.14 -	1.95 -	D
	7	1.40 +	2.05 -	B
	8	1.29 -	2.22 -	D
	9	1.35 +	1.85 +	A
	10	1.43 +	1.91 +	A
	11	1.08 -	1.71 +	C
	12	.84 -	1.87 +	C
S2	1	1.41_c +	1.39_d +	A
	2	1.35 -	1.77 -	D
	3	1.24 -	1.53 -	D
	4	.95 -	1.41 +	C
	5	1.24 -	1.70 -	D
	8	1.41 +	1.33 +	A
	9	1.78 +	1.41 +	A
	10	1.48 +	1.88 -	B
	11	1.60 +	1.57 -	B
	12	1.45 +	1.48 +	A
S3	1	1.49_e -	2.38_f -	D
	2	1.67 +	2.14 +	A
	3	1.80 +	1.96 +	A
	4	1.59 +	2.39 -	B
	5	1.55 -	2.29 -	D
	6	1.42 -	2.46 -	D
	7	1.54 -	2.65 -	D
	8	1.49 -	2.33 -	D
	10	1.55 -	2.10 +	C
	11	1.71 +	2.28 +	A
	12	1.56 +	2.12 +	A
S4	1	1.62_g +	2.46_h -	B
	2	1.61 +	2.27 +	A
	3	1.71 +	2.42 -	B
	4	1129 -	2.24 +	C
	5	1.35 -	2.39 -	D
	6	1.45 -	2.15 +	C
	7	1.51 -	2.61 -	D
	8	1.55 +	2.30 +	A
S5	1	1.73_i +	1.45_j +	A
	2	1.77 +	1.61 -	B
	3	1.56 -	1.24 +	C
	4	1.68 +	1.53 -	B
	5	1.37 -	1.92 -	D
	6	1.43 -	1.45 +	C
	7	1.12 -	1.33 +	C
	8	1.74 +	1.63 -	B

Notes

(a) N self-relevant constructs = 24; Median EE score = 1.335

(b) N stable constructs = 14; Median ES score = 1.93.

(c) N self-relevant constructs = 11; Median EE score = 1.41. Two elements tied at median, both assigned to +EE.

(d) N stable constructs = 17; Median ES score = 1.505.

(e) N self-relevant constructs = 39; Median EE score = 1.555.

(f) N stable constructs = 21; Median ES score = 2.285.

(g) N self-relevant constructs = 47; Median EE score = 1.53.

(h) N stable constructs = 30; Median ES score = 2.345.

(i) N self-relevant constructs = 52; Median EE score = 1.62.

(j) N stable constructs = 53; Median ES score = 1.525.

Tabulating these data by class and subject, the following frequencies are obtained:-

Subject	S1	S2	S3	S4	S5	Total
Code A	3	4	4	2	1	14
B	2	2	1	2	3	10
C	2	1	1	2	3	9
D	3	3	5	2	1	14
Total	10	10	11	8	8	47

E3 Estimating construct and element likelihoods.

To estimate the extent to which principal components analysis (PCA) located central constructs and elements in the grid sample, all construct sorts in each of the 5 grid series were first processed by the PREFAN program.[1] PREFAN solutions comprise the principal components underlying all constructs produced by each subject ona fixed element sample sample over all testing occasions. To obtain approximate conditional probabilities of the extent to which PCA identified central predicates, simplified transformations were employed to designate central constructs and elements, as follows:-

(i) Significant components were first identified by the method of construct representation. (3.2.4.). Unrepresented components were eliminated.

(ii) Self-relevant components were located by testing for the inclusion of the element SELF within those elements accounting for the first 50 percent of variance attributable to each significant component. In only one case (S2) was it necessary to relax the 50 percent criterion in order to locate a self-relevant component (relaxed to 72%).

(iii) To locate central elements, the elements SELF and IDEAL SELF were removed and percent variance accounted for by each element on the first component listed (Table I below). All elements exceeding the median percent value for each subject were designated central elements (+).

(iv) To locate central constructs, construct loadings on self-relevant components were first listed disregarding sign (Table II below). Where more than one self-relevant component was found (S1 and S5), the highest loading for each construct was listed. The median loading was found for each subject, and constructs exceeding this median designated as central constructs (+).

The conditional probabilities obtained by cross-tabulating central items derived by these procedures with items designated as central in terms of the operational definitions of centrality must be regarded as approximate, since the procedures above are at variance with those developed in Chapter 3.2. In the main, the above procedures will tend to overestimate the extent of centrality, since a median split has been employed in the designation of constructs and elements. As the analysis in E 2 indicates, the unconditional ratio of central to peripheral items is in the region of 2:1, in contrast to the 1:1 ratio assumed by the median split. The effect of employing the latter procedure may be seen in the following contingency tables which represent the conditional probabilities which obtain given the optimal fit between hypothesis classes and data:-

1 Slater P. Notes on INGRID 72, Institute of Psychiatry, St. George's Hospital, London, 1972.

(i) Conditional probabilities and likelihoods given optimal fit for median-split procedures.

	D_c	D_p	
H_c	.3	0	.3
H_p	.2	.5	.7
	.5	.5	1.0

	D_c	D_p	Priors
H_c	1	0	.3
H_p	.29	.71	.7

(ii) Theoretical conditional probabilities given optimal fit with the procedures of Chapter 3.2.

	D_c	D_p	
H_c	.3	0	.3
H_p	0	.7	.7
	.3	.7	1.0

	D_c	D_p	Priors
H_c	1	0	.3
H_p	0	1	.7

It is evident that the former method favours $p(H_p)$ in that a single datum D_p is required to ensure $p(H_p) = 1.0$. This is not the case for the datum D_c, where one observation yields the posterior probabilities $p(H_c) = .6$, $p(H_p) = .4$. In fact, optimal fit is unlikely to be achieved, and thus conditional probabilities of zero would not be obtained. In this case, the general outcome will be to retard increments to $p(H_c)$ given successive observations of D_c, and to accelerate increments to $p(H_p)$ given successive observations of D_p. Consequently, as a method for estimating $p(D/H_c)$, the above procedure leads to reduced certainty of predication centrality.

Table I : Data classes in the element sample.

Element		V%	D_{ce}	Code
S1	1	5.23		B
	2	0.0		D
	3	21.58	○	A
	4	.16		D
	7	.37		B
	8	3.94		D
	9	11.64	○	A
	10	12.62	○	A
	11	0.0		C
	12	4.32	○	C
S2	1	1.46		A
	2	3.18		D
	3	.15		D
	4	1:08		C
	5	.56		D
	8	32.74	○	A
	9	10.16	○	A
	10	28.87	○	B
	11	2.35		B
	12	7.49	○	A
S3	1	0.0		D
	2	10.88	○	A
	3	2.19		A
	4	9.67	○	B
	5	.20		D
	6	7.05	○	D
	7	9.78	○	D
	8	5.87		D
	10	7.54	○	C
	11	16.25	○	A
	12	.80		A
S4	1	1.56		B
	2	15.72	○	A
	3	0.0		B
	4	4.48	○	C
	5	.46		D
	6	21.35	○	C
	7	1.14		D
	8	15.67	○	A
S5	1	1.26		A
	2	.64		B
	3	21.86	○	C
	4	3.08	○	B
	5	2.47		D
	6	10.60	○	C
	7	.94		C
	8	29.86	○	B

Abbreviations: V% = percent variance; C_{ce} = central element.

Construct		Ldg	D_{cc}	Code
$S1_a$ T_1	1	3.064	○	C
	2	.816		C
	3	2.426	○	C
	4	.446		D
	5	2.936	○	C
	6	.170		D
S1 T_2	1	2.858	○	A
	2	1.661		A
	3	1.984		H
	4	2.837	○	A
	5	3.090	○	A
	6	1.410		B
	7	2.517	○	C
	8	1.741		E
	9	.463		C
	10	1.534		A
	11	2.291	○	A
	12	2.801	○	A
$S2_b$ T_1	1	.708		E
	2	2.577	○	A
	3	2.825	○	G
	4	1.488		H
	5	2.319		A
	6	2.568	○	A
S2 T_2	1	2.778	○	G
	2	2.953	○	A
	3	2.943	○	G
	4	2.334		G
	5	3.210	○	E
	6	2.141		G
	7	2.781	○	A
	8	1.999		G
	9	2.420		A
	10	2.821	○	A
	11	1.810		G
	12	1.951		E
$S3_c$ T_1	1	1.716	○	D
	2	.726		A
	3	2.319	○	A
	4	2.323	○	A
	5	1.192		B
	6	.288		A
S3 T_2	1	1.299		H
	2	.789		H
	3	1.633	○	G
	4	.460		H
	5	.326		A
	6	2.215	○	E
	7	1.434		D
	8	.452		A
	9	1.511		A
	10	1.143		C
	11	2.546	○	A
	12	2.515	○	A
S3 T_3	1	1.389		C
	2	1.234		G
	3	1.561		H
	4	1.219		H
	5	.376		E
	6	1.864	○	F
	7	2.812	○	A
	8	2.516	○	E
	9	1.802	○	H
	10	2.191	○	C
	11	3.053	○	A
	12	2.395	○	A
	13	.788		D
	14	.603		G
	15	1.853	○	D
	16	2.288	○	D
	17	2.228	○	D
	18	2.394	○	A
$S4_d$ T_1	1	1.947	○	D
	2	1.759		E
	3	2.296	○	A
	4	1.829		A
S4 T_2	1	2.530	○	C
	2	1.943	○	A
	3	2.300	○	G
	4	1.753		A
	5	1.804		H
	6	1.833	○	H
	7	2.158	○	C
	8	2.347	○	A
S4 T_3	1	2.252	○	A
	2	1.908		F
	3	1.855		H
	4	2.228	○	D
	5	1.533		D
	6	2.290	○	D
	7	1.352		H
	8	2.347	○	A
	9	2.180	○	A
	10	2.235	○	A
	11	.847		D
	12	2.119	○	C
S4 T_4	1	2.556	○	A
	2	1.160		F
	3	1.590		D
	4	.901		H
	5	.828		B
	6	2.398	○	C
	7	2.609	○	C
	8	2.347	○	A
	9	1.729		B
	10	2.528	○	A
	11	.608		H
	12	1.090		B
	13	1.492		C
	14	2.604	○	A
	15	2.116	○	E
	16	1.279		B
S4 T_5	1	1.848	○	B
	2	1.848	○	E
	3	1.506		F
	4	1.607		F
	5	.765		A
	6	1.626		F
	7	2.360	○	A
	8	1.881	○	G
	9	1.148		H
	10	2.423	○	G
	11	.794		H
	12	.917		C
	13	.654		C
	14	2.027	○	A
	15	2.326	○	A
	16	1.968	○	A
	17	.500		H
	18	1.506		H
	19	.716		F
	20	2.183	○	A
$S5_a$ T_1	1	1.045		A
	2	.408		A
	3	1.842	○	A
	4	1.400		C
S5 T_2	1	1.385		A
	2	1.615	○	A
	3	2.286	○	A
	4	2.299	○	C
	5	.177		E
	6	.192		C
	7	1.476		C
	8	1.636	○	A
S5 T_3	1	1.608	○	E
	2	1.290		A
	3	1.780	○	G
	4	1.874	○	A
	5	1.608	○	E
	6	2.491	○	C
	7	1.751	○	C
	8	2.500	○	A
	9	.460		A
	10	1.023		G
	11	.244		H
	12	1.641	○	C
S5 T_4	1	2.147	○	E
	2	2.178	○	A
	3	2.237	○	A
	4	2.234		A
	5	1.300		G
	6	2.014	○	A
	7	1.595		C
	8	1.427		C
	9	.460		A
	10	.831		G
	11	1.608	○	E
	12	2.233	○	A
	13	1.662	○	A
	14	1.626	○	H
	15	1.715	○	A
	16	.860		G
S5 T_5	1	2.073	○	E
	2	.487		A
	3	.076		E
	4	2.187	○	C
	5	1.430		E
	6	2.436	○	C
	7	1.655	○	A
	8	1.684	○	A
	9	1.344		C
	10	.438		G
	11	.345		F
	12	1.534		C
	13	1.690	○	G
	14	2.474	○	A
	15	1.411		G
	16	.471		D
	17	2.062	○	E
	18	.272		C
	19	.229		D
	20	1.703	○	G

Abbreviations : Ldg = loading on self-relevant components; D_{cc} = core construct datum.

Notes

(a) Median loading = 2.138
(b) Median loading = 2.494
(c) Median loading = 1.597
(d) Median loading = 1.848. Two constructs tied at median, both assigned to D_{cc}
(e) Median loading = 1.608. Three constructs tied at median, all assigned to D_{cc}

Cross-tabulations of hypothetical classes and data classes are given for constructs on page 331, and for elements on page 334.

E 4 Tables of posterior probabilities for centrality hypotheses.

The computation of posterior probabilities from the data of E2 and E3 is time-consuming and tedious. The following pages provide instant reference to posterior probabilities of centrality for constructs and elements, based on the estimates of conditional and unconditional probability distributions provided by the sample reported above. To utilise the tables, the transformations described in Chapter 3.2. should be applied and items classified into dichotomous data classes:-

D_{cc} = core construct
D_{pc} = peripheral construct
D_{ie} = incidental element
D_{ce} = central element

The tables that follow provide posterior probabilities for construct centrality (Table I) and element centrality (Table II) for a maximum of eight successive observations.

Table I : Posterior probabilities for construct centrality.

D_{pc} \ D_{cc}	0	1	2	3	4	5	6	7	8
0	359 641	505 495	650 350	772 228	860 140	918 082	953 047	974 026	986 014
1	204 796	318 682	459 541	607 393	737 263	836 164	903 097	944 056	
2	105 895	175 825	279 721	413 587	562 438	700 300	810 190	•	
3	051 949	089 911	151 849	245 755	372 628	518 482			
4	024 976	043 957	076 924	130 870	213 787				
5	011 989	020 980	036 964	064 936					
6	005 995	009 991	016 984						
7	002 998	004 996							
8	001 999								

Note: Each cell comprises two values, $p(H_{cc}/D)$ upper values, $p(H_{pc}/D)$ lower values, given to three places, decimal point omitted.

Table II : Posterior probabilities for element centrality.

D_{io} \ D_{co}	0	1	2	3	4	5	6	7	8
0	293 702	454 546	620 380	761 239	862 138	925 075	960 040	979 021	989 011
1	160 840	272 728	423 577	590 410	738 262	847 153	916 084	955 045	
2	079 921	143 857	247 753	392 608	558 442	712 288	829 171		
3	037 963	070 930	129 871	225 775	363 637	528 472			
4	017 983	033 967	063 937	117 883	206 794				
5	008 992	016 984	031 969	059 941					
6	004 996	008 992	016 984						
7	002 998	004 996							
8	001 999								

Note: Each cell comprises two values, $p(H_{co}/D)$, upper values, $p(H_{io}/D)$ lower values, given to three places, decimal point omitted.

E 5 A core grid test case; Kenneth.

In order to develop appropriate displays the methodology described in Chapter 3.2. was applied to a single test case, namely S3 (Kenneth) in the grid sample. The following pages depict the application of the procedures to each of the four grids produced by Kenneth to locate central elements and constructs. Firstly, cumulative principal components analyses are obtained for the four grids ($grid_1$; $grid_1 + grid_2$; $grid_1 + grid_2 + grid_3$; $grid_1 + grid_2 + grid_3 + grid_4$). For each analysis only those loadings obtaining for constructs in the most recent grid are employed. Significant components are located by the method of construct representation. Elements central to each component are located by applying the 50 percent variance criterion (obtained by squaring and summing element vectors (v) in order of magnitude until $\sum v^2 \geq .5$). Core components are identified as components which include the element SELF (E9) in the central element subset. The following tables first list the percentages of total variance accounted for by each of the exhaustive series of components, followed by element vectors for each significant component, central elements denoted by a marker, and construct loadings, representative constructs denoted by a marker. Finally, components are denoted as core (C) or peripheral (P), and total variance accounted for by significant components listed.

KENNETH GRID 1

THE COMPONENT-SPACE IS LIMITED TO 6 DIMENSIONS

COMPONENT	ROOT	AS PER CENT
1	64.8182	42.41
2	40.1169	26.25
3	21.7087	14.20
4	13.2046	8.64
5	9.1997	6.02
6	3.7852	2.48

COMPONENTS

	1	2	3
ELEMENT	VECTOR	VECTOR	VECTOR
1	0.0864	-0.1095	0.0834
2	0.2557	-0.4408	-0.1355
3	0.1615	-0.4057	-0.3064
4	0.4945	0.1709	0.4390
5	0.0565	0.1897	0.2119
6	-0.1624	0.2933	0.4572
7	-0.0533	0.4127	-0.5061
8	-0.4124	-0.0529	-0.0027
S 9	-0.5114	-0.1718	0.0317
10	-0.3445	-0.1207	0.0798
11	0.0573	0.4583	-0.4091
12	0.2657	-0.2239	0.0568

CONSTRUCT	LOADING	LOADING	LOADING
1	-4.5434	-0.0997	1.9507
2	-4.4736	1.3096	0.0806
3	-0.9828	-3.2674	2.2989
4	-1.8736	-4.6696	-1.2044
5	-2.3343	-0.8646	-3.3177
6	-3.7732	2.2722	-0.3927
	C	P	P

VARIANCE ACCOUNTED FOR = 82.86%

KENNETH GRID 2

THE COMPONENT-SPACE IS LIMITED TO 11 DIMENSIONS

COMPONENT	ROOT	AS PER CENT
1	144.0685	29.82
2	101.2571	20.96
3	64.9528	13.44
4	49.0545	10.15
5	36.3132	7.52
6	28.9693	6.00
7	22.6039	4.68
8	17.9419	3.71
9	10.8977	2.26
10	5.4492	1.13
11	1.5752	0.33

COMPONENTS

	1	2	3	4	5
ELEMENT	VECTOR	VECTOR	VECTOR	VECTOR	VECTOR
1	-0.1705	0.0730	0.4480	-0.1870	0.4085
2	-0.2854	0.3656	-0.2570	-0.2682	0.3959
3	-0.0137	0.5192	0.2718	0.2559	-0.3270
4	0.4752	0.0286	-0.0491	-0.2794	0.0184
5	0.0202	0.2236	-0.5122	0.3602	0.0614
6	0.1226	-0.4659	-0.2408	-0.2187	-0.2658
7	0.2043	-0.2643	0.3981	0.2088	0.3437
8	-0.3560	-0.3457	-0.1103	-0.2013	0.0822
9	-0.3739	-0.1674	0.3101	0.1264	-0.4708
10	-0.3101	-0.0015	-0.2258	0.1157	-0.1508
11	0.2820	-0.2174	-0.0814	0.5320	0.1978
12	0.4049	0.2343	0.0684	-0.3840	-0.2936

CONSTRUCT

1	-2.3635 o	-0.3110	-2.0253	1.4916	-0.0788
2	0.9859	-3.8504 o	0.6637	0.1092	1.2918
3	-1.9292	4.3304 o	-1.1150	0.4899	-0.0683
4	1.3352	3.2532 o	2.3742	0.1754	-0.7011
5	0.6172	3.2175	-2.6326	3.5169 o	0.4002
6	-3.3402	-0.9621	-3.8562 o	-1.3743	-0.0761
7	-3.0611 o	0.1378	0.6585	1.9714	2.5808
8	-0.5335	-0.5630	4.2841 o	1.0631	-0.5708
9	2.7657	0.2847	-0.1765	2.9856	-3.2411 o
10	-2.5172 o	-0.2307	1.4841	1.0630	-0.3232
11	-5.1932 o	0.4417	0.1091	0.4606	1.4174
12	-5.2018 o	2.0986	1.6419	-0.5423	-0.5876
	C	P	P	P	C

VARIANCE ACCOUNTED FOR = 81.89%

KENNETH GRID 3

COMPONENT	ROOT	AS PER CENT
1	117,5517	29,685
2	75,6439	19,107
3	47,3623	11,960
4	40,5771	10,247
5	26,0750	6,585
6	23,2880	5,881
7	20,5764	5,196
8	16,2135	4,094
9	11,8910	3,003
10	9,8588	2,490
11	6,9423	1,753

ELEMENT — COMPONENTS

ELEMENT	1.	2.	3.	4	5	6
1	0.0783	-0.1259	-0,4316 o	0.2064	-0.2363	-0,4826
2	0.3740 o	0.3786	0.2034	0.0781	-0.5755 o	0,2776
3	-0.1670	0.5855 o	-0.3900	-0,1619	-0,0530	0,1467
4	-0.2825	-0.0548	0.3365	0,4713 o	-0,1260	-0,2255
5	0.0714	0.2552	0,4431 o	-0,3666	0,4113 o	-0,0999
6	-0.2033	-0.4790 o	0.1011	0,0732	-0,1097	0,5047 o
7	-0.3194	-0.1406	-0.2194	-0,2046	0,0100	-0,0390
8	0.3567 o	-0.2837	0.2100	-0,1535	-0,0908	0,0780
S 9	0.4643 o	-0.1922	-0,4265 o	0,0641	0,4034	0,2298
10	0,2442	-0.0146	0,1430	0,0234	0,1591	-0,4986 o
11	-0.3553 o	-0.1323	-0.0079	-0,5113 o	-0,1519	-0,0836
12	-0.2617	0.2289	0,0524	0,4813 o	0,4033	0,1924

CONSTRUCT

1	1,5598	-1,0349	0,7631	0,7581	1,8795 o	-1,3153
2	-0,6784	-2,2903 o	0,7404	-1,3524	-0,1310	0,0548
3	1,2207	2,6834 o	-0,0157	0,2081	-0,1607	-1,2149
4	0,7616	2,2353 o	-0,0760	-0,7012	1,6992	0,5857
5	-0,6145	2,0232 o	1,2160	-1,3309	0,0081	-0,2099
6	1,8804	0,4765	2,3795 o	0,4309	0,0253	-0,3907
7	2,9658 o	-0,2254	0,0078	0,2958	-0,6713	0,3295
8	-2,3640 o	-1,0960	-1,6140	0,5207	-0,4549	-0,3377
9	-1,8059 o	0,3533	-1,0618	-1,5153	1,4903	0,3366
10	2.3019 o	0.5926	-1.6901	-0.4282	0.1110	0.1665
11	3.1117 o	-0.0213	0.1398	-0.1033	0.1367	-0,4324
12	2.3769 o	1.3373	-0.9596	-0.3901	-0.5011	1,0215
13	0.7734	-1.9335	-0.3030	1,9647 o	1,1163	-0,7267
14	-1.0757	1.8218	0.0474	0,9197	-0,3613	1,9716 o
15	1.5955	-0.5288	-1.3550	2,0612 o	0,0379	-0,0572
16	-2.5124 o	1.8079	-0.0472	-0,3249	0,3749	-1,0373
17	2.2723 o	-0,3103	0,7471	0,6021	-0,2065	-0,1652
18	2.4073 o	-0.3175	0.7640	-0,1545	1,4141	1,2004
	C	P	C	P	P	P

VARIANCE ACCOUNTED FOR = 77.58%

KENNETH GRID 4

COMPONENT	ROOT	AS PER CENT
1	183.2636	27.767
2	103.8152	15.730
3	70.6699	10.708
4	68.1040	10.319
5	50.3402	7.627
6	49.0561	7.433
7	41.3450	6.264
8	30.9376	4.688
9	26.5268	4.019
10	20.6263	3.125
11	15.3106	2.320

ELEMENT COMPONENTS

ELEMENT	1.	2.	3.	4	5	6	7
1	-0.0133	-0.1291	0.2512	0.4300	0.6095	0.3083	-0.2455
2	-0.4570	0.3423	-0.2714	0.0097	0.2425	-0.0739	0.4370
3	0.1431	0.7065	0.2759	0.2475	-0.1495	0.0052	-0.0360
4	0.3100	-0.0275	-0.0402	-0.2433	0.2577	-0.5109	0.1513
5	-0.0443	0.1053	-0.5612	0.0765	-0.1434	-0.1518	-0.6755
6	0.2423	-0.2792	0.2950	-0.0447	0.1716	-0.5636	-0.0633
7	0.3128	-0.2077	-0.0170	-0.0340	-0.2329	0.5632	-0.0214
8	-0.2655	-0.4261	-0.3123	0.1421	0.0410	0.0871	0.2341
S 9	-0.4446	-0.1137	0.4913	-0.0567	-0.3601	0.0501	0.0084
10	-0.2746	-0.1015	0.0950	-0.1333	-0.2670	-0.1924	-0.1560
11	0.4032	-0.0519	-0.1869	0.3090	-0.3207	-0.0325	0.4231
12	0.0375	0.1647	-0.0194	-0.5935	0.2407	0.3110	-0.0414

CONSTRUCT

CONSTRUCT	1	2	3	4	5	6	7
1	-1.3646	-1.3723	1.4897	-0.2793	-0.6257	-0.4482	-1.6924
2	1.6907	-1.7940	-1.5187	0.5129	-0.6793	0.8440	-0.0148
3	-1.2477	0.5237	0.2489	1.9740	0.0234	-1.8135	-0.2539
4	-1.5799	2.4402	-0.7562	-0.9804	1.7074	0.6845	-0.5238
5	-0.7944	1.2114	-1.0717	-0.5387	-2.6323	0.4942	0.5014
6	0.4135	-1.0148	-1.4935	-1.0689	1.0242	-0.1092	-1.0798
7	-2.7758	-0.0059	-1.3196	1.0602	1.3319	-0.0418	-0.1175
8	0.8597	-1.1562	1.5015	0.3936	1.2626	-0.1157	-0.5513
9	0.6683	0.1203	1.1054	0.3897	-0.6713	-0.5256	-2.3607
10	-1.4330	1.0324	1.6721	1.5263	0.7124	0.5784	0.0259
11	-1.6542	-0.4137	-1.3506	0.5182	1.7597	0.3199	-1.0289
12	-1.5499	1.7367	1.3790	0.4595	0.1311	-0.9052	0.9745
13	-2.4293	-0.2229	-0.7076	-1.3683	-0.0649	0.2957	-0.3925
14	-0.4950	1.8289	1.3427	-0.4045	-0.4123	-1.6529	-0.2151
15	1.1673	0.5543	1.2527	-1.2752	-0.1459	0.0205	-1.8495
16	1.9027	0.8444	0.5954	2.0349	0.6621	-0.8371	-0.3354
17	-2.6332	-0.5263	0.0671	-0.7500	1.1998	-0.0114	-0.7741
18	-1.6298	-0.2675	-0.0327	-1.4742	-0.1299	0.3556	0.9170
19	-2.2735	-0.5900	0.2007	-1.4246	-0.2667	1.3451	1.0374
20	2.5074	-0.7355	-0.4321	1.1213	0.7051	0.7371	-0.8917
21	1.0727	-1.4796	-0.9728	1.1139	0.6179	1.9085	0.5643
22	-1.3306	-0.3504	-1.6645	2.7089	1.0152	0.4507	-0.9199
23	-1.9734	-1.4196	0.9575	-0.3034	0.6573	1.4226	0.1474
24	-2.1977	0.5042	0.1042	-0.3937	0.8073	-1.3995	1.5680
	C	P	C	P	C	P	P

VARIANCE ACCOUNTED FOR = 85.85%

Appendix F The reconstruction grid.

F 1 The serial grid sample.

To obtain estimates of the unconditional and conditional distributions of construct and element reconstruction data classes, the 5 subject sample of Appendix E was augmented by including serial grid data obtained from an additional two subjects, S6 and S7. These data could not be included in the previous sample owing to the use of the ranking form grid method of element allotment, which did not permit the use of measures based on element distribution on rating scales. However, the two additional subjects completed repertory grid cycles identical in all other respects to other subjects, in the following format:-

Subject	Sex	Age	Number of testing occasions	Size of element sample	Number of constructs elicited each occasion	Time period (wks)
S6	Female	21	5	9	4	8
S7	Male	23	5	9	4	8

The following tables list raw rankings for the two additional subjects (constructs by row, elements by column, element SELF denoted by *).

S6T1	1	2	3	4	5	6	7	8	9*
1	3	2	9	5	8	1	6	4	7
2	6	9	1	5	7	8	2	4	3
3	8	7	1	6	5	9	2	4	3
4	5	9	3	1	8	7	2	6	4

S6T2	1	2	3	4	5	6	7	8	9*
1	2	5	8	4	6	1	7	3	9
2	5	9	1	7	6	8	2	4	3
3	6	7	1	8	5	9	3	4	2
4	1	9	3	2	7	8	5	6	4
5	5	9	1	6	4	8	2	7	3
6	5	9	2	6	8	7	4	1	3
7	7	6	4	9	3	5	2	8	1
8	1	9	2	5	7	8	6	4	3

S6T3	1	2	3	4	5	6	7	8	9*
1	3	2	9	5	6	1	7	4	8
2	5	9	1	7	6	8	2	4	3
3	6	7	1	8	4	9	3	5	2
4	1	9	3	2	7	8	5	6	4
5	3	8	1	5	7	9	2	6	4
6	2	9	1	8	7	6	3	5	4
7	8	6	4	9	2	5	1	7	3
8	1	9	3	6	7	8	2	5	4
9	4	8	3	7	6	9	1	5	2
10	3	9	4	8	6	5	1	7	2
11	1	6	9	8	7	2	5	3	4
12	6	8	1	4	5	9	2	7	3

S6T4	1	2	3	4	5	6	7	8	9*
1	2	5	9	6	4	1	7	3	8
2	5	9	2	8	6	7	1	4	3
3	6	8	3	7	5	9	1	4	2
4	2	8	1	4	7	9	3	6	5
5	5	8	1	7	6	9	2	4	3
6	5	9	1	8	7	6	3	2	4
7	8	5	1	9	4	7	3	6	2
8	1	9	5	6	7	8	3	2	4
9	2	7	4	8	6	9	1	5	3
10	5	9	4	8	3	6	2	7	1
11	1	5	9	8	7	2	6	3	4
12	5	8	2	7	4	9	3	6	1
13	7	8	4	9	3	6	1	5	2
14	4	6	9	2	7	1	8	3	5
15	8	1	9	2	4	3	7	5	6
16	5	8	4	7	2	9	3	6	1

S6T5	1	2	3	4	5	6	7	8	9*
1	2	3	9	7	4	1	5	6	8
2	5	9	1	7	6	8	3	4	2
3	6	7	2	8	5	9	3	4	1
4	4	9	1	6	7	8	2	5	3
5	5	8	1	7	6	9	3	4	2
6	5	9	1	8	7	6	4	2	3
7	8	5	3	9	4	7	2	6	1
8	1	8	4	6	7	9	2	5	3
9	1	7	4	8	6	9	3	5	2
10	3	9	4	7	6	5	2	8	1
11	1	6	8	9	7	2	5	3	4
12	8	7	3	5	2	9	4	6	1
13	8	7	1	9	4	5	2	6	3
14	9	8	4	6	5	7	3	1	2
15	6	1	7	2	4	3	9	5	8
16	5	9	1	6	7	8	2	4	3
17	9	8	5	1	6	2	7	3	4
18	5	9	3	8	6	7	4	2	1
19	6	8	4	5	7	9	1	3	2
20	8	7	2	6	5	9	3	4	1

S7T1	1	2	3	4	5	6	7	8*	9
1	2	4	9	5	6	1	7	3	8
2	6	2	8	4	5	1	9	3	7
3	8	5	1	6	2	9	7	3	4
4	8	1	9	7	2	4	5	3	6

S7T2	1	2	3	4	5	6	7	8*	9
1	5	3	9	6	2	1	7	4	8
2	6	1	8	5	4	2	9	3	7
3	7	6	1	5	3	9	8	2	4
4	9	3	8	7	1	4	6	2	5
5	9	7	6	4	2	5	1	3	8
6	6	8	2	4	7	9	5	3	1
7	4	5	9	6	2	1	7	3	8
8	8	3	7	1	4	2	5	6	9

S7T3	1	2	3	4	5	6	7	8*	9
1	4	6	9	5	2	3	7	1	8
2	6	1	9	5	4	2	8	3	7
3	7	5	1	6	3	9	8	2	4
4	8	5	9	6	1	3	4	2	7
5	9	8	7	4	3	5	1	2	6
6	3	9	1	6	7	8	5	4	2
7	2	6	9	5	1	4	7	3	8
8	9	4	5	2	3	1	7	6	8
9	3	7	5	2	9	1	6	8	4
10	1	9	4	7	6	8	3	2	5
11	4	9	1	6	5	8	3	7	2
12	3	6	9	1	5	4	7	2	8

S7T4	1	2	3	4	5	6	7	8*	9
1	4	5	9	6	2	1	7	3	8
2	7	1	8	5	4	2	9	3	6
3	6	5	1	7	2	9	8	3	4
4	8	4	7	9	3	1	5	2	6
5	9	6	4	7	3	5	1	2	8
6	4	9	2	5	8	7	6	3	1
7	4	6	9	3	1	7	5	2	8
8	7	3	8	1	5	2	4	6	9
9	2	5	7	3	9	1	6	8	4
10	3	9	7	1	4	5	8	2	6
11	4	7	1	6	5	9	3	8	2
12	4	7	8	3	2	6	5	1	9
13	7	4	5	9	3	8	2	1	6
14	9	8	1	3	4	6	5	7	2
15	3	1	4	2	7	9	6	8	5
16	5	2	7	4	9	1	3	8	6

S7T5	1	2	3	4	5	6	7	8*	9
1	5	3	9	7	2	1	6	4	8
2	8	1	9	3	5	2	7	4	6
3	4	6	1	8	2	9	7	3	5
4	9	5	8	6	1	2	4	3	7
5	7	9	3	8	6	5	1	2	4
6	3	9	1	6	5	7	8	4	2
7	2	6	9	3	7	1	4	5	8
8	8	3	6	1	5	2	4	7	9
9	2	1	8	3	7	4	6	9	5
10	3	9	6	2	5	8	7	1	4
11	3	9	1	7	4	8	5	6	2
12	3	7	9	1	6	4	5	2	8
13	8	7	2	9	5	6	1	3	4
14	9	8	1	4	7	5	3	6	2
15	3	1	7	5	4	9	8	2	6
16	5	1	8	3	9	2	4	7	6
17	9	8	6	1	4	3	5	2	7
18	5	9	1	2	6	7	8	3	4
19	7	2	5	4	3	8	9	1	6
20	8	2	7	3	5	1	6	4	9

F2 Estimating conditional and unconditional probabilities of reconstruction.

With the additional grid data, the grid sample was formed by pooling from each grid series constructs that were reapplied to respective element samples at least once. This enabled a total of 80 constructs to be examined for reconstruction. Similarly, elements from the grid series were pooled with the exception of element samples from S6 and S7. As the measure of element reconstruction employed was based on exact probabilities of association between occasions, the ranking form data of S6 and S7 was excluded from this analysis. A total of 54 elements were thus available for examination:-

	Constructs	Elements
S1	6	12
S2	6	12
S3	12	12
S4	16	9
S5	16	9
S6	12	-
S7	12	-
Total	80	54

The construct and element samples were then classified in two ways: (a) by applying operational definitions of predication stability over the complete grid series, and (b) by applying transformations developed in Chapter 3.3. to locate reconstruction on each testing occasion.

Operational definitions of stability were as follows:-

(i) Stable constructs and elements were designed as those which obtained exact probabilities of associateion between ratings on every successive testing occasion in the series of .05 or less (or $r_s \leqslant .01$, where applicable).

(ii) Transitional constructs and elements were designated as those which obtained one or more exact probabilities of .05 or less (or $r_s \leqslant .01$, where applicable) between successive testing occasions in the series.

(iii) Unstable constructs and elements were designated as those which failed to obtain exact probabilities of .05 or less (or $r_s \leqslant .01$, where applicable) between any successive testing occasion.

The following tables list exact probabilities for the 80 sample constructs and 54 sample elements coded according to whether they are stable (S), transitional (T), or unstable (U).

In addition, the same tables record the data classes observed for each construct and element on each testing occasion in which it was employed by the subjects. The data classes for constructs were derived by (i) obtaining a PCA solution for all constructs in each subject's series, (ii) locating significant components by assigning constructs to components without replacement by the method of representation, (iii) coding each construct according to observed data class on each testing occasion. This provided a sample of 238 replications, coded according to the following data classes:-

(a) Replication (D_r) where a construct in grid t+1 is assigned to the same component as the same construct in grid t;

(b) Displacement (D_d), where a construct in grid t+1 is assigned to a component other than the component to which the same construct is assigned in grid t;

(c) Emergence (D_e), where a construct in grid t+1 is assigned to a component not represented by any construct in grid t.

The data classes for element were based on exact probabilities of association between ratings obtained on successive testing occasions. Elements were designated as consistent (D_c) if $p \leqslant .05$, and inconsistent (D_i) if $p > .05$. Since the joint observation for any element of D_c and D_i excluded the operational definitions of stability and instability, the tables record only the frequency of D_c and D_i observations for transitional elements.

(a) Classification of sample constructs.

S1 construct	T_{12}	T_{23}	H	D_r	D_d	D_e
1	005a	009	S	1	1	
2	002	000	S	2		
3	000	064	T		1	1
4	511	001	T	1	1	
5	000	000	S	2		
6	059	904	U	2		

S2 construct	T_{12}	T_{23}	H	D_r	D_d	D_e
1	023a	001	S	1	1	
2	005	000	S	2		
3	022	001	S	2		
4	244	004	T	2		
5	016	000	S	2		
6	006	001	S	2		

S3 construct	T_{12}	T_{23}	T_{34}	H	D_r	D_d	D_e
1	104a	129	021	T		1	2
2	037	068	020	T	3		
3	037	000	239	T	1	1	1
4	039	060	099	T	2	1	
5	373	013	016	T		1	2
6	043	006	192	T		2	1
7		054	002	T	1	1	
3		033	033	S		2	

S3 construct	T_{12}	T_{23}	T_{34}	H	D_r	D_d	D_e
9		008	237	T		1	1
10		026	007	S		2	
11		001	011	S	1		1
12		001	003	S	1	1	

S4 construct	T_{12}	T_{23}	T_{34}	T_{45}	T_{56}	H	D_r	D_d	D_e
1	112a	038	046	006	071	T	5		
2	046	004	468	351	003	T	3	1	1
3	010	007	547	436	537	T	2	3	
4	044	012	172	487	301	T	3	2	
5		322	429	161	045	T		3	1
6		108	096	035	405	T	3	1	
7		036	430	012	008	T	2	1	1
8		000	000	003	003	S	3	1	
9			012	087	132	T	1	1	1
10			050	013	019	S	3		
11			831	302	854	U		2	1
12			033	219	014	T	1	2	
13				041	004	S	2		
14				009	001	S	2		
15				000	001	S	2		
16				499	114	T	1	1	

S5 construct	T_{12}	T_{23}	T_{34}	T_{45}	T_{56}	H	D_r	D_d	D_e
1	003a	004	041	006	003	S	4	1	
2	009	012	023	066	013	T		2	3

S5 construct	T_{12}	T_{23}	T_{34}	T_{45}	T_{56}	H	D_r	D_d	D_e
3	014	016	006	001	001	S	5		
4	036	017	047	000	001	S	5		
5		000	002	000	003	S	4		
6		009	004	002	004	S	4		
7		008	003	000	000	S	4		
8		054	078	092	058	U	1	2	1
9			011	009	002	S	3		
10			060	080	211	U		3	
11			111	042	151	T		1	2
12			009	001	004	S	1	2	
13				003	004	S	1	1	
14				105	001	T	2		
15				001	001	S	2		
16				002	118	T	2		

S6 construct	T_{12}	T_{23}	T_{34}	T_{45}	H	D_r	D_d	D_e
1	.81b	.83	.86	.85	S	4		
2	.95	1.00	.96	.93	S	4		
3	.91	.93	.90	.93	S	4		
4	.76	1.00	.86	.86	T	2	1	1
5		.85	.88	.98	S	3		
6		.71	.85	.93	T	3		
7		.93	.80	.95	S	1	1	1
8		.83	.88	.83	S	2	1	
9			.93	.95	S	2		
10			.86	.86	S		2	
11			.98	.96	S		2	
12			.85	.83	S	2		

S7 construct	T_{12}	T_{23}	T_{45}	T_{56}	H	D_r	D_d	D_e
1	.76b	.80	.91	.93	T	4		
2	.96	.98	.96	.90	S	4		
3	.95	.98	.96	.93	S	4		
4	.91	.86	.80	.83	S	2	2	
5		.93	.78	.66	S		1	2
6		.85	.93	.85	S	3		
7		.86	.81	.23	T	1	2	
8		.88	.75	.95	T	3		
9			.91	.73	T	2		
10			.44	.85	T	2		
11			.91	.86	S	2		
12			.78	.76	T		1	1

Abbreviations: T: testing occasion, H: hypothesis class, D_r: replication data class, D_d: duplicate data class, D_e: emergent data class.

Notes: a, exact probability of association given to three places, decimal point omitted; b, Spearman correlation coefficient, $N = 9$, $\alpha = .01$ (one-tailed), $r_s = .78$.

Tabulating the 80 constructs by hypothesis class for the seven subjects obtains the following frequencies:-

Subject	Hypothesis class S	T	U	Total
S1	3	2	1	6
S2	5	1	-	6
S3	4	8	-	12
S4	5	10	1	16
S5	10	4	2	16
S6	10	2	-	12
S7	6	6	-	12
Total	43	33	4	80

Finally, the 238 replications may be tabulated by hypothesis and data class, and subtotals employed to estimate conditional probability distributions (p.394):-

Subject	H	Data Class D_r	D_d	D_e	Total
S1	S	5	1	-	6
	T	1	2	1	4
	U	2	-	-	2
S2	S	9	1	-	10
	T	2	-	-	2
	U	-	-	-	-
S3	S	2	5	1	8
	T	7	8	7	28
	U	-	-	-	-
S4	S	12	1	-	13
	T	21	15	4	40
	U	-	2	1	3
S5	S	33	4	-	37
	T	4	3	5	12
	U	1	5	1	7
S6	S	22	6	1	29
	T	5	1	1	7
	U	-	-	-	-
S7	S	15	3	2	20
	T	12	3	1	16
	U	-	-	-	-
Subtotals	S	98	21	4	123
	T	52	32	19	103
	U	3	7	2	12
Total		153	60	25	238

(b) Classification of sample elements.

S1 Elements	T_{12}	T_{23}	H	D_c	D_i	S2 Elements	T_{12}	T_{23}	H	D_c	D_i
1	012	486	T	1	1	1	000	203	T	1	1
2	731	622	U			2	776	064	U		
3	004	004	S			3	326	000	T	1	1
4	133	033	T	1	1	4	003	064	T	1	1
5	537	201	U			5	513	064	U		
6	012	002	S			6	003	203	T	1	1
7	182	248	U			7	651	873	U		
8	689	018	T	1	1	8	000	010	S		
9	000	790	T	1	1	9	003	064	T	1	1
10	226	002	T	1	1	10	931	395	U		
11	000	030	T	1	1	11	015	755	T	1	1
12	138	004	T	1	1	12	015	064	T	1	1

S3 Elements	T_{12}	T_{23}	T_{34}	H	D_c	D_i
1	126	186	120	U		
2	203	000	000	T	2	1
3	000	002	000	S		
4	081	466	083	U		
5	006	239	120	T	1	2
6	009	686	942	T	1	2
7	865	810	424	U		
8	735	015	000	T	2	1
9	770	001	167	T	1	2
10	000	015	222	T	2	1
11	058	111	005	T	1	2
12	000	008	599	T	2	1

S4 Elements	T_{12}	T_{23}	T_{34}	T_{45}	T_{56}	H	D_c	D_i
1	724	013	033	123	092	T	2	3
2	029	001	003	608	229	T	3	2
3	276	201	160	260	000	T	1	4
4	096	157	009	000	229	T	2	3
5	490	001	136	102	016	T	2	3
6	000	001	926	361	001	T	3	2
7	175	949	381	783	051	U		
8	096	289	013	000	782	T	2	3
9	009	157	000	000	229	T	3	2

S5 Elements	T_{12}	T_{23}	T_{34}	T_{45}	T_{56}	H	D_c	D_i
1	013	583	242	003	000	T	3	2
2	043	012	698	784	783	T	2	3
3	252	053	000	000	000	T	3	2
4	122	132	034	400	103	U		
5	993	391	974	733	174	U		
6	013	187	009	187	174	T	3	2
7	043	036	005	009	000	S		
8	122	391	042	064	845	T	1	4
9	000	000	000	003	103	T	4	1

Abbreviations: D_c, consistent data class; D_i, inconsistent data class.

Note: Exact probabilities given to three places, decimal point omitted.

Tabulating the 54 elements by hypothesis class for the five subjects obtains the following frequencies:-

Code	Hypothesis class S	T	U	Total
S1	2	7	3	12
S2	1	7	4	12
S3	1	8	3	12
S4	-	8	1	9
S5	1	6	2	9
Total	5	36	13	54

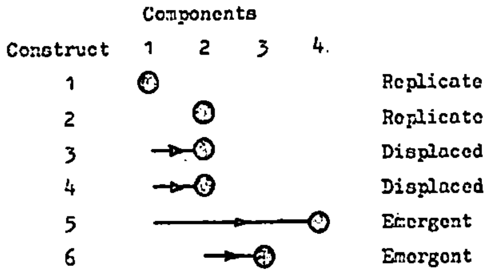
Finally, the 122 replications obtaining for elements designated above as transitional may be tabulated to estimate the conditional probabilitiy distribution (p.396):-

Data class	Data class D_c	D_i	Total
S1	7	7	14
S2	7	7	14
S3	12	12	24
S4	18	22	40
S5	14	16	30
Total	58	64	122

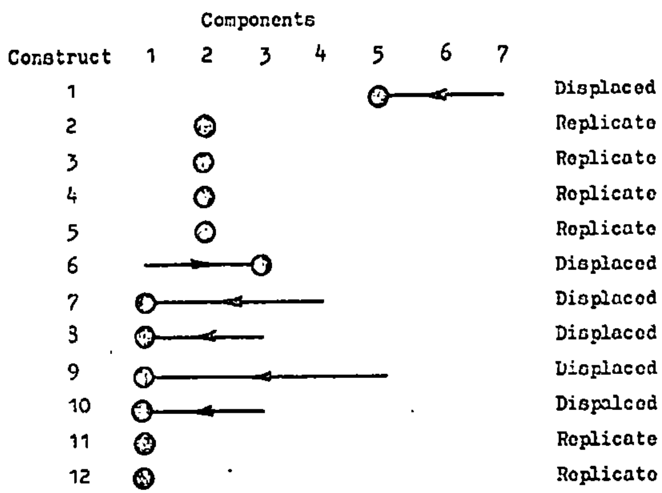
F3 A reconstruction grid test case.

To illustrate the application of reconstruction grid transformations to successive grids, the f llowing tables depict the analysis of Kenneth's series of four grids in the form of a series of reconstruction maps. Each map depicts the component representation of constructs reapplied on each successive testing occasion. For example, constructs elicited and applied on Day 1 (C1 to C6) are retested on Day 38, and a combined PCA obtained. The reconstruction map (Day 38) records the displaced representation of C3 and C4 on component 2, and the emergent representation of C5 and C6 on components 4 and 3, respectively. Constructs 1 and 2 maintain their representation of components 1 and 2, respectively.

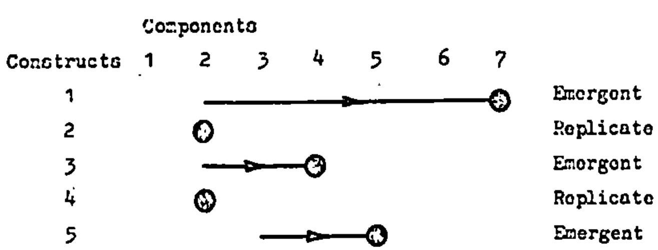
Day 38 Reconstruction map

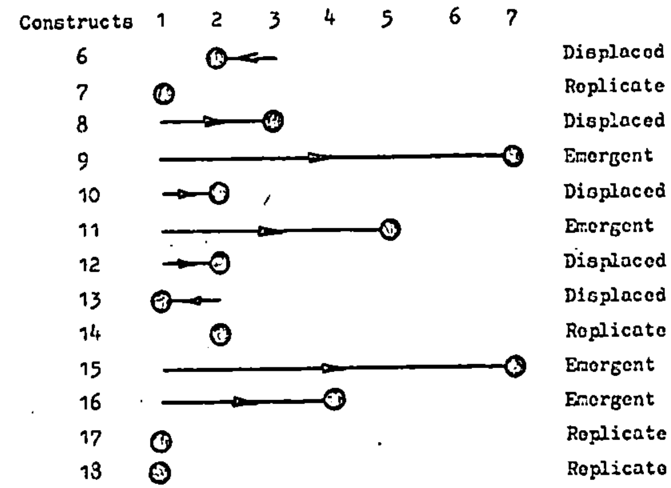


Day 52 Reconstruction map



Day 108 Reconstruction map





Appendix G The insight grid

G1 The case study data

The following tables comprise Module A and B data for the two case studies of Tom and Brenda on each of the three testing occasions forming the repgrid cycle. Element and construct samples were elicited in the manner described in Chapter 3.4. In addition to recording element ratings, the following tables depict subjects' rankings of (a) the expected relevance of constructs to self-description (CC), (b) the expected relevance of elements to self-description (EC), the expected extent of element rating change (ER), and (d) the expected extent of construct rating change (CR). Elements are recorded by column, ACTUAL SELF and IDEAL SELF elements denoted TA and TI respectively for Tom, BA and BI respectively for Brenda.

Tom Day 1: Grid matrix

	GB	RF	B	KP	W	BD	JB	F	M	ET	TA	TI	CC
1	3	1	1	3	4	2	2	3	4	5	1	3	2
2	3	4	4	2	5	1	2	3	4	3	1	1	5
3	3	4	5	1	4	4	2	3	3	3	1	1	3
4	3	3	2	5	3	2	.1	4	2	2	1	5	1
5	2	5	4	3	4	2	1	3	4	3	1	1	4
6	3	4	2	5	2	1	4	2	2	2	1	1	6
EC	7	6	4	8	12	11	10	5	9	2	1	3	

Tom Day 1; Listing of elicited constructs.

Rating position 1	Rating position 5
1. Situation identical i.e. harrassments of running business	Opposite situation
2. Similar interests	Dissimilar interests
3. Smart	Scruffy
4. Ability to communicate in a businesslike manner	less able
5. Socially compatible	socially incompatible
6. Lack of suitability to business life.	suitable

Tom Day 24; Grid matrix

	GB	RF	B	KP	W	BD	JB	F	M	ET	TI	TA	CC	CR
1	4	1	1	3	1	3	2	2	2	3	5	5	12	4
2	1	3	5	2	3	1	1	4	5	2	1	1	9	2
3	3	4	5	1	3	4	1	3	3	4	2	1	11	6
4	1	3	1	5	2	3	5	4	1	3	1	5	8	3
5	2	4	5	4	5	1	1	4	5	3	1	1	5	1
6	3	4	3	5	4	1	5	4	3	2	1	1	2	5
7	1	2	1	4	2	2	4	1	5	3	5	5	3	
8	5	3	4	2	4	1	2	2	4	2	1	1	10	
9	5	4	5	3	2	1	2	4	4	1	1	3	7	
10	1	3	5	2	3	2	2	4	5	3	1	1	4	
11	3	3	3	1	1	4	2	2	3	1	5	1	1	
12	5	4	5	2	4	3	3	1	4	2	1	1	6	
EC	6	7	12	2	8	5	4	10	9	11	1	3		
ER	11	9	8	12	10	4	6	1	3	5	7	2		

Tom Day 24; Listing of elicited constructs

Rating position 1	Rating position 5
7. Cockney	Non London
8. Futuristic	Non futuristic
9. Introvert	Extrovert

10. Sincere	Insincere
11. Content	Discontented
12. Philosophical	Mundane

Tom Day 103; Grid matrix

	GB	RF	B	KP	W	BD	JB	F	M	ET	TI	TA	CC	CR
1	5	1	2	3	3	4	2	2	2	3	4	5	8	5
2	2	4	4	3	5	2	1	2	5	4	1	1	5	3
3	2	3	4	1	2	4	2	3	3	3	2	4	13	1
4	3	2	5	1	4	3	2	2	4	3	3	5	14	2
5	1	3	5	2	4	1	1	3	5	4	1	1	4	11
6	3	4	2	5	4	3	5	4	3	2	1	1	9	12
7	1	4	1	5	4	3	4	2	5	4	5	5	7	8
8	5	4	5	3	5	2	2	1	5	2	1	1	11	9
9	5	2	5	2	3	1	2	5	2	2	3	3	12	7
10	1	2	4	4	5	3	2	3	5	2	2	1	15	4
11	2	2	4	1	1	5	3	2	1	1	3	1	16	6
12	5	4	5	2	5	3	2	1	5	3	3	1	1	10
13	1	3	5	5	4	3	2	4	4	2	1	2	6	
14	1	2	5	4	5	2	1	1	5	3	3	1	18	
15	1	4	4	5	4	1	2	2	2	4	3	3	17	
16	1	3	4	4	4	3	3	2	5	4	2	1	2	
17	4	5	4	3	5	1	4	5	4	4	1	3	3	
18	3	2	5	4	3	2	3	3	4	1	2	1	10	
EC	2	12	3	11	4	5	6	7	8	10	1	9		
ER	7	6	1	2	3	9	8	11	10	4	12	5		

Tom Day 103; Listing of elicited constructs

Rating position 1	Rating position 5
13. Relaxed & comfortable in manner	Stiff & forced
14. Interesting to listen to	Boring
15. Unorthodox business manner	Conservative
16. Straightforward	Devious
17. Unsettled	Settled
18. Talkative	Quiet

Brenda Day 1; Grid matrix

	RF	JH	HS	VB	MB	AB	BP	GC	WW	OB	BA	BI	CC
1	2	2	4	1	2	3	4	3	2	1	2	2	4
2	5	5	4	1	5	5	2	4	4	4	4	5	1
3	1	2	1	5	2	2	5	2	1	1	2	1	5
4	2	4	5	1	2	5	3	1	2	2	1	1	6
5	2	3	1	4	2	3	5	4	2	1	1	2	3
6	5	5	2	2	5	5	1	2	4	4	5	3	2
EC	2	5	6	10	8	9	12	7	11	3	1	4	

Brenda Day 1; Listing of elicited constructs

Rating position 1	Rating position 5
1. More controlled	less controlled
2. Scheming	forthright
3. Kind to others for free	kind to others for ulterior motives
4. Ability to control others	unable to control others
5. Approachable	distant
6. Hard	soft.

Brenda Day 53; Grid matrix

	RF	JH	HS	VB	MB	AB	BP	GC	WW	OB	BI	BA	CC	CR
1	2	2	4	4	3	2	3	4	2	2	3	2	10	1
2	4	4	2	2	4	4	2	4	3	4	4	4	5	5
3	2	2	3	5	3	2	4	2	3	2	2	2	6	3
4	2	4	5	3	2	4	3	2	2	3	2	3	9	4
5	1	2	3	5	3	2	5	3	3	1	2	1	12	2
6	5	5	3	1	3	5	1	2	2	5	5	5	1	6
7	1	2	3	4	2	2	3	3	1	2	1	1	8	
8	1	4	3	3	1	4	3	3	2	1	1	1	2	
9	2	3	4	3	5	2	5	2	3	3	2	2	7	
10	3	3	2	1	2	5	2	5	5	4	3	4	4	
11	1	3	1	5	3	3	5	5	3	2	1	2	11	
12	2	3	2	2	3	3	5	4	2	1	2	2	3	
EC	7	9	3	8	11	2	4	1	12	10	5	6		
ER	12	8	2	1	4	9	10	11	3	5	6	7		

Brenda Day 53; Listing of elicited constructs

Rating position 1	Rating position 5
7. Together	untogether
8. Personality impact	no impact
9. Spiritual	materialistic
10. Good intentions hardly ever carried out	always goes to others if in need
11. Playful	uptight
12. Optimistic	gloomy

Brenda Day 91; Grid matrix

	RF	JH	HS	VB	MB	AB	BP	GC	WW	OB	BI	BA	CC	CR
1	2	1	4	4	3	2	4	4	2	3	2	3	15	1
2	5	5	2	1	4	5	1	4	3	5	4	5	16	3
3	1	1	3	5	3	1	5	1	2	1	2	1	13	2
4	1	5	5	3	1	5	4	2	1	2	1	1	2	7
5	1	2	2	4	3	1	5	3	2	1	1	1	5	8
6	5	5	2	1	3	5	1	3	3	5	4	4	3	6
7	2	3	4	4	2	4	4	4	2	2	2	2	7	4
8	2	5	3	3	2	5	3	4	2	2	2	1	6	5
9	2	4	4	4	5	2	5	2	3	2	2	2	12	10
10	2	3	3	2	2	5	2	5	4	4	2	3	11	9
11	1	3	2	5	4	3	5	4	3	2	1	1	18	12
12	2	3	3	4	3	2	5	3	2	1	2	2	10	11
13	4	5	3	2	3	4	2	4	2	4	3	3	14	
14	2	4	4	4	2	5	5	4	3	3	2	1	1	
15	5	4	4	1	1	5	2	3	2	3	2	1	9	
16	4	5	4	1	2	5	2	2	5	4	5	5	4	
17	1	3	4	5	1	3	3	3	2	2	2	1	17	
18	3	5	2	1	3	5	1	4	3	4	3	1	8	
EC	7	6	8	2	11	4	1	12	10	9	5	3		
ER	12	2	4	1	10	3	9	6	7	8	5	11		

Brenda Day 91; Listing of elicited constructs

Rating position 1	Rating position 5
13. Shrewd	naive
14. Survivor	would be lost
15. Envies those who know more	equivocal
16. Neurotic	normal
17. Over in a flash	long term moody
18. Greasy	straight

G2 The cumulative principal components analyses

The following pages list the PCA solutions for the three testing occasions in each case study. Each solution comprises (a) an exhaustive listing of latent roots and the variance accounted for by each (the number of roots is equal to the number of constructs or to the number of elements less one, whichever is smaller), (b) a listing of element vectors on significant components, the central element subset denoted by markers, and (c) a listing of construct loadings on significant components (located by the method of representation) for constructs in each and the immediately preceding grids. Representatative constructs are denoted by markers. These listings enable core components to be identified by the usual procedures, and the identification of reconstruction data classes for retested constructs on each testing occasion.

TOM DAY 1

COMPONENT	ROOT	AS PER CENT
1	27.7825	42.095
2	16.0588	24.332
3	11.9256	18.069
4	6.9173	10.481
5	2.0992	3.181
6	1.2166	1.843

ELEMENT	COMPONENTS 1.	2.	3.
1	0.0131	0.0854	-0.0171
2	-0.3827	-0.0093	-0.5068◀
3	-0.3353	-0.3778	-0.1735
4	0.1264	0.6449◀	-0.3751◀
5	-0.3851◀	0.0815	0.3043
6	0.1585	-0.3804	0.1113
7	0.2383	-0.1333	-0.3494
8	-0.0451	0.1484	0.1240
9	-0.2332	0.0107	0.2705
10	-0.0813	0.0952	0.4294◀
11	0.4709◀	-0.4099◀	-0.0754
12	0.4572◀	0.2656	0.2576

CONSTRUCT	LOADINGS 1.	2.	3.
1	-0.5254	1.7751	2.4435◀
2	-3.1406◀	0.2458	0.2478
3	-2.7140◀	-1.4379	0.2220
4	0.1445	2.7551◀	0.0742
5	-3.1136◀	0.4158	-0.2744
6	-0.7496	1.7368	-2.4007◀

TOM DAY 24

COMPONENT	ROOT	AS PER CENT
1	189.3900	45.73
2	76.3289	18.43
3	40.1882	9.70
4	29.6523	7.16
5	28.3692	6.85
6	24.4420	5.90
7	9.5374	2.30
8	7.6924	1.86
9	4.6857	1.13
10	2.2175	0.54
11	1.6630	0.40

		COMPONENTS		
		1	2	3
ELEMENT		VECTOR	VECTOR	VECTOR
	1	0.0540	-0.1966	-0.6035◀
	2	0.2733	0.0544	-0.2633
	3	0.4796◀	-0.2580	-0.0399
	4	-0.1200	0.6900◀	-0.1023
	5	0.2821	0.1093	0.1313
	6	-0.1978	-0.4119	-0.0240
	7	-0.2222	0.2177	-0.3725
	8	0.1160	0.2242	0.1939
	9	0.2388	-0.0539	0.4012◀
	10	-0.0483	-0.0119	0.3903
	11	-0.4348◀	-0.4670◀	0.0931
	12	-0.4703◀	0.1837	0.1957
CONSTRUCT				
D1	1	0.2580	1.5687	2.1298◀
	2	4.1543◀	0.5320	0.3055
	3	3.5903◀	-1.6188	-0.2367
	4	-0.2740	3.0235◀	0.2122
	5	3.9965◀	0.6351	0.7606
	6	0.8994	2.8555	-2.4467
D24	1	-4.0023◀	-0.9519	0.0956
	2	4.3642◀	0.3379	2.0507
	3	3.0475◀	-2.4247	0.4879
	4	-2.5674	4.0522◀	-0.1971
	5	4.9674◀	1.6141	1.6321
	6	2.2411	3.4274◀	-1.8075
	7	-3.2327◀	0.8350	1.9604
	8	3.6396◀	-0.2171	-1.3536
	9	3.0471◀	0.7884	-1.6326
	10	3.9951◀	0.1313	2.0444
	11	-0.2472	-3.5517◀	-0.8893
	12	3.6539◀	-1.2518	-2.2713

TOM DAY 108

COMPONENT	ROOT	AS PER CENT
1	154.3711	38.983
2	65.8573	16.631
3	44.8029	11.314
4	33.7058	8.512
5	29.1274	7.355
6	20.7312	5.235
7	12.8812	3.253
8	12.3461	3.118
9	10.2077	2.578
10	7.5463	1.906
11	4.4231	1.117

COMPONENTS

ELEMENT	1.	2.	3.	4	5
1	-0.0608	-0.3156	-0.6125 ◁	-0.3162	0.5102 ◁
2	0.2078	0.0798	-0.1940	0.1856	-0.1148
3	0.4645 ◁	-0.4135 ◁	-0.0235	0.0432	-0.2330
4	-0.0035	0.6531 ◁	-0.0202	0.1227	0.1509
5	0.3412	0.1248	0.1591	-0.1726	0.2355
6	-0.2286	-0.3006	0.1157	0.4299 ◁	-0.2253
7	-0.1984	0.2598	-0.2864	0.4194	0.0349
8	0.0393	0.1136	-0.3067	-0.1566	-0.6042 ◁
9	0.3553	-0.0036	0.3955 ◁	-0.0131	0.2379
10	-0.0232	0.0610	0.3399	-0.2064	-0.0785
11	-0.4241 ◁	-0.2494	0.2700	0.2409	0.2687
12	-0.4701 ◁	0.0355	0.1631	-0.5769 ◁	-0.2014

CONSTRUCT		1.	2.	3.	4	5
D24	1	-2.6374 ◁	-0.4710	0.3958	-0.9408	0.8233
	2	2.8577 ◁	-0.1301	0.5229	-0.2601	-0.9460
	3	1.9844	-2.0302 ◁	0.1731	0.2426	-0.8694
	4	-1.4099	-2.3493 ◁	-0.4943	0.0222	-1.4593
	5	3.0895 ◁	0.6762	0.3689	-0.4945	-0.2305
	6	1.6612	2.1349 ◁	-1.0195	0.6494	0.2185
	7	-1.5542	1.1530	1.9461 ◁	0.1604	0.9704
	8	2.5168 ◁	-0.6502	-1.1008	-0.8279	1.4386
	9	1.7405	-0.3106	-1.7946 ◁	-1.1333	-0.0983
	10	2.8005 ◁	-0.1695	0.6876	-0.1645	-1.2065
	11	-0.4630	-2.2727 ◁	-0.0267	1.7655	0.4942
	12	2.2906 ◁	-1.2027	-0.9860	0.3476	1.2713
D108	1	-2.1820 ◁	-0.9972	0.0750	-1.3911	1.1225
	2	2.9310 ◁	0.2657	1.1402	-0.3093	0.3336
	3	0.1192	-1.7301	0.7929	-0.5395	-2.1039 ◁
	4	0.5188	-1.9451 ◁	1.3396	-1.5699	-0.0274
	5	2.9144 ◁	-0.0465	1.2110	-0.5153	-0.4935
	6	1.1110	2.1171 ◁	-1.5499	1.2878	0.0762
	7	-1.0663	1.6310	2.1356 ◁	0.3162	0.7028
	8	2.6779 ◁	-0.5482	-0.4565	-0.2281	1.5872
	9	0.7298	-1.1237	-1.7053 ◁	-1.6152	-0.3285
	10	2.3396 ◁	0.6239	1.3075	0.6708	0.0319
	11	-0.4330	-2.0646	-0.5638	2.1558 ◁	-0.8691
	12	2.2469 ◁	-1.5364	0.1534	0.1253	1.8060
	13	2.3474 ◁	1.0460	0.4448	0.3565	-1.1517
	14	2.2422 ◁	0.0383	1.9330	0.2914	0.8750
	15	1.0412	1.6404 ◁	1.0922	-0.2911	-0.1116
	16	2.2949 ◁	0.8350	1.7056	1.1436	0.2386
	17	2.1906 ◁	1.0332	-1.1904	-1.2341	-0.4036
	18	2.2315 ◁	0.1229	-0.7151	0.7457	0.4550

BRENDA . DAY 1

COMPONENT	ROOT	AS PER CENT
1	33.6742	51.022
2	18.1525	27.504
3	7.1750	10.871
4	4.8351	7.326
5	1.7851	2.705
6	0.3779	0.573

VECTORS

ELEMENT	1.	2.
1	-0.2493	-0.0707
2	-0.1384	0.1338
3	-0.0410	0.5763 ◁
4	0.5296 ◁	-0.4915 ◁
5	-0.1875	-0.0880
6	-0.1140	0.4025
7	0.6577 ◁	0.2755
8	0.2032	0.0033
9	-0.1280	-0.0920
10	-0.2214	-0.2650
11	-0.1755	-0.2431
12	-0.1355	-0.1412

LOADINGS

CONSTRUCT	1.	2.
1	1.0304	2.9104 ◁
2	-2.9149 ◁	0.9067
3	3.0048 ◁	-0.4540
4	-0.3360	2.8917 ◁
5	2.7576 ◁	0.2421
6	-2.7148 ◁	-0.4832

BRENDA DAY 53

COMPONENT	ROOT	AS PER CENT
1	162.7455	52.32
2	48.9964	15.75
3	36.4046	11.70
4	19.7088	6.34
5	16.4310	5.28
6	10.2817	3.31
7	6.6738	2.15
8	5.7406	1.85
9	2.3603	0.76
10	1.0727	0.34
11	0.6679	0.21

COMPONENTS

		1	2	3
ELEMENT		VECTOR	VECTOR	VECTOR
	1	-0.3127	0.1379	-0.0610
	2	-0.1072	-0.3687	0.1480
	3	0.0583	-0.5129 ◁	-0.5975 ◁
	4	0.5418 ◁	0.3267	-0.2131
	5	-0.0107	0.1527	-0.1757
	6	-0.1408	-0.5087 ◁	0.3569
	7	0.5863 ◁	-0.1284	0.0571
	8	0.1858	0.1271	0.5900 ◁
	9	-0.0399	0.1573	0.1181
	10	-0.2644	0.1523	-0.1363
	11	-0.2463	0.2799	-0.1575
	12	-0.2506	0.1843	0.0711
CONSTRUCT				
D1	1	1.0579	-2.1431 ◁	0.2156
	2	-3.6210 ◁	-1.1254	0.8644
	3	4.1951 ◁	0.4756	0.1375
	4	-0.1039	-4.8495 ◁	-0.6592
	5	3.4200 ◁	-0.2742	2.3212
	6	-3.8995 ◁	0.0115	0.3094
D53	1	1.9016 ◁	0.1860	-0.7174
	2	-2.3338 ◁	0.4718	1.3889
	3	2.8066 ◁	0.5205	-1.1803
	4	0.2924	-2.7583 ◁	-1.0040
	5	4.4070 ◁	0.0442	-0.4070
	6	-5.0472 ◁	-0.9262	0.0462
	7	2.7640 ◁	-0.6207	-0.3473
	8	1.9614	-2.8500 ◁	1.3056
	9	1.9751 ◁	-0.6852	-1.6341
	10	-2.2223	-0.2765	3.2071 ◁
	11	4.1453 ◁	0.5040	2.5651
	12	2.1378 ◁	-1.0079	1.8167

BRENDA DAY 91

COMPONENT	ROOT	AS PER CENT
1	196.5318	49.629
2	78.4229	19.804
3	34.6903	8.760
4	25.1455	6.350
5	18.9354	4.782
6	13.7439	3.471
7	11.1739	2.822
8	7.1186	1.798
9	5.1168	1.292
10	2.9054	0.734
11	2.2155	0.559

COMPONENTS

ELEMENT	1.	2.
1	-0.3188	0.1514
2	-0.1208	-0.4488
3	0.1785	-0.2027
4	0.5373	0.2010
5	0.0331	0.3168
6	-0.1534	-0.6000
7	0.5722	0.0042
8	0.1037	-0.2063
9	-0.0750	0.1741
10	-0.2736	0.0611
11	-0.2278	0.2628
12	-0.2603	0.3053

CONSTRUCT		1.	2.
D53	1	2.3358	0.1939
	2	-2.7775	-0.1990
	3	2.9428	0.9157
	4	-0.3641	-2.1411
	5	3.2100	0.1442
	6	-2.9529	-0.5674
	7	2.8214	-0.8307
	8	1.5512	-2.7806
	9	1.9992	0.4352
	10	-1.9505	-1.0446
	11	2.4203	-0.4926
	12	1.8102	-1.1009
D91	1	2.3333	0.7044
	2	-3.0425	-0.6101
	3	2.9906	0.9729
	4	1.2935	-2.7380
	5	3.1164	0.2719
	6	-3.0688	-0.8978
	7	2.3644	-2.0641
	8	0.7351	-3.0478
	9	2.3752	0.1705
	10	-0.9009	-1.9596
	11	2.7747	-0.5034
	12	3.0419	-0.1746
	13	-1.9872	-1.9586
	14	1.9915	-2.4625
	15	-1.2034	-2.4772
	16	-2.5892	-0.7609
	17	2.3418	-1.4541
	18	-1.7930	-2.1221

G5 Level 1 measurement

Transformations developed for Level 1 feedback comprised four measures: (a) an element centrality score for each sample element on each testing occasion, computed as $e_i = \sum_{n}^{j} L_{ij}$, where n = number of significant components, L_{ij} = loading of the ith element on the jth significant component, (b) a core construct score for each sample construct on each testing occasion, computed as $c_k = \sum_{n}^{j} L_{kj} V_{sj}$, where n = number of significant components, L_{kj} = loading of the kth construct on the jth significant component, and V_{sj} = vector of the element ACTUAL SELF on the jth component, (c) an element reconstruction score, computed as exact probabilities of association between element ratings on successive testing occasions, and (d) a construct reconstruction score, computed in the same manner as for elements. These scores were ranked for the purpose of comparison with the subject's Module B rankings. Scores for each case are listed in the following tables.

(a) Element centrality scores.

	TOM						BRENDA					
	Grid 1		Grid 2		Grid 3		Grid 1		Grid 2		Grid 3	
Element	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1	.470	12	6.1999	8	12.005	1	1.748	7	5.647	8	5.632	6
2	3.768	4	5.906	9	6.226	11	1.373	10	3.474	11	5.668	5
3	3.833	3	9.116	3	10.791	4	2.693	3	8.160	3	4.294	9
4	3.017	6	7.550	4	7.137	10	5.167	1	5.768	7	9.313	1
5	3.411	5	5.669	10	8.591	7	1.463	8	4.937	10	3.340	10
6	2.744	8	6.472	7	10.253	5	2.376	5	8.238	2	7.464	3
7	2.997	7	7.322	5	9.221	6	4.991	2	10.177	1	8.059	2
8	1.261	11	4.784	11	7.680	9	1.193	11	6.927	4	3.281	11
9	2.207	9	6.988	6	8.487	8	1.135	12	2.987	12	2.593	12
10	2.176	10	3.242	12	4.680	12	2.414	4	6.196	5	4.376	8
11	4.335	1	10.654	1	11.876	2	2.054	6	6.122	6	5.521	7
12	4.364	2	9.325	2	11.662	3	1.388	9	5.416	9	6.361	4

(b) Core construct scores

	TOM						BRENDA					
	Grid 1		Grid.2		Grid 3		Grid 2		Grid 2		Grid 3	
Construct	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1	1.159	6	2.197	7	1.822	6	.888	1	.651	12	.718	17
2	1.598	3	2.246	6	1.793	8	.732	2	.948	10	.851	11
3	1.884	1	2.503	4	1.429	17	.638	4	1.033	9	.937	7
4	1.203	5	3.027	2	1.435	16	.709	3	1.089	8	1.014	3
5	1.657	2	3.066	1	1.831	5	.543	6	1.194	5	.781	13
6	1.246	4	2.744	3	1.729	11	.594	5	1.571	2	.935	8
7			1.978	8	1.734	10			.924	11	1.031	2
8			1.810	12	1.872	4			1.568	3	.969	4
9			1.845	11	1.518	14			1.093	7	.591	18
10			1.946	9	1.700	12			1.152	6	.723	16
11			1.849	10	1.585	13			1.761	1	.764	14
12			2.387	5	1.879	3			1.210	4	.739	15
13					1.762	9					.967	5
14					1.799	7					1.101	1
15					1.231	18					.925	9
16					1.971	1					.790	12
17					1.907	2					.916	10
18					1.471	15					.967	6

(c) Element reconstruction scores

	TOM				BRENDA			
	Grid 12		Grid 23		Grid 12		Grid 23	
Element	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1	226	4	002	11.5	003	9	064	8
2	000	11	080	6	000	11.5	203	4.5
3	012	8.5	486	3	776	2	064	8
4	000	12	790	1	931	1	395	3

Element	Score	Rank	Score	Rank	Score	Rank	Score	Rank
5	732	1	622	2	326	5	000	12
6	004	10	004	9.5	015	6.5	756	2
7	639	2	018	8	000	11.5	010	11
3	133	6.5	033	7	003	9	064	8
9	132	5	248	4	514	4	064	8
10	133	6.5	004	9.5	015	6.5	064	8
11	537	3	201	5	003	9	203	4.5
12	012	8.5	002	11.5	651	3	873	1

(Note: Probabilities given to three places, decimal point omitted).

(d) Construct reconstruction scores

	TOM				BRENDA			
	Grid 12		Grid 23		Grid 12		Grid 23	
Construct	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1	5106	1	0010	8	2441	1	0039	3
2	0050	3	0086	6	0233	2	0010	5
3	000	6	0643	2	0221	3	0010	5
4	0539	2	9040	1	0060	5	0010	5
5	0001	5	0003	9	0162	4	0002	10
6	0016	4	0000	12	0053	6	0000	11.5
7			0011	7			0274	1
8			0002	10.5			0005	8
9			0127	4			0001	9
10			0108	5			0006	7
11			0163	3			0000	11.5
12			0002	10.5			0159	2

(Note: probabilities given to four places, decimal point omitted).

G4 Level 3 classifications

Transformations developed for Level 3 feedback comprised four procedures; (a) the identification of significant components by the method of construct representation, and the demarcation of the subset of central elements by applying the 50 percent variance criterion to each significant component, (b) the designation of core components as those which include the element SELF in the central subset, and the designation of representative constructs on that component as core constructs, (c) the construction of construct reconstruction maps to examine component representation of retested constructs, and the designation of retested constructs as replicated, displaced or emergent, and (d) the computation of exact probabilities of association between element ratings on successive testing occasions, and the designation of consistent elements as those obtaining p .05. These procedures enable the classification of constructs and elements into the following classes:-

Constructs	Elements
core (D_{cc})	central (D_{ce})
peripheral (D_p)	incidental (D_i)
replicated (D_r)	consistent (D_{co})
displaced (D_d)	inconsistent (D_{in})
emergent (D_e)	

The following tables list data classes for elements (a) and for constructs (b) for both case-studies. Data class subscripts have been employed to indicate classification. All constructs in the second case-study (Brenda) were designated as peripheral as no significant components included SELF in the central element subset. In this case-study the 50 percent criterion was not relaxed.

(a) Data classes for elements

ELEMENT	TOM			BRENDA		
	Day 1	Day 24	Day 108	Day 1	Day 53	Day 91
1	i	ce in	ce co	i	i co	i in
2	ce	i co	i in	i	i co	ce in
3	i	co co	co in	co	ce in	i in
4	ce	co co	co in	co	ce in	ce in
5	ce	i in	i in	i	ce in	i co
6	i	i co	ce co	i	ce co	ce in
7	i	i in	i co	ce	ce co	ce co
8	i	i in	ce co	i	i co	i in
9	i	ce in	ce in	i	i in	i in
10	ce	i in	i co	i	i co	i in
11	ce	ce in	ce in	i	i co	i in
12	ce	ce co	ce cò	i	i in	i in

(b) Data classes for constructs

CONSTRUCT	TOM			BRENDA		
	Day 1	Day 24	Day 108	Day 1	Day 53	Day 91
1	p	cc d	cc r	p	p d	p r
2	cc	cc r	cc r	p	p r	p r
3	cc	cc r	p e	p	p r	p r
4	p	cc r	p d	p	p r	p r
5	cc	cc r	cc r	p	p r	p r
6	p	cc r	p r	p	p r	p r
7		cc	p r		p	p r
8		cc	cc r		p	p r
9		cc	p r		p	p r
10		cc	cc r		p	p d
11		cc	p e		p	p r
12		cc	cc r		p	p r
13			cc			p

Construct	Day 1	Day 24	Day 108	Day 1	Day 53	Day 91
14			cc			p
15			p			p
16			cc			p
17			cc			p
18			cc			p

Following the data classification, posterior probabilities for each hypothesis class were computed for constructs and elements on each occasion. Two sets of hypothesis classes were employed:-

Constructs	Elements
core (H_{cc})	central (H_{ce})
peripheral (H_p)	incidental (H_i)
stable (H_{sc})	stable (H_{se})
transitional (H_{tc})	transitional (H_{te})
unstable (H_{uc})	unstable (H_{ue})

The following tables list posterior probabilities obtaining for element hypotheses (c) and construct hypotheses (d). Probabilities are given to three places decimal point omitted. Where dichotomous hypotheses are employed, posteriors for only one hypothesis are listed (H_{cc} or H_{ce}). Where three hypotheses are employed, two posterior probabilities are listed (H_{sc}, H_{te} or H_{se}, H_{te}).

(c) Posterior probabilities for element hypotheses

Element	Tom							Brenda						
	Day1	Day 24			Day 108			Day 1	Day 53			Day 91		
	H_{ce}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{se}	H_{te}
1	160	272	0	593	423	0	1	160	079	227	773	037	0	1
2	454	272	227	773	143	0	1	160	079	227	773	143	0	1
3	160	272	227	773	423	0	1	454	620	0	593	423	0	433
4	454	620	227	773	761	0	1	454	620	0	593	761	0	433
5	454	272	0	593	143	0	433	160	272	0	593	143	0	1
6	160	079	227	773	143	382	618	160	272	227	773	423	0	1
7	160	079	0	593	037	0	1	454	620	227	773	761	382	618

Element	H_{ce}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{ce}	H_{se}	H_{te}	H_{ce}	H_{se}	H_{te}
8	160	079	0	593	143	0	1	160	272	227	773	143	0	1
9	160	272	0	593	423	0	433	160	079	0	593	037	0	433
10	454	272	0	593	143	0	1	160	079	227	773	037	0	1
11	454	620	0	593	761	0	433	160	079	227	773	037	0	1
12	454	620	227	773	761	382	613	160	079	0	593	037	0	433

(d) Posterior probabilities for construct hypotheses

Construct	Tom							Brenda						
	Day 1	Day 24			Day 108			Day 1	Day 53			Day 91		
	H_{cc}	H_{cc}	H_{sc}	H_{tc}	H_{cc}	H_{sc}	H_{tc}	H_{cc}	H_{cc}	H_{sc}	H_{tc}	H_{cc}	H_{sc}	H_{tc}
1	220	338	416	579	484	502	444	220	115	416	579	057	502	444
2	529	673	660	320	790	759	234	220	115	660	320	057	759	234
3	529	673	660	320	484	251	712	220	115	660	320	057	759	234
4	220	338	660	320	189	502	444	220	115	660	320	057	759	234
5	529	673	660	320	790	759	234	220	115	660	320	057	759	234
6	220	338	660	320	189	759	234	220	115	660	320	057	759	234
7		529			338	660	320		220			115	660	320
8		529			673	660	320		220			115	660	320
9		529			338	660	320		220			115	660	320
10		529			673	660	320		220			115	416	579
11		529			338	168	752		220			115	660	320
12		529			673	660	320		220			115	660	320
13					529							220		
14					529							220		
15					220							220		
16					529							220		
17					529							220		
18					529							220		

G 5 Query Prompts

Following the assembly of feedback displays, items which obtained either (a) a significant discrepancy between anticipated and observed function at Level 1 or (b) a disjunction between prior probability and observed function at Level 3 were isolated down on Query Forms which requested subjects to furnish an account for the discrepancies. The following pages depict query prompts presented in one case-study and the subject's responses to them.

QUERY FORM L1CC
SUBJECT Tom DAY 1

Listed below are the numbers of constructs which are more (or less) important to your definition of yourself than you anticipated. Look at each construct card in turn. Can you think of any reason why you thought these constructs might be important (or unimportant)? That is, can you describe why those constructs seemed important or unimportant to you at the time? If you can, jot down your reasons in the space provided.

1	I assumed that that was something I did not want to be. Most of the people who run their own business are harassed, difficult to get on with socially, messed up and often inefficient.
4	Most of the people who are harassed don't have enough time to go through normal procedures. They don't seem to have enough time to cater for you. That they weren't able to be efficient and businesslike seemed less important.

QUERY FORM L1CE
SUBJECT Tom DAY 1

Listed below are the numbers of persons who are more (or less) important to your definition of yourself than you anticipated. Think about each person in turn. Can you think of any reason why you thought these people might be important (or unimportant)? That is, can you describe why these people seemed important or unimportant to you at the time? If you can, jot down your reasons in the spaces provided.

5	Yes I've changed my mind about her. She placed an urgent order but something didn't arrive so she phoned the office and as I wasn't there she gave a rollicking to whoever answered. Now I'm wondering if she's two faced as when I saw her after that she was as nice as pie.
8	I thought he would be important because I have just met him, but he's a busy fellow, brash and I don't think I would have formed a strong opinion about him after all. It's because he's new to me
10	Last time I saw him he seemed more relaxed a bit more time on his hands. He seems to have taken a liking to me. He has a tendency towards being slightly effeminate but is probably just a sensitive kind of person. I suppose it's because
	he took a liking to me. He sent an order to me instead of head office and I appreciate that.

QUERY FORM L1CC
SUBJECT Tom DAY 24

Listed below are the numbers of constructs which are more (or less) important to your definition of yourself than you anticipated. Look at each construct card in turn. Can you think of any reason why you thought these constructs might be important (or unimportant)? That is, can you describe why these constructs seemed important or unimportant to you at the time? If you can, jot down your reasons in the space provided.

3	This has to do with being socially compatible I used to think being presentable was important but for instance Barry is scruffy but is socially compatible to me.
4	Because it seemed less important last time I thought it would be less important this time.
11	Strange. Being contented is very important to me.

QUERY FORM L1CE
SUBJECT Tom DAY 24

Listed below are the numbers of persons who are more (or less) important to your definition of yourself than you anticipated. Think about each person in turn. Can you think of any reason why you thought these people might be important (or unimportant)? That is, can you describe why these people seemed important or unimportant to you at the time? If you can, jot down your reasons in the spaces provided.

3	None really except that I havent yet figured him out.

QUERY FORM L1CR
SUBJECT Tom DAY 24

Listed below are the numbers of constructs on which you have changed your mind since the last occasion more (or less) than you anticipated. Look at each construct card in turn. What made you think your views on these constructs had (or had not) changed, when we can see that they have not (or have)? That is, can you describe what it was that made you think your views on these constructs had or had not changed? If you can, jot down your reasons in the spaces provided.

1	I saw John as harassed what with running his own business. I've been thinking whether the people are really suited to what they're doing asking myself if they would be happier being a farmer or labourer. This fellow had be happier being a pigfarmer. So I suppose I'd be happier being a pigfarmer too.
5	Mostly because of Barry and the Betty man. They certainly don't seem efficient but they get where they want to go. They don't speak the right way but they get what they want.

QUERY FORM L1ER
SUBJECT Tom DAY 24

Listed below are the numbers of persons about whom you have changed your mind since the last occasion more (or less) than you anticipated. Think about each person in turn. What made you think you had (or had not) changed your mind about them, when we can see that you have not (or have)? That is, can you describe what it was that made you think your views about these people had or had not changed? If you can, jot down your reasons in the spaces provided.

1	It depends where and when I meet this fellow. If I meet him in the pub hes entirely diferent to when we talk about business. But I dont use business acumen with him, Im very straight with him
5	I know why this is. Its because of that order mix-up and my suspicions about her being two faced. I will have to be wary of her.
6	I expected to see him differently because hes becoming more of a friend than a client.
12	Surprising. Thought I had changed my mind about what Id like to be. Perhaps it hasnt sunk in yet.

QUERY FORM L3CC

SUBJECT Tom DAY 24

Listed below are the numbers of constructs which have changed in their importance to your self-definition since the last occasion. Look at each construct card in turn. Can you think of any reason why these constructs are no longer important (or unimportant)? In particular, has anything of note occurred in your relationships that might have led to this unexpected outcome? If you can identify an event of this sort, jot down a brief note of what occurred in the space provided.

1	Yes. Seeing my closest friends harassed frightens me off having my own business.
4	Being able to communicate affects my efficiency. That's not strictly true, it affects my ambition.
6	This has become very important I'm beginning to examine these fellows asking are they suitable to what they are doing. Of course I'm asking the same question of myself.

QUERY FORM L3CE

SUBJECT Tom DAY 24

Listed below are the numbers of persons who have changed in their importance to you since the last occasion. Think about each person in turn. Can you think of any reason why these people are no longer important (or unimportant)? In particular, has anything of note occurred in your relationships with them that might have led to this unexpected outcome? If you can identify an event of this sort, jot down a brief note of what occurred in the space provided.

1	That's odd. He's one of the most established of my relationships. We have a few pints every time we see each other and I would that for that reason he would be important to me. I have two categories for this fellow in business ~~where~~ we are different to when we are in the pub. It depends on where I meet him as to how I see him but I'm beginning to wonder whether people who stay in this business end up by being like him.
3	Lately my relationship with this fellow has been on the up and up. His language is awful he is in a different world from me but I now admire he doesn't pull his punches
9	I've spoken to this fellow once since last time. He's trying to con us out of something so since then I've spoken to someone who knows this fellow and who said he's that sort of person. Which means that now I'll treat him with some suspicion.

QUERY FORM L1CC
SUBJECT Tom DAY 108

Listed below are the numbers of constructs which are more (or less) important to your definition of yourself than you anticipated. Look at each construct card in turn. Can you think of any reason why you thought these constructs might be important (or unimportant)? That is, can you describe why these constructs seemed important or unimportant to you at the time? If you can, jot down your reasons in the space provided.

14	Yes. I suppose I exaggerated this because I'm always worried about being stiff and want to be natural.

QUERY FORM L1CE
SUBJECT Tom DAY 108

Listed below are the numbers of persons who are more (or less) important to your definition of yourself than you anticipated. Think about each person in turn. Can you think of any reason why you thought these people might be important (or unimportant)? That is, can you describe why these people seemed important or unimportant to you at the time? If you can, jot down your reasons in the spaces provided.

12	I had the feeling for once that I was talking about things as they were rather than as I would like them to be. I was saying that I felt harassed but I have changed my mind. At that time lots of things were happening and since then I've found my sales are up by 100% we have busy time and not so busy times. There are peak times as far as problems are concerned and I have to go dashing round to sort them out, which means I don't get a chance to socialise with customers and I see them in a different light. A total businessman's view. At present I'm not harassed as I have no problems and I am a bit more relaxed.

QUERY FORM L1ER
SUBJECT Tom DAY 108

Listed below are the numbers of persons about whom you have changed your mind since the last occasion more (or less) than you anticipated. Think about each person in turn. What made you think you had (or had not) changed your mind about them, when we can see that you have not (or have)? That is, can you describe what it was that made you think your views about these people had or had not changed? If you can, jot down your reasons in the spaces provided.

9	Couldn't tell you why I've changed my mind about him.
11	Me. Suppose I'm beginning to see myself differently
12	As above.

QUERY FORM L3CC
SUBJECT Tom DAY 108

Listed below are the numbers of constructs which have changed in their importance to your self-definition since the last occasion. Look at each construct card in turn. Can you think of any reason why these constructs are no longer important (or unimportant)? In particular, has anything of note occurred in your relationships that might have led to this unexpected outcome? If you can identify an event of this sort, jot down a brief note of what occurred in the space provided.

1	looking around, I dont want to be a selfemployed businessman.
3	Particular people have shown me that what people look like isnt much of a guide to what theyre really like.

QUERY FORM L3CE
SUBJECT Tom DAY 108

Listed below are the numbers of persons who have changed in their importance to you since the last occasion. Think about each person in turn. Can you think of any reason why these people are no longer important (or unimportant)? In particular, has anything of note occurred in your relationships with them that might have led to this unexpected outcome? If you can identify an event of this sort, jot down a brief note of what occurred in the space provided.

1	No. Haven't seen him.
3	Yes. Ive seen him. Hes a good example of a 'natural'.
6	I see him regularly. We have lots in common and I think he views business in the same way that I do.
8	Ive seen him a couple of times but hes a brash sort of fellow as if he were selling from a market stall. Its a bit offputting and an aspect of business that I'm not happy with.
9	Yes. I'm a bit suspicious of this fellow and I had to tread carefully with him.

QUERY FORM L3CR
SUBJECT Tom DAY 108

Listed below are the numbers of constructs on which your views have become more (or less) changeable since the last occasion. Look at each construct card in turn. Can you think of any reason why you have (or have not) changed your mind on these constructs between days 24 and 108 when you did not (or did) change your mind between days 1 and 24? If you can, jot down your reasons in the spaces provided.

3	Smart people were I thought people I can get on with. Im not so sure I believe that now but my ideal customer would have all these properties. Collapsing them all together makes my ideal customer.
4	I suppose its because you dont need to speak efficiently in order to communicate.

QUERY FORM L3ER

SUBJECT Tom DAY 108

Listed below are the numbers of persons about whom your views have become more (or less) changeable since the last occasion. Think about each person in turn. Can you think of any reason why you have (or have not) changed your mind about them between days 24 and 108 when you did not (or did) change your mind between days 1 and 24? If you can, jot down your reasons in the spaces provided.

2	Ive seen Rupert since. Much like Barry he is harassed with running his business. With him I can joke within accepted limits. Very straight fellow slightly absent minded Ive realised since last time. But his changing for the better gradually Im getting to know more about him its a little bit more free and easy.
3	Dont know whether to like him or dislike him..
4	Hes written to me and his letters seem to be softening towards me.

G6 Evaluation of the procedures

Three criteria were constructed to assess the procedures applied to the two case-studies; (a) tests of improvement in the quality of modelling, (b) tests of elaboration of the conversational domain, (c) tests of the emergence of higher-order control of modelling.

(a) Improvement in the quality of modelling

Two tests were employed to assess change in the nature of modelling over the three testing occasions in the two case-studies; (i)a test of diversity in construction based on the distribution of exact probabilities of association between the six constructs elicited on each testing occasion, and (ii) a test of the centrality or self-relevance of constructs elicited on each testing occasion. The following tables list (i) exact probability proximity matrices between constructs for the two case-studies on the three occasions, (ii) median tests of these probabilities for each case-study, (iii) Kruskal-Wallis one way nonparametric analysis of variance of core construct scores of elicited constructs for the two case-studies.

(i) Exact Probability Proximity Matrices

TOM PROBABILITIES GRID 1

	1	2	3	4	5	6
1	0	2583	-4602	2709	4301	-4710
2	2583	0	108	-5024	3	3015
3	-4602	108	0	-2526	108	-4301
4	2709	-5024	-2526	0	4219	3173
5	4301	3	108	4219	0	2491
6	-4710	3015	-4301	3173	2491	0

TOM PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	-194	-807	4316	-54	-210	656	-900	-2052	-63	3566	-440
2	-194	0	570	-1618	6	1932	-2304	630	432	0	-4850	1506
3	-807	570	0	-314	899	-3379	-107	1210	2905	302	2229	468
4	4316	-1618	-314	0	-1950	1967	2560	-358	-2704	-2123	-481	-370
5	-54	6	899	-1950	0	525	-1587	223	552	10	-2408	917
6	-210	1932	-3379	1967	525	0	-2677	1240	1414	2087	-1445	2134
7	656	-2304	-107	2560	-1587	-2677	0	-842	-1029	-2147	-5082	-616
8	-900	630	1210	-358	223	1240	-842	0	113	1103	-4924	5
9	-2052	432	2905	-2704	552	1414	-1029	113	0	1176	-5110	492
10	-63	0	302	-2123	10	2087	-2147	1103	1176	0	-4747	1495
11	3566	-4850	2229	-481	-2408	-1445	-5082	-4924	-5110	-4747	0	3682
12	-440	1506	468	-370	917	2134	-616	5	492	1495	3682	0

TOM PROBABILITIES GRID 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	-548	-5525	2365	-241	-612	-5390	-2461	4277	-873	-5393	-3876	-413	-1999	-1897	-267	-620	-1310
2	-548	0	5118	3174	2	3295	5222	47	-4268	67	-2135	132	268	24	861	16	706	1520
3	-5525	5118	0	410	2930	-695	-2566	-4126	5044	-4427	1680	-5279	4796	-4334	-3113	-4837	-4621	-3501
4	2365	3174	410	0	1900	-96	-4079	2401	2479	4208	4994	1507	5478	1925	-4918	-5504	-5120	5384
5	-241	2	2930	1900	0	5152	-3999	390	3753	102	-2900	656	200	50	1114	51	634	911
6	-612	3295	-695	-96	5152	0	-5086	2613	-3333	1762	-4340	-4785	1098	-5019	4832	2099	1142	1471
7	-5390	5222	-2566	-4079	-3999	-5086	0	-1921	-156	4292	-1191	-2197	-4400	3350	1829	2894	-2617	-1695
8	-2461	47	-4126	2401	390	2613	-1921	0	3041	605	-4021	1	1262	290	3880	766	864	247
9	4277	-4268	5044	2479	3753	-3333	-156	3041	0	-4256	5324	3747	4888	-4275	-4212	-1242	1560	1780
10	-873	67	-4427	4208	102	1762	4292	605	-4256	0	-4541	1277	7	6	2192	8	3261	143
11	-5393	-2135	1680	4994	-2900	-4340	-1191	-4021	5324	-4541	0	4689	-4882	-3853	-1764	-4413	-1065	4044
12	-3876	132	-5279	1507	656	-4785	-2197	1	3747	1277	4689	0	3928	301	5271	1215	2941	1289
13	-413	268	4796	5478	200	1098	-4400	1262	4888	7	-4882	3928	0	200	953	142	2018	113
14	-1999	24	-4334	1925	50	-5019	3350	290	-4275	6	-3853	301	200	0	445	10	4535	424
15	-1897	861	-3113	-4918	1114	4832	1829	3880	-4212	2192	-1764	5271	953	445	0	1042	3009	4379
16	-267	16	-4837	-5504	51	2099	2894	766	-1242	8	-4413	1215	142	10	1042	0	3308	915
17	-620	706	-4621	-5120	634	1142	-2617	864	1560	3261	-1065	2941	2018	4535	3009	3308	0	2855
18	-1310	1520	-3501	5384	911	1471	-1695	247	1780	143	4044	1289	113	424	4379	915	2855	0

BRENDA PROBABILITIES GRID 1

	1	2	3	4	5	6
1	0	5289	4470	668	2685	-1061
2	5289	0	-175	3168	-856	194
3	4470	-175	0	-4219	82	-719
4	668	3168	-4219	0	-5073	4399
5	2685	-856	82	-5073	0	-527
6	-1061	194	-719	4399	-527	0

BRENDA PROBABILITIES GRID 2

	1	2	3	4	5	6	7	8	9	10	11	12
1	0	-559	856	4847	359	-221	348	3158	2883	-901	1771	2923
2	-559	0	-49	-2126	-95	95	-593	-1981	-1120	454	-2071	-3829
3	856	-49	0	4978	9	-12	727	3660	843	-130	653	3756
4	4847	-2126	4978	0	5124	3769	2829	704	3846	-3602	-4027	-5263
5	359	-95	9	5124	0	-0	260	1299	603	-581	64	779
6	-221	95	-12	3769	-0	0	-305	-2211	-679	1594	-44	-849
7	348	-593	727	2829	260	-305	0	338	2713	-1272	714	2559
8	3158	-1981	3660	704	1299	-2211	338	0	5023	5281	990	954
9	2883	-1120	843	3846	603	-679	2713	5023	0	-376	2635	2153
10	-901	454	-130	-3602	-581	1594	-1272	5281	-376	0	-4678	-5060
11	1771	-2071	653	-4027	64	-44	714	990	2635	-4678	0	266
12	2923	-3829	3756	-5263	779	-849	2559	954	2153	-5060	266	0

BRENDA PROBABILITIES GRID 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	-201	431	4645	438	-47	521	-3728	2371	-4775	934	673	-695	2987	-1555	-76	1309	-333
2	-201	0	-2	-2438	-55	0	-616	5169	-366	1434	-265	-57	50	-1160	1462	310	-197	226
3	431	-2	0	3123	32	-4	1373	-4479	209	-426	238	54	-91	2047	-950	-175	730	-264
4	4645	-2438	3123	0	2934	-3706	61	24	1601	3147	1687	1288	2914	26	650	5083	108	2934
5	438	-55	32	2934	0	-18	804	3757	289	-2208	14	5	-795	1221	-1514	-22	957	-1368
6	-47	0	-4	-3706	-18	0	-700	4417	-256	1692	-134	-24	36	-1921	577	92	-487	84
7	521	-616	1373	61	804	-700	0	111	2087	2800	305	227	-4742	11	2790	-1084	21	-4619
8	-3728	5169	-4479	24	3757	4417	111	0	4026	1180	1154	2665	984	19	458	-5086	586	309
9	2371	-366	209	1601	289	-256	2087	4026	0	-595	169	100	-1648	1756	-1677	-847	2378	-1615
10	-4775	1434	-426	3147	-2208	1692	2800	1180	-595	0	5379	-1218	1468	1660	1559	2190	4620	320
11	934	-265	238	1687	14	-134	305	1154	169	5379	0	42	-1816	205	-1981	-46	550	-3873
12	673	-57	54	1288	5	-24	227	2665	100	-1218	42	0	-1301	815	-2496	-119	729	-1006
13	-695	50	-91	2914	-795	36	-4742	984	-1648	1468	-1816	-1301	0	5337	242	1459	-3555	61
14	2987	-1160	2047	26	1221	-1921	11	19	1756	1660	205	815	5337	0	1591	-2503	142	3151
15	-1555	1462	-950	650	-1514	577	2790	458	-1677	1559	-1981	-2496	242	1591	0	1412	4657	191
16	-76	310	-175	5083	-22	92	-1084	-5086	-847	2190	-46	-119	1459	-2503	1412	0	-1413	1443
17	1309	-197	730	108	957	-487	21	586	2378	4620	550	729	-3555	142	4657	-1413	0	-4158
18	-333	226	-264	2934	-1368	84	-4619	309	-1615	320	-3873	-1006	61	3151	191	1443	-4158	0

(ii) Median tests of construct diversity.

The exact probability submatrices for elicited constructs in the two case-studies above (C1 - C6, $Grid_1$; C7 - C12, $Grid_2$; C13 - C18, $Grid_3$), comprising a total of $3(n(n-1)/2) = 45$ probabilities, were examined to locate (a) median probabilities for each testing occasion, and (b) median probabilities for the entire grid series (Tom, median p = .215; Brenda, median p = .146). Probability frequencies were then tabulated, as follows, and chi-squared computed.

Tom	$Grid_1$	$Grid_2$	$Grid_3$	
Median	.302	.118	.095	Total
> .215	12	5	5	22
< .215	3	9	10	22
Total	15	14	15	44

$\chi^2 = 3.21$, df = 2, $p < .02$

Brenda	$Grid_1$	$Grid_2$	$Grid_3$	
Median	.106	.215	.146	Total
> .146	7	8	7	22
< .146	8	7	7	22
Total	15	15	14	44

$\chi^2 = .13$, df = 2, n.s.

(ii) Kruskal-Wallis tests of centrality.

PCA solutions were computed for all construct sorts in each case-study, and core construct scores computed for constructs elicited on each testing occasion (C1-C6, C7-C12, C13-C18) by the method described in Appendix D. As core construct scores were comparable between occasions, the 18 scores were ranked and Kruskal-Wallis H computed.

Tom	$Grid_1$	$Grid_2$	$Grid_3$
Construct 1	18	2	11
2	13	9	10
3	6	8	16
4	17	4	3
5	12	7	5
6	15	1	14
R_j	81	31	59
Mean score	1.458	1.969	1.690
Standard deviation	.297	.215	.234

H = 7.345, df = 2, $p < .05$

Brenda	$Grid_1$	$Grid_2$	$Grid_3$
Construct 1	12	10	7
2	14	2	5
3	16	6	9
4	15	4	13
5	18	1	11
6	17	3	8
R_j	92	26	53
Mean score	.684	1.285	.944
Standard deviation	.122	.315	.101

H = 12.377, df = 2, $p < .01$.

(b) Tests of the elaboration of the conversational domain.

To test for shifts of attention in construction over the grid series loadings of elicited constructs over the three testing occasions were tested on the first five components of PCA solutions in each case-study. A Kruskal-Wallis analysis of variance was calculated for each component but as is evident from the following tables, no component attained significance ($\alpha = .05$, df = 2, critical value of $H = 5.99$).

Tom Construct	Components 1	2	3	4	5
1	.45 17	1.14 8	1.00 9	1.83 2	.50 10
2	3.06 1	.09 17.5	.22 17	.63 10	.35 15
3	2.43 5	1.62 5	.33 15	.40 11	.79 7
4	.17 18	1.61 4	.60 13	1.95 1	.78 8
5	2.99 2	.32 14	.26 16	.04 18	.28 14
6	.82 15	2.21 2	1.66 5	.89 7	.76 9
Mean/R_j	1.65 58	1.17 50.5	.69 75	.96 49	.59 63
7	1.53 13	1.15 7	1.95 1	.16 17	.97 5
8	2.52 4	.65 12	1.10 7	.83 8	1.49 1
9	1.74 12	.33 13	1.80 3	1.13 6	.10 18
10	2.80 3	.17 16	.69 12	.17 16	1.21 3
11	.46 16	2.27 1	.03 18	1.77 3	.49 11
12	2.29 8	1.20 6	.99 10	.35 13	1.27 2
Mean/R_j	1.89 56	.97 55	1.09 51	.74 63	.92 40
13	2.35 6	1.05 9	.45 14	.36 12	1.15 4
14	2.24 9	.09 17.5	1.93 2	.29 14.5	.88 6
15	1.04 14	1.64 3	1.09 8	.29 14.5	.11 17
16	2.30 7	.86 11	1.71 4	1.14 5	.21 16
17	2.19 11	1.04 10	1.19 6	1.23 4	.41 13
18	2.23 10	.12 15	.72 11	.75 9	.46 12
Mean/R_j	2.06 57	.80 65.5	1.18 45	.68 59	.54 68
H	.032	.713	2.947	.628	2.629

Brenda Constructs	Components 1	2	3	4	5
1	1.21 17	1.49 7	.75 9	.03 17	2.47 1
2	2.79 3	.71 14	.14 15	.79 6	1.00 4
3	2.83 1	.10 18	.60 11	.61 10	.89 7
4	.17 18	2.57 2	1.79 2	.62 9	.49 11.5
5	2.32 8	.89 11	1.74 3	.58 11	.05 18
6	2.58 5	.16 17	.05 18	1.47 2	.96 6
Mean/R_j	1.93 52	.99 69	.85 58	.63 55	.93 47.5
7	2.82 2	.88 12	.08 17	.68 7	.68 9
8	1.55 15	2.78 1	.12 16	.02 18	.36 13
9	2.00 9	.48 16	1.08 6	1.63 1	.82 8
10	1.95 12	1.04 10	1.66 4	.96 5	.93 5
11	2.42 6	.49 15	2.08 1	.24 13	.20 15
12	1.81 13	1.10 9	1.31 5	1.29 3	1.55 2
Mean/R_j	2.09 57	1.13 63	1.06 49	.79 47	.77 52
13	1.99 10.5	1.96 6	.42 13	.49 12	.49 11.5
14	1.99 10.5	2.46 4	.17 14	.12 14.5	.17 16
15	1.20 16	2.48 3	.62 10	.10 16	.07 17
16	2.59 4	.76 13	1.02 7	.12 14.5	.27 14
17	2.34 7	1.45 8	.48 12	1.17 4	1.24 3
18	1.80 14	2.12 5	.92 8	.65 3	.55 10
Mean/R_j	1.82 62	1.87 39	.61 64	.44 69	.47 71.5
H	.312	2.968	.687	1.471	1.924

(c) Tests of the emergence of higher-order control

Emergence of control over modelling was equated with increasing accuracy of prediction of the functional ordering of constructs and elements. The rank ordered Level 1 variables were correlated on each testing occasion with subject's anticipated rankings using Spearman's rank-order correlation coefficient. To test for the significance of differences between correlations on successive testing occasions Fisher's z transformation was applied to the correlations with a standard error of $\sqrt{(1/N_1 - 3) + (1/N_2 - 3)}$. The following table lists the coefficients for the two case-studies, z values in brackets.

Variables	Tom			Brenda		
	$Grid_1$	$Grid_2$	$Grid_3$	$Grid_1$	$Grid_2$	$Grid_3$
ELEMENT CENTRALITY	.294 $(.303)_a$	.584 $(.669)_a$	.937 $(1.713)_a$	.075 $(.075)_a$	.790 $(1.071)_a$	.927 $(1.637)_a$
CONSTRUCT CENTRALITY (ALL CONSTRUCTS)	-.371 $(-.390)_{be}$	-.007 $(-.007)_{bc}$	.711 $(.889)_{be}$	-.036 $(-.036)_{be}$	.237 $(.295)_{bc}$	.496 $(.544)_{be}$
CONSTRUCT CENTRALITY (ELICITED CONSTRUCTS)		.436 $(.531)_d$	.657 $(.783)_d$		.143 $(.144)_d$	.257 $(.263)_d$
ELEMENT RECONSTRUCTION		.203 $(.206)_a$	.301 $(.311)_a$		.730 $(1.045)_a$	.333 $(.404)_a$
CONSTRUCT RECONSTRUCTION (ALL CONSTRUCTS)		.200 $(.203)_b$	.837 $(1.211)_b$		.600 $(.693)_b$	.442 $(.475)_b$
CONSTRUCT RECONSTRUCTION (ELICITED CONSTRUCTS)			.814 (1.139)			.600 (.693)

Standard errors: (a) .471; (b) .667; (c) .422; (d) .816; (e) .632.

APPENDIX H

The aggregate grid.

H 1. A pilot application.

The aggregate grid analysis was applied to a pilot case-study comprising two male subjects, A & B, completing a six-fold repertory grid cycle yoked by element sample and by testing occasion. The element sample comprised the names of four mutual friends and subjects A and B. On each of the six testing occasions four constructs were elicited and constructs from previous occasions reapplied. Constructs were elicited by the modified Full Context Form (see Appendix E) and elements rated on five point scales formed by each construct. Following the completion of the cycles, a cumulative aggregate PCA solution was obtained (listed on the following pages) and root mean square loadings of constructs for each subject calculated for each testing occasion on the first three aggregate components, listed in the following table.

components	Subject A			Subject B		
	1	2	3	1	2	3
Occasions						
1	1.544	.804	.697	1.180	1.317	.947
2	1.470	1.141	.376	1.553	1.080	.783
3	.793	1.663	.851	1.653	1.113	.655
4	.999	.954	1.436	1.609	.914	.856
5	1.329	.952	1.184	.621	1.010	1.595
6	2.140	.735	.722	1.414	1.135	.662

AGGREGATE GRID SUBJECT A

ITEM	VECTORS 1.	2.	3.	4	5
1	0.1756	0.4627	0.5606	0.4364	-0.2545
2	0.2148	-0.1194	-0.6940	0.2896	-0.4555
3	-0.2538	0.6221	-0.2785	-0.5134	0.1792
4	0.0732	-0.1950	-0.0761	0.3691	0.8045
A5	0.5365	-0.3753	0.2757	-0.5708	-0.0625
B6	-0.7514	-0.4221	0.2142	-0.0110	-0.2111

CASE	LOADINGS 1.	2.	3.	4	5
CASE 1					
1	-2.0535	-0.8096	0.5241	-0.1214	0.0899
2	0.0845	0.8324	1.1397	-1.6618	-0.3019
3	-1.9465	0.4909	-0.1245	-1.0154	-0.0618
4	1.2346	0.9755	0.7242	-1.2914	-0.5408
CASE 2					
1	-1.7272	-0.9339	0.1998	0.3142	0.9933
2	1.2133	1.1531	0.9529	-0.9423	-0.0251
3	-1.9465	0.4909	-0.1245	-1.0154	-0.0613
4	1.3814	0.3289	1.4266	-0.3493	-0.4765
5	-1.5660	1.2928	0.0198	0.5412	-0.7635
6	-2.0506	-0.1035	-0.0743	-0.4805	0.7395
7	-1.1224	1.5291	-0.2354	-0.5460	-0.9103
8	0.6952	0.9822	-0.7092	1.7055	0.3743
CASE 3					
1	-1.5376	-0.5940	-0.0049	-0.3575	1.5013
2	0.8124	0.4311	0.1651	-1.4719	1.3339
3	-1.8293	0.1334	-0.0320	-1.2347	0.3299
4	0.7365	-0.8354	0.0052	-1.3122	-0.1320
5	-1.5660	1.2928	0.0198	0.5412	-0.7635
6	-2.0717	-0.0195	-0.3503	-0.0282	0.4401
7	-1.6110	1.4320	0.2476	0.1703	0.3216
8	-1.4492	0.0357	-1.0333	1.1527	0.3149
9	1.4004	-1.6438	-0.8996	-0.5713	-0.5613
10	-0.1931	1.7756	-0.8255	0.7494	-0.7517
11	0.0518	-1.9553	-0.4611	-0.3370	-0.9136
12	1.5199	-0.0296	-1.0933	-0.6816	-0.5147
CASE 4					
1	-1.3649	-0.3482	-1.7060	-0.2298	0.2290
2	0.3755	0.3347	1.1265	-0.6380	1.5412
3	-1.9465	0.4909	-0.1245	-1.0154	-0.0618
4	1.3814	0.3289	1.4266	-0.8493	-0.4765
5	-1.1727	0.0742	-0.6955	-0.3130	-1.6079
6	-1.3971	-0.2073	-0.1112	-0.2560	1.1314
7	-1.5204	1.2930	0.0327	-0.0304	-0.7344
8	-0.2249	0.7036	-1.8364	0.5407	0.8845
9	0.4562	-2.0976	-0.3495	0.0157	0.5198
10	-0.2268	1.0970	-0.6783	0.4164	-1.1980
11	-0.9564	-1.4485	0.8053	-1.1566	-0.0294
12	1.3933	-0.0835	-0.7922	-0.3295	-0.9586
13	-1.0115	1.1926	-0.8407	0.2047	-1.3439
14	1.4545	-1.0270	-1.1597	-0.1056	-0.0133
15	0.8663	0.6898	1.6321	-0.8585	-0.6108
16	0.3138	-0.8309	-1.8790	-0.7313	0.3765
CASE 5					
1	-1.5979	-0.2398	-0.5273	-0.4345	1.3814
2	-1.0212	-0.1461	1.5486	-0.7272	1.4325
3	-1.7643	0.2292	0.0084	-1.3510	-0.0963
4	1.0973	-0.2714	1.7079	-0.3624	-0.6993
5	-0.8099	0.4035	-0.5184	-0.8323	-1.7932
6	-1.9251	-0.2934	-0.5231	-0.1086	0.9535
7	-1.5373	1.2550	0.9354	0.0086	-0.1671
8	-1.2249	0.7036	-1.8364	0.5407	0.8143
9	-1.0721	-1.9726	-0.1048	-0.5741	-0.8731
10	0.0906	1.5414	-0.9985	-0.0973	-1.2439
11	-0.6134	-1.1973	0.8052	-1.5344	-0.4359
12	1.5915	-1.8474	-0.8165	-0.9485	-0.3853
13	-1.2747	0.6650	-1.1095	-0.3727	-1.0329
14	1.6373	-0.7345	0.6207	-1.0051	-0.0197
15	0.7457	1.4493	1.2495	-0.5605	0.0792
16	1.2132	-1.0533	-1.3791	-0.4461	0.2791
17	1.3649	0.3432	1.7060	0.2298	-0.2290
18	-1.0963	1.7636	-0.2074	0.6173	-1.1969
19	-1.9465	0.4909	-0.1245	-1.0154	-0.0618
20	1.1871	0.4339	1.6153	0.8229	0.2353
CASE 6					
1	-1.6924	0.0220	-0.2563	-0.2834	1.4105
2	2.1142	0.0793	0.4557	0.5631	-0.0256
3	-1.7643	0.2292	0.0084	-1.3510	-0.0963
4	1.3814	0.3289	1.4266	-0.3493	-0.4765
5	-1.1905	1.1043	-0.3327	0.3905	-1.4367
6	-1.8751	-0.6947	-0.3312	0.1998	0.9015
7	-1.6249	1.5128	0.6527	0.1649	-0.4279
8	-1.4568	0.0290	-1.5133	0.5308	0.5524
9	0.3630	-1.5998	-0.5087	-0.5672	-1.3254
10	-0.3456	1.8416	-0.7545	0.0659	-0.9431
11	-0.0422	-1.5935	-1.5216	-0.3673	0.0954
12	1.4550	-0.9530	-0.8138	-0.5446	-1.0032
13	-1.2723	1.2244	-1.4262	-0.3834	-0.7424
14	1.3142	-0.9193	0.6704	-1.3981	-0.1531
15	0.2875	1.5279	1.1405	-1.0705	-0.3639
16	-0.8749	-0.7174	-1.0934	-0.0709	-0.9206
17	0.7733	0.9709	1.5706	0.7335	-0.6744
18	-1.1162	1.4009	1.1687	0.1960	-0.6224
19	-1.7968	-1.2066	0.4677	0.2776	0.1413
20	1.1905	-1.1943	0.3827	-0.3905	1.4367
21	1.6373	-0.7345	0.6207	-1.0051	-0.6197
22	1.3884	-1.0537	0.6559	-1.1947	0.3460
23	-2.0231	-0.0147	-0.2197	0.1610	0.9015
24	-1.5940	0.7170	-1.1169	0.7757	-0.3100

AGGREGATE GRID SUBJECT B

CASE 7

1	-1.2730	-1.4372	-0.1607	-0.0222	-1.1347
2	1.0763	-1.2790	-1.4506	0.0187	0.2400
3	1.6080	0.5730	-1.1871	-0.7478	0.3426
4	1.4037	1.7030	0.2170	0.4707	1.2332

CASE 8

1	-2.1380	0.2962	0.3079	-0.4737	0.1430
2	1.4545	-1.0270	-1.1597	-0.1056	-0.6383
3	1.3363	1.2359	-1.2787	-0.1845	0.1351
4	1.0762	0.5986	-0.7054	-1.3753	1.4650
5	-1.5550	0.8223	-0.2198	-1.2827	-0.4577
6	-1.3094	1.1543	0.8342	-0.1597	1.1098
7	-1.5050	-1.2965	1.0072	0.1297	-0.2425
8	1.8002	-1.0768	-0.7108	0.2208	0.0457

CASE 9

1	-2.0345	-0.6612	0.3610	-0.3478	-0.4152
2	1.3117	-1.5737	-0.8934	-0.3150	0.0685
3	1.3363	1.2359	-1.2787	-0.1845	0.1351
4	-0.0775	1.6903	-0.7682	-1.1192	0.5479
5	1.2248	1.5179	-0.5106	-0.8095	-0.5290
6	-1.8568	-0.4415	0.6246	0.9833	-0.0152
7	-1.3137	-1.2972	1.3753	-0.3892	-0.7305
8	1.8002	-1.0768	-0.7108	0.2208	0.0457
9	-1.7518	-1.2927	0.0560	0.3969	-0.3198
10	-1.8406	-1.0339	0.5246	-0.0269	-0.5171
11	-1.6648	0.1166	-0.7474	-1.1385	-0.6902
12	-1.3057	-1.4129	-0.9389	0.3254	-0.3298

CASE 10

1	-2.0345	-0.6612	0.3610	-0.3478	-0.4152
2	-0.5520	-1.7148	-0.9259	0.9116	0.2531
3	-0.3757	-1.5550	-0.2674	1.0520	-1.1236
4	0.3333	0.7445	-0.2878	-1.3282	0.9521
5	-0.6216	1.5409	-0.6821	-1.2575	0.4349
6	-2.1034	0.1736	0.2032	-0.2506	0.6415
7	-0.3773	-2.1436	0.4228	0.2491	0.1467
8	1.8002	-1.0768	-0.7108	0.2208	0.0457
9	-1.9420	-1.3850	-0.5435	0.1451	-1.2983
10	-1.7763	-0.9141	0.8658	0.4916	-0.1900
11	-1.2334	-0.5632	1.0480	1.9216	-0.1436
12	-1.5105	0.0761	-1.5251	-0.2792	-0.5611
13	-1.6135	-0.4709	-1.2025	-0.5919	-0.0715
14	-1.8406	-1.0339	0.5246	-0.0269	-0.5171
15	-1.8223	0.6025	-0.3126	-0.9805	0.5770
16	-1.0120	-1.2998	-1.0555	0.9421	-0.5323

CASE 11

1	-2.0833	0.0323	0.5371	-0.3959	-0.4622
2	0.1514	-2.1529	-0.5464	0.1490	0.1458
3	0.9036	0.2453	-1.2757	-1.4507	-0.0137
4	-0.0754	0.9370	-1.8831	-0.4334	-0.5352
5	-0.6216	1.5409	-0.6821	-1.2575	0.4349
6	-1.5469	1.4533	0.0587	-0.2369	0.0725
7	-1.2738	-1.3753	1.0190	0.6310	0.1079
8	1.5230	-1.3243	-0.1915	-0.4117	-0.8487
9	-1.7111	-0.8370	0.9641	0.6609	-0.0713
10	-1.7164	-0.0470	0.9935	0.3332	-0.7530
11	0.7494	-0.0542	1.3662	0.6834	1.2949
12	-1.4733	-1.0155	0.2648	0.0299	-0.3791
13	-1.2532	-0.6925	-1.0822	-1.2754	0.4355
14	-1.8406	-1.0339	0.5246	-0.0269	-0.5171
15	-2.0221	0.2759	-0.3517	-0.7727	0.1103
16	-1.4521	1.1754	1.1725	-0.2972	-0.2169
17	0.7645	-0.6630	1.9161	-0.3338	-0.3856
18	-0.5675	0.6038	1.4912	-1.2735	-0.6757
19	0.2668	0.5566	1.8560	0.6223	-0.3871
20	-0.7525	-1.7134	0.9147	-0.7021	-0.1299

CASE 12

1	-1.1031	-0.5834	1.0199	1.2934	0.8443
2	1.0566	-1.8429	0.3464	-0.9246	0.8002
3	-1.9279	0.4905	-1.0028	0.1547	0.2974
4	1.0496	1.5539	-0.8167	-0.8415	1.1257
5	-0.8558	0.5531	-0.1928	-1.6464	1.1312
6	-0.8237	-1.6769	0.5593	0.1480	1.1454
7	-1.3499	-1.1759	1.7028	0.3565	0.2739
8	0.8418	-1.7426	-0.6996	-0.3566	-0.1773
9	-1.1178	-1.0725	0.6398	-1.4782	0.0301
10	-1.8406	-1.0339	0.5246	-0.0269	-0.5171
11	-1.9204	-1.6398	0.0100	-0.3715	-1.1516
12	-1.5370	-1.0453	-0.9711	0.6367	0.2013
13	-1.6359	-1.4101	-1.4445	-0.4270	1.5313
14	-1.8273	-1.1755	0.4373	0.2030	-0.0249
15	-1.9964	0.3205	-0.1687	-0.8751	0.5427
16	-1.5373	1.2560	0.9354	0.0036	-0.1471
17	0.0754	-0.9370	1.8831	0.4334	0.5352
18	-1.0612	0.1736	0.6770	0.5270	-1.2155
19	0.9178	-1.4253	0.2920	-1.2264	-0.7307
20	0.3240	-1.8576	-0.9767	0.5947	0.5556
21	-1.5715	-1.0943	0.0565	-1.1370	-0.1719
22	-1.2237	-0.4126	0.8566	-1.6073	0.0359
23	-1.6899	-1.7390	0.9494	-0.0769	-0.6428
24	-1.4134	-0.7628	0.3389	1.1718	-0.9627

H 2 The status of aggregate components

To examine the relationship between components obtained in aggregate and individual grid solutions, the PCA solutions for the case-study reported in Chapter 4.1. (Jack & Jill) for the entire grid series were examined. The following tables list the vectors for the common element sample and their ranking from the highest negative to highest positive vector on significant components in Jack's (H) and Jill's (W) individual solutions, and on significant components (HW) in the aggregate solution. Vectors are listed to three places, decimal point omitted. Vector rankings were then correlated using Spearman's rank-order correlation coefficient, and tabulated on pages 533 and 535.

Element	PC_1^W	PC_2^W	PC_3^W	PC_4^W
1	015 5	772 1	-079 5	-466 1
2	457 8	-324 8	-077 6	-205 3
3	-461 1	-159 7	323 8	019 6
4	246 7	006 4	797 9	-036 5
5	065 6	-452 9	-132 4	-251 2
6	464 9	082 3	-352 1	243 8
7	-338 2	-031 5	-215 2	-169 4
8	-011 4	222 2	-005 7	760 9
9	-335 3	114 6	-210 3	098 7

Element	PC_1^H	PC_2^H	PC_3^H	PC_4^H	PC_5^H
1	-087 4	325 9	-673 1	031 5	495 9
2	351 8	156 6	213 8	756 9	-064 3
3	-606 1	-027 3	179 6	123 7	-266 2
4	143 6	253 7	-245 3	-327 2	-735 1
5	144 7	-567 2	039 5	099 6	048 6
6	502 9	262 8	212 7	-244 3	103 7
7	-110 3	084 4	539 9	-440 1	356 8
8	104 5	-622 1	-267 2	-140 4	007 4
9	-433 2	134 5	035 4	155 8	025 5

ELEMENT	PC_1^{WH}	PC_2^{WH}	PC_3^{WH}	PC_4^{WH}	PC_5^{WH}
1	-011 4	-733 1	-289 2	-169 3	-374 2
2	432 8	184 7	414 9	027 5	-522 1
3	-523 1	063 5	240 8	294 8	-067 5
4	214 7	-275 2	191 7	649 9	470 9
5	034 6	531 9	-187 3	053 6	-135 3
6	487 9	-050 3	089 4	-403 2	329 7
7	-293 3	102 6	156 6	-516 1	429 8
8	021 5	215 8	-748 1	153 7	094 6
9	-401 2	-022 4	156 5	-189 4	-168 4

H 3 A pilot case-study; Jack and Jill.

Subjects S6 and S7 of the reconstruction grid sample (Appendix F1) correspond to Jack and Jill, and details of the format of their repertory grid cycles may be found in that appendix. It is important to note, however, that the cycles were yoked by testing occasion (five over a 60 day period; days 1,2,5, 23 and 60) and by element sample (comprising seven mutual acquaintances and themselves). Constructs were elicited (four on each occasion) by the modified Full Context method, and previously elicited constructs were reapplied on each occasion. Elements were ranked from the similarity pole, and ranking form grids for the subjects are tabulated on page 863. Verbatim construct descriptions are listed below. The descriptions were abbreviated in the case-study report of Chapter 4.1.

Jack Verbatim construct descriptions

Similarity pole (Rank position 1)	Contrast pole (Rank position 9)
1. "emotionally remote, distant"	"emotionally present, in touch"
2. "socially self-conscious and nervous"	"socially confident, competent"

3.	"less articulate, (have difficulty with words")	("articulate, good command of a referential vocabulary")
4.	("often) serious and humourless"	("mainly jokey and)funny socially"
5.	("consientious) can be relied (up)on (for some certain things")	("forgetful), careless,(difficult to rely on")
6.	"warm-hearted, loving, can feel for other people"	"icy, stand-offish, frightened, and snooty"
7.	"guarded, inhibited, believe in being tactful"	"a bit tactless, innocent, guileless out-front"
8.	("relish things going wrong, so that they can) punish themselves and other people"	"hopeful"
9.	("talk first and listen later, if at all), find it easy to talk but hard to listen"	("listen first, talk later), find it (easy to listen but) hard to talk"
10	("very susceptible to games invented by others), easily led on"	"plays games with other people, (without knowing about it at the time")
11	"find participating with others easy"	"find participating difficult, stand-offish"
12	"try to be tactful, (but only imagine possible misconstructions of their actions")	("so open that they are) often (tactless and) get into trouble"
13	"prefer to change their circumstances and other people's minds to suit their values"	"prefer to change their values to suit their circumstances and other people"
14	("forthright,) challenging (through being overt), refusing to let things pass unsaid"	("avoid referring to things,)(avoid the challenge by) pretending things (were never said or) never happened"
15	"a bit weak, cannot resist an invitation to play some game, help-less in the face of strong invitations to collude"	"realise what's going on, but become self-conscious when trying to resist colluding with someone"
16	"vituperative, always gossiping about some poor unfortunate, conspiring behind their back"	"less articulate about other people taciturn"
17	"get frustrated and give up (without having really tried")	"stay with it to the point of (becoming obsessed")
18	"give in to their slightest whim"	"slow, methodical, reasoning"
19	"get touchy with other people when they can't keep up"	"stay with other people until they can catch up"
20	"stuck-up, hyper-critical, snobbish"	"try to accept things and other people in their own terms"

Jill Verbatim construct descriptions

	Similarity pole (Rank position 1)	Contrast pole (rank position 9)
1	"issues resolved via grey matter"	"issues resolved via red matter"
2	"soul sincere"	"soul sham"
3	"robust strength"	"weak, indicisive"

4	"tolerant and wide, goes with flow"	"competitive and choosy"
5	"free"	"tied, bound"
6	"guileless"	"wilfully artful, guile"
7	"cannot go too far with or will put you in place"	"can go quite far with"
8	"tolerant"	"blind, onesided"
9	"prepared to listen and understand others"	"gets bored with others unless it has any relevance to self"
10	"confident about sexuality, therefore prepared to treat all as equal"	"not confident about own sexuality, therefore always trying to flog it"
11	"coherent in words"	"less coherent"
12	"the way there is often more enchanting than the end, to do with being relaxed in circumstances"	"there must be an end in order to precipitate the way to it"
13	"strong individualists, no messing, stubborn"	"flexible, go with the flow in order to be in"
14	"high ideals about self, not talking about ideals with others, just personal one"	"not such high ideals about self not pushy about self"
15	"do certain things to gain attention exaggerate events, emotions etc., as above, collude with others then blame others for collusion"	"do same things but much smaller scale, know when enough is enough"
16	"do not choose as such but still bear dislike for neurotics etc. therefore try to avoid, or at least disclose"	"chooses associates etc. carefully so as not to confront real self"
17	"concept of 'romantic'"	"concept of 'industrial'"
18	"truth will out"	"truth can be constructed"
19	"warm welcoming"	"cool reception"
20	"carry things through"	"lose impetus"

H4 Principal components analyses of individual and aggregate grids.

Following the completion of the repertory grid cycles, cumulative PCA solutions were obtained for Jack's and Jill's individual grids, and for their combined aggregate grids. The following pages list these solutions together with the application of core grid transformations described in Chapter 3.2. As may be seen, more of Jill's components are explicitly self-relevant. The component obtaining the highest vector for the element JILL (component 1) was designated a core component. Similarly, in the aggregate grid solution, no components attained Jill-relevance at the 50% level. Consequently, the component with the highest vector for the element JILL (component 1) was designated core to Jill's self-definition. In the aggregate PCA listing, cases 1,3,5,7 and 9 represent Jill's grids, the remaining cases Jack's grids.

(a) JACK CUMULATIVE IG P.C.A.

COMPONENT	ROOT	AS PER CENT
1	192.4207	40.088
2	95.1439	19.822
3	60.7609	12.659
4	48.8001	10.167
5	36.5630	7.617
6	22.9378	4.779
7	15.0353	3.132
8	7.8248	1.630

ITEM VECTORS

ITEM	1.	2.	3.	4	5
1	-0.0372	0.3245	-0.6732◀	0.0308	0.4951
2	0.3516	0.1061	0.2132	0.7536◀	-0.0641
3	-0.6036◀	-0.0266	0.1790	0.1227	-0.2657
4	0.1426	0.2533	-0.2445	-0.3268	-0.7365◀
5	0.1443	-0.5668◀	0.0385	0.0993	0.0478
6	0.5015◀	0.2624	0.2120	-0.2441	0.1031
7	-0.1093	0.0842	0.5392◀	-0.4396	0.3564
8 JACK	0.1043	-0.6222◀	-0.2667	-0.1403	0.0070
9 JILL	-0.4327	0.1338	0.0347	0.1545	0.0249

CASE LOADINGS

CASE	1.	2.	3.	4	5
CASE 1					
1	2.2271◀	0.3129	-1.2520	-0.2129	0.7578
2	2.4162◀	-0.1067	-0.5040	0.6331	-0.6111
3	-1.4172	-1.9581◀	0.2447	1.0031	-1.0067
4	1.9632◀	-1.2374	0.8782	0.9902	0.3746
CASE 2					
1	2.5711◀	-0.6052	-0.1936	0.3449	0.5275
2	2.3617◀	-0.4413	-0.4003	1.1538	-0.3365
3	-1.4095	-1.8537◀	-0.4766	0.6941	-1.2158
4	1.4207	-1.9529◀	0.7661	0.6739	0.0425
5	0.6724	-1.5919◀	1.2699	-1.5659	-0.2967
6	-2.3571◀	-0.4554	-0.3628	-0.4167	-0.8140
7	2.3214◀	-0.8351	-0.6926	-0.2469	0.7577
8	2.1910◀	0.2675	0.6983	-0.4544	-1.3764
CASE 3					
1	1.9554◀	-1.4493	-1.2094	-0.5664	0.4427
2	2.5428◀	-0.4109	-0.2687	0.9414	-0.1594
3	-1.4236	-1.8996◀	-0.3094	1.0894	-0.9710
4	1.8250◀	-1.7939	0.6558	-0.5538	0.3787
5	0.4349	-1.5653	1.0407	-1.8613◀	-0.1730
6	-2.6029◀	-0.0911	-0.7720	-0.4698	0.2172
7	1.0352◀	-1.0607	-1.5696	-0.3161	0.7789
8	1.7654◀	-0.1473	0.7966	-0.2080	-1.6558
9	0.1262	2.3161◀	-0.5538	-1.0183	-0.4441
10	-1.4123	-0.7361	-1.7861◀	-0.5372	1.0032
11	-2.6501◀	0.1195	0.1879	-0.5759	0.3239
12	1.7527	-0.2085	-1.8346◀	-1.0009	-0.5419
CASE 4					
1	2.3214◀	-0.8351	-0.6926	-0.2469	0.7577
2	2.2356◀	-0.5119	-0.1418	1.1969	-0.5583
3	-1.4929	-1.3443◀	-0.3545	1.3074	-0.5071
4	1.5573◀	-1.4065	1.0748	0.1359	0.8352
5	0.2173	-1.8434◀	1.6349	-0.9299	0.2756
6	-2.2472◀	-0.0137	-0.8991	-0.0048	-0.2331
7	1.2616	-1.5659◀	-1.1924	-0.6821	0.0308
8	2.2945◀	0.6335	-0.5609	-0.6847	-0.9358
9	0.7605	2.4708◀	-0.6854	-0.4255	0.1521
10	0.5201	-0.6457	-2.1723◀	-1.3403	-0.7940
11	-2.6253◀	0.3721	0.3635	0.1102	0.2369
12	1.2390	-1.6004◀	-1.2516	-1.1462	-0.0291
13	-0.2708	-2.1131◀	0.9110	0.3273	1.0014
14	-1.7176◀	-0.2117	1.0020	-0.5352	-1.5756
15	-0.5285	1.4238◀	-0.6254	1.4111	-0.9570
16	1.3637	2.1992◀	0.9402	-0.1065	0.1801
CASE 5					
1	2.4700◀	-0.6669	0.0924	0.3037	0.9259
2	2.4218◀	0.0609	0.3372	0.5941	-0.9331
3	-1.6137	-1.7786◀	-0.6506	0.9364	0.2672
4	1.8507◀	-1.5991	1.1418	-0.5582	0.1350
5	-1.3036	-1.0793	1.0729	-1.4541◀	0.8625
6	-2.1942◀	-0.5015	-1.2572	-0.0048	-0.1007
7	1.8262◀	1.2012	-0.8148	-1.4188	0.9361
8	1.8460◀	0.7227	1.0438	-0.5551	-1.3535
9	1.1496	2.2000◀	-0.5588	0.2681	0.0659
10	-0.6731	-0.9272	-2.1391◀	-1.0340	-0.6064
11	-2.5731◀	-0.3502	-0.4458	-0.1393	0.5324
12	1.4919	-0.0107	-1.5327	-1.6341◀	-0.2757
13	-1.4575	-1.2345	1.0631◀	-0.5928	0.7333
14	-1.7867◀	0.2468	1.4229	-0.9351	-1.0592
15	0.0133	-0.9139	-1.5021	1.7033◀	-0.0630
16	1.6500	2.0083◀	0.4917	0.2037	-0.1793
17	1.0219	-1.0707	0.1786	-1.8033◀	-1.5565
18	-1.6208	-0.4363	-1.2595	-0.7049	-1.5042◀
19	0.5264	-1.7446◀	-0.7581	1.4066	-1.2975
20	2.4685◀	-0.0591	0.6264	-0.0071	-0.9632
	P	C	P	P	P

VARIANCE ACCOUNTED FOR = 90.35%

(b) JILL CUMULATIVE IG P.C.A.

COMPONENT	ROOT	AS PER CENT
1	297.0566	61.887
2	68.1330	14.194
3	45.7990	9.541
4.	27.3371	5.695
5	14.8121	3.086
6	12.7258	2.651
7	8.6575	1.804
8	5.4789	1.141

	1.	2.	3.	4
1	0.0145	0.7715 ◀	-0.0791	-0.4656
2	0.4564 ◀	-0.3242	-0.0765	-0.2045
3	-0.4613 ◀	-0.1592	0.3232	0.0192
4	0.2456	0.0069	0.7973 ◀	-0.0356
5	0.0649	-0.4522	-0.1817	-0.2506
6	0.4039 ◀	0.0617	-0.3524	-0.2477
7	-0.3883	-0.0314	-0.2150	-0.1649
8	-0.0114	0.2217	-0.0054	0.7599 ◀
9	-0.3848	-0.1139	-0.2104	0.0913

CASE LOADINGS

	1.	2.	3.	4
CASE 1				
1	2.2992 ◀	1.2110	-0.6991	0.3116
2	-2.0118 ◀	0.1636	0.7403	0.5726
3	-2.5115 ◀	-0.9939	0.4470	0.5028
4	-1.6155	0.6448	1.6584 ◀	-0.0724
CASE 2				
1	2.1118 ◀	1.6573	-0.1376	0.4439
2	-2.7621 ◀	0.2758	0.0628	0.3371
3	-2.6631 ◀	-0.4699	-0.1913	0.2864
4	-1.4053	1.6189 ◀	1.5496	-0.7303
5	-2.0125 ◀	-0.2951	0.2271	-0.6913
6	-2.1110 ◀	0.9620	0.3910	1.5463
7	-1.9320 ◀	-1.2357	-1.6304	-0.5831
8	-1.8497 ◀	1.6761	0.7919	-0.0377
CASE 3				
1	2.5390 ◀	0.9538	-0.6765	0.1544
2	-2.7621 ◀	0.2758	0.0628	0.3371
3	-2.6432 ◀	-0.7153	-0.2557	-0.0825
4	-1.4053	1.6189 ◀	1.5406	-0.7303
5	-2.4497 ◀	0.7402	0.8352	-0.6934
6	-2.2344 ◀	1.3157	-0.3487	-0.1391
7	-1.4785	-1.5799	-1.5947 ◀	-0.3606
8	-2.1936 ◀	1.6468	0.1476	-0.5918
9	-2.7109 ◀	0.3915	-0.2547	-0.3153
10	-2.0979 ◀	0.8050	-1.1756	-0.5977
11	0.5707	2.0113 ◀	-1.7672	0.4509
12	-2.4641 ◀	-0.5556	1.0054	-0.6210
CASE 4				
1	1.9977 ◀	1.3392	-1.0474	0.3158
2	-2.6559 ◀	0.3502	-0.5535	0.3719
3	-2.6920 ◀	-0.2360	-0.2653	0.2107
4	-2.0724 ◀	1.0771	1.2528	-0.3506
5	-2.7663 ◀	0.1276	0.1635	0.1720
6	-2.2628 ◀	0.7134	-0.2680	1.2133
7	-2.0661 ◀	-1.5397	-0.8004	0.0246
8	-1.7276	2.0174 ◀	-0.0159	0.2882
9	-2.3944 ◀	0.9341	-0.6727	-0.7599
10	-2.2053 ◀	-0.3138	-1.1866	-0.5251
11	1.8792	1.9343 ◀	-1.7166	0.4379
12	-2.6799 ◀	-0.3732	-0.1584	-0.4395
13	-2.1486 ◀	-0.0157	-1.4535	0.2106
14	1.3292 ◀	1.2850	0.2499	1.1224
15	2.3391 ◀	-1.1207	0.2864	0.3211
16	-2.2958 ◀	-0.5922	-0.5271	-0.6306
CASE 5				
1	1.9703 ◀	0.8344	-1.5455	-0.7762
2	-2.7609 ◀	0.2457	0.0645	0.4347
3	-2.6402 ◀	-0.4534	-0.3862	0.3153
4	-2.0667 ◀	0.6430	0.3934	-0.9319
5	-2.7635 ◀	0.0975	0.1652	0.2696
6	-2.2615 ◀	0.6333	-0.2663	1.3009
7	-2.0997 ◀	-1.4765	-1.1917	-0.0152
8	-2.1634 ◀	1.5151	0.0535	-0.7281
9	-2.1560 ◀	1.1971	-0.6214	-0.7706
10	-2.0328 ◀	0.6960	-0.8808	-0.7906
11	0.3126	1.9511 ◀	-1.9403	0.4709
12	-1.9922 ◀	-1.5900	0.3103	-0.1385
13	-2.9931 ◀	-1.2131	-1.0035	0.2573
14	-1.8401 ◀	-0.7154	-0.1118	1.3373
15	2.0186 ◀	-0.5574	0.7753	0.0467
16	-2.0962 ◀	0.4431	0.4203	0.4156
17	1.4565	-0.3451	1.1204	1.9290 ◀
18	-2.3515 ◀	0.5214	-0.5937	1.1707
19	-2.3953 ◀	0.2176	0.3297	0.6381
20	-2.4714 ◀	-1.0125	0.2538	0.6293
	C	P	P	P

VARIANCE ACCOUNTED FOR = 91.32%

(c) CUMULATIVE AG P.C.A.

COMPONENT	ROOT	AS PER CENT
1	475.3972	49.521
2	134.0133	13.960
3	98.1558	10.225
4	87.4934	9.114
5	68.7720	7.164
6	41.2766	4.300
7	30.8777	3.216
8	23.4889	2.447

ITEM VECTORS

ITEM	1.	2.	3.	4	5
1	0.0114	0.7534◀	0.2891	0.1685	0.3735
2	-0.4317	-0.1835	-0.4142	-0.0267	0.5215◀
3	0.5232◀	-0.0625	-0.2403	-0.2938	0.0668
4	-0.2139	0.2746	-0.1910	-0.6492◀	-0.4699◀
5	-0.0344	-0.5514	0.1873	-0.0530	0.1346
6	-0.4366◀	0.0497	-0.0887	0.4029	-0.3236
7	0.2984	-0.1016	-0.1561	0.5163◀	-0.4293◀
8 JACK	-0.0297	-0.2147	0.7477◀	-0.1528	-0.0940
9 JILL	0.4010	0.0223	-0.1559	0.0893	0.1676

CASE LOADINGS

CASE	1.	2.	3.	4	5
CASE 1					
1	-2.2563◀	1.0266	0.2175	0.3601	0.0643
2	2.5972◀	0.0674	0.0970	-0.2794	-0.9575
3	2.4677◀	-1.1124	-0.1777	-0.3708	-0.4230
4	1.0238	1.1445	-0.4908	-0.7061	-1.7362◀
CASE 2					
1	-2.2614◀	0.9928	1.1493	0.6255	0.0159
2	-2.5827◀	-0.2541	0.3925	-0.3483	0.1461
3	1.3613	-1.7296◀	0.3399	-1.4793	0.8433
4	-1.6326	-1.9150◀	0.3446	0.6246	0.5506
CASE 3					
1	-2.1372◀	1.1290	1.1999	0.2582	-0.3329
2	2.7267◀	-0.0575	0.4105	0.2369	-0.4105
3	2.6697◀	-0.7234	0.1730	0.0706	0.4109
4	1.5436	2.0219◀	0.2729	-0.9549	-0.3615
5	2.6097◀	-0.1102	-0.3416	0.1285	-0.3443
6	2.1009◀	0.3108	1.1923	-0.2514	-0.6598
7	1.5263◀	-1.1277	-0.9495	1.5523	0.2599
8	1.9912◀	1.5868	0.9405	-0.6185	0.3270
CASE 4					
1	-2.4691◀	-0.6812	0.7517	0.6465	0.2727
2	-2.5153◀	-0.6355	0.4118	-0.2375	0.6955
3	1.3593	-1.1399	0.7885	-1.3701◀	0.6777
4	-1.1314	-2.3106◀	0.7953	0.2441	0.5088
5	-1.0816	-1.7332	0.5923	0.1301	-1.7993◀
6	2.3065◀	0.1545	0.3263	-1.1222	-0.2347
7	-2.1573◀	-0.3559	1.4327	0.4717	-0.0361
8	-2.1641◀	-0.5901	-0.7967	-0.5904	-1.2665
CASE 5					
1	-2.5732◀	0.6675	0.4682	0.6002	0.2947
2	2.7267◀	-0.0575	0.4105	0.2369	-0.4105
3	2.6465◀	-0.8440	-0.0316	0.1070	0.5126
4	1.5436	2.0219◀	0.2729	-0.9549	-0.3615
5	2.4935◀	0.9398	-0.1943	-0.1727	-0.2305
6	2.2450◀	0.9388	0.5046	0.3009	-0.0073
7	1.2998	-1.7232◀	-0.6568	1.5389	-0.1225
8	2.1752◀	1.4312	0.0539	0.5031	-0.1797
9	2.6318◀	0.2221	0.1857	0.6331	-0.0737
10	1.9351◀	0.7106	-0.0755	1.7488	-0.3920
11	-0.6957	1.2300	1.3889	1.7974◀	0.2709
12	2.5002◀	-0.0704	-0.7739	-0.5447	-0.5309
CASE 6					
1	-1.7375	-0.3317	2.1250◀	0.0346	-0.1967
2	-2.5974◀	-0.6478	0.4425	0.3331	0.5144
3	1.2798	-1.5072	0.7070	-1.6427◀	1.0397
4	-1.3337	-1.8463◀	1.1388	0.6543	-0.0375
5	0.2010	-1.5114	0.9221	0.2759	-1.9934◀
6	2.5974◀	0.8955	0.5975	-0.3907	0.1547
7	-1.5672	0.1022	1.8908◀	0.1067	0.3321
8	-1.8305◀	-1.0322	-0.7637	-0.3364	-1.0503
9	-0.4379	2.1032◀	-0.9177	0.1088	-1.0516
10	1.4266	1.0648	1.9837◀	-0.1260	0.4978
11	2.6822◀	0.3987	-0.3043	0.0535	-0.0574
12	-1.7630◀	0.9313	1.5058	-0.3814	-0.7946

CASE 7

1	-2.0373◀	0.5715	1.5070	0.3335	0.1319
2	2.5450◀	-0.1539	0.4746	0.9169	-0.5401
3	2.5351◀	-0.5396	0.3160	0.4348	-0.3134
4	2.1692◀	1.3336	-0.0446	-0.5693	-0.1702
5	2.7463◀	-0.1427	0.2916	0.0800	-0.1001
6	2.2097◀	-0.0555	1.0070	0.4549	-0.5194
7	2.0532◀	-1.5029	-0.8133	0.5515	0.5366
8	1.0615	1.2788	1.7055◀	0.3618	-0.1745
9	2.2232◀	0.6033	0.4600	1.0582	0.4754
10	2.0995◀	-0.3836	-0.0490	1.2646	-0.1246
11	-0.9422	1.2001	1.2946	1.5991◀	0.6172
12	-2.0931◀	-0.2977	-0.0868	0.1369	0.5581
13	1.9590◀	-1.2922	0.2043	1.4132	-0.3219
14	-1.8276◀	1.1439	0.8492	-0.2607	-0.8796
15	-2.3919◀	-0.7766	-0.6054	-0.6404	-0.1301
16	2.2495◀	-0.6401	0.2255	0.3127	0.4441

CASE 8

1	-2.1573◀	-0.3559	1.4327	0.6717	-0.0061
2	-2.3731◀	-0.8959	0.2493	-0.3164	0.6203
3	1.3338	-1.2534	0.0777	-1.3077	- 1.4494◀
4	-1.1313	-1.7901◀	0.8698	1.3183	-0.0904
5	0.4013	-2.0310◀	0.6795	0.5806	-1.1470
6	2.1171◀	0.9239	0.0822	-0.6272	-0.1315
7	-0.9384	-0.4435	1.7964◀	-0.6106	-0.2717
8	-2.2112◀	-0.1407	-0.7288	-0.2137	-1.3737
9	-1.0530	2.1342◀	-0.8694	0.6025	-0.4116
10	-1.5324	0.9239	1.8279◀	-1.3566	-0.8506
11	2.5522◀	0.3250	-0.8475	-0.0573	0.4777
12	-0.9406	-0.2737	2.0891◀	-0.6301	-0.7206
13	0.7679	-1.8328◀	1.1286	0.6452	0.4302
14	1.6654◀	-0.7993	-1.0750	-1.0773	-0.9228
15	0.0207	1.1369	-1.4602◀	-1.3053	1.1489
16	-1.4263	0.9464	-1.6271◀	1.1261	-0.0705

CASE 9

1	-2.0838◀	0.4931	0.3413	1.5956	0.4737
2	2.7642◀	-0.0123	0.4105	0.0810	-0.1926
3	2.6251◀	-0.6974	0.2038	0.2104	0.4477
4	2.6912◀	0.5348	0.1049	0.1365	-0.4738
5	2.7342◀	-0.0974	0.2917	-0.0759	0.1178
6	2.2472◀	-0.0101	1.0071	0.2990	-0.5014
7	1.9265◀	-1.4362	-0.7517	0.9872	0.4423
8	2.1507◀	1.3771	0.5659	0.4862	0.1675
9	2.1559◀	0.9608	0.6226	0.7753	0.9365
10	1.9521◀	0.9345	-0.4182	1.4116	-0.3113
11	-0.4266	1.1069	1.3709	1.9272◀	0.4660
12	2.0052◀	-1.3013	-0.4127	-0.6516	0.0534
13	1.9756◀	-1.3779	-0.5756	1.0212	-0.2522
14	1.7075◀	-1.4002	0.8456	-0.1297	-0.9430
15	-2.5122◀	-0.2251	-0.3420	-1.1741	0.3326
16	2.6794◀	0.2368	0.2723	0.0192	-0.6495
17	-0.4450	-0.3025	0.1901	-1.1605	-1.9245◀
18	2.3049◀	-0.1602	1.1695	0.4123	-0.0405
19	2.2919◀	-0.0566	0.4005	0.0509	-0.8501
20	2.4606◀	-1.0361	-0.1468	-0.3868	-0.1683

CASE 10

1	-2.2321◀	-0.8185	0.7644	1.0721	0.2376
2	-2.4632◀	-0.7431	-0.3634	-0.2926	-0.2302
3	1.5454◀	-1.7926	1.1097	-0.7819	1.4354
4	-1.3670	-2.0422◀	0.6901	0.6884	-0.8352
5	1.8337◀	-0.7090	0.8935	1.0512	-1.2070
6	1.9412◀	0.6369	0.8728	-0.8478	0.6397
7	-1.7295◀	1.5568	0.5269	0.8673	-1.1772
8	-1.8257◀	-0.3777	-1.2329	-0.4340	-1.4319
9	-1.5419	1.5667◀	-1.3688	0.2159	0.7936
10	0.6448	0.8453	1.9408◀	-1.4509	-0.4307
11	2.5032◀	0.3699	0.3263	-0.1001	0.5971
12	-1.3617	1.1132	1.4746◀	-0.4753	-1.3459
13	1.9329◀	-1.4596	0.2952	0.9893	-0.5448
14	1.3635◀	-0.4519	-1.0838	-0.3158	-1.4212
15	-0.8203	-0.0817	1.0265	-1.0747	1.8392◀
16	-1.7919◀	0.9430	-1.3980	0.5951	-0.4336
17	-0.7439	-0.8629	0.7768	-1.0157	-2.2254◀
18	1.3509	0.5979	0.7012	-2.0209◀	-0.5435
19	-0.7004	-1.2558	0.8762	-1.3793◀	1.0503
20	-2.4365◀	-0.7652	-0.3062	-0.2596	-0.8322
	C_{JILL}	P	C_{JACK}	P	P

VARIANCE ACCOUNTED FOR = 89.98%

H5 Construct centrality data classes

From the previous PCA listings, the following tables were obtained: (a) individual grid data classes, (b) aggregate grid data classes, (c) posterior probabilities of centrality in individual grids, and (d) posterior probabilities of centrality in aggregate grids. Data classes are represented in tables (a) and (b) as c (central) and p (peripheral). Posterior probabilities are given to three places, decimal point omitted.

(a) Data classes in individual grid solutions

	Jack					Jill				
construct	1	2	5	28	60	1	2	5	28	60
1	p	p	p	p	p	c	c	c	c	c
2	p	p	p	p	p	c	c	c	c	c
3	c	c	c	c	c	c	c	c	c	c
4	p	c	p	p	p	p	p	p	c	c
5		c	p	c	p		c	c	c	c
6		p	p	p	p		c	c	c	c
7		p	p	c	p		c	p	c	c
8		p	p	p	p		c	c	p	c
9			c	c	c			c	c	c
10			p	p	p			c	c	c
11			p	p	p			p	p	p
12			p	c	p			c	c	c
13				c	p				c	c
14				p	p				c	c
15				c	p				c	c
16				c	c				c	c
17					p					p
18					p					c
19					c					c
20					p					c

(b) Data classes in aggregate grid solutions

	Jack					Jill				
construct	1	2	5	28	60	1	2	5	28	60
1	p	p	c	p	p	c	c	c	c	c
2	p	p	p	p	p	c	c	c	c	c
3	p	p	p	p	p	c	c	c	c	c
4	p	p	p	p	p	p	p	p	c	c
5		p	p	p	p		c	c	c	c
6		p	p	p	p		c	c	c	c
7		p	c	c	p		c	p	c	c
8		p	p	p	p		c	c	p	c
9			p	p	p			c	c	c
10			c	c	c			c	c	c
11			p	p	p			p	p	p
12			p	c	c			c	c	c
13				p	p				c	c
14				p	p				c	c
15				c	p				c	c
16				c	p				c	c
17					p					p
18					p					c
19					p					c
20					p					c

construct	Jack 1	Jack 2	Jack 5	Jack 28	Jack 60	Jill 1	Jill 2	Jill 5	Jill 28	Jill 60
1	204	105	051	024	011	505	650	772	860	918
2	204	105	051	024	011	505	650	772	860	918
3	505	650	772	860	918	505	650	772	860	918
4	204	318	175	089	043	204	105	051	089	151
5		505	318	459	279		505	650	772	860
6		204	105	051	024		505	650	772	860
7		204	105	175	089		505	318	459	607
8		204	105	051	024		505	650	459	607
9			505	650	772			505	650	772
10			204	105	051			505	650	772
11			204	105	051			204	105	051
12			204	318	175			505	650	772
13				505	318				505	650
14				204	105				505	650
15				505	318				505	650
16				505	650				505	650
17					204					204
18					204					505
19					505					505
20					204					505

(d) Posterior probabilities of centrality in aggregate grid solutions

construct	Jack 1	Jack 2	Jack 5	Jack 28	Jack 60	Jill 1	Jill 2	Jill 5	Jill 28	Jill 60
1	204	105	175	089	043	505	650	772	860	918
2	204	105	051	024	011	505	650	772	860	918
3	204	105	051	024	011	505	650	772	860	918
4	204	105	051	024	011	204	105	051	089	151
5		204	105	175	089		505	650	772	860
6		204	105	175	089		505	650	772	860
7		204	318	459	279		505	318	459	607
8		204	105	175	089		505	650	459	607
9			204	105	175			505	650	772
10			505	650	772			505	650	772
11			204	105	175			204	105	051
12			204	318	459			505	650	772
13				204	105				505	650
14				204	105				505	650
15				505	318				505	650
16				505	318				505	650
17					204					204
18					204					505
19					204					505
20					204					505

H6 Salience of self and partner relevant components

To assess the salience of self-relevant and partner-relevant predicates to Jack and Jill over the five testing occasions, root mean square loadings of constructs on components 1 (Jill-relevant) and 3 (Jack-relevant) of the aggregate grid solution were computed. These values are listed in the following table.

	Component 3 (Jack-relevant)					Component 1 (Jill-relevant)				
	1	2	5	28	60	1	2	5	28	60
Jack	.654	.801	1.263	1.235	1.001	2.029	1.947	1.779	1.546	1.730
Jill	.287	.793	.590	.804	.626	2.263	2.209	2.213	2.195	2.203
Total	.505	.797	.986	1.042	1.181	2.152	2.032	2.008	1.893	1.981

APPENDIX I

The reciprocal grid

I 1 Modules A and B

The reciprocal grid case-study comprised a married couple who completed a repertory grid cycle over a four week period. The cycle consisted of six modules of activities repeated once. Module A comprised (a) the elicitation of the names of fourteen mutually important persons which, combined with the subjects' own names formed the element sample, (b) the recording of brief character sketches of each element in the sample, and (c) the elicitation of ten constructs and their application to the element sample, using seven-point rating scales for each construct dimension. Two additional whole-figure constructs were then introduced (LIKE SELF, LIKE PARTNER IN CHARACTER), and then rated. Module B comprised subjects independent anticipations of the importance of constructs (a) to their own grid and (b) to the aggregate grid. Listed below are firstly each subjects' character sketches, secondly the constructs elicited on the two testing occasions, and finally, the matrices of ratings obtained on these occasions (constructs by row, elements by column). Rankings of the subjective importance of constructs are recorded at the side of the grid matrices, for individual (CIG) and aggregate (CAG) grid solutions.

Ruth: Element characterisations

1. Ruth's father — Basically, a very kind, well meaning person, but rather lacking in empathy and sensitivity. Fairly quiet, not a dominant character, but knows where he stands on most issues. Does not play a very important part in the relationship between I. and me.

2. Isaac — Warm and loving. Dominant person who tends to lead the conversation in a group of people. In some ways dominates me, but I can quietly stand my ground if I feel strongly enough. Rather erratic in mood - has bouts of elation and depression, also has sporadic bursts of energy. I have to adjust my behaviour to fit in with his mood. Loves lots of stimulation, noise etc. butespecially likes to be with people. much more generous than I am.

3. Ruth's mother — Rather sensitive - likes to feel loved. Can easily be hurt. Has much more empathy with others than father. Likes adventure and trying new things, and has a fear of growing old. Fairly well read and appreciates art. Has developed much more liberal attitudes in recent years.

4. Paul — Can be rather intense, but on the whole a warm, friendly person who seems to show a lot of empathy with me. In some situations I feel there are similarities between him and me, which differentiate us from Isaac and Paul's wife. On the other hand, I feel he is far more intellectual than I am and when he talks about his work I sometimes can't understand what he's talking about.

5. Jack — A very gentle, quiet, serene person who seems to have no ambitions about money and has opted out of the rat-race in favour of living a peaceful life in the countryside enjoying his garden. Has a boyish enthusiasm for things, but does have his sensitive side, and can be hurt if he feels people are attacking him. Is refreshingly different from most of our acquaintances and has probably influenced us, making us feel the importance of 'nature'.

6. Isaac's mother — A very loving and well-meaning person, who always tries to please. Her main interests in life are her home and family and she perhaps finds it difficult to understand women who want more than that. She pays a great deal of attention to the minutiae of day to day life, always organising things to the finest detail. This tends to irritate me. I also find I have to resist a tendency to say things that I feel would shock her.

7. Isaac's brother-in-law — Very relaxed and self-assured. Very direct in his manner and doesn't worry about what he says. Since he is so easy going he is pleasant to be with. Doesn't seem to be particularly interested in his work or very ambitious.

8. Isaac's father — Now very much a shadow of his former self, but comes to life on occasion; notably when his wife isn't there. He allows himself to

be organised by her, as day to day life has become rather an effort and he is rather forgetful. Normally I find it an effort to talk to him as we have so little in common, and it's only on these occasions when he does 'come to life' that I feel I'm truly seeing him as a human being.

9. Isaac's brother — Very smooth talking with charming manners which at first sight make him very likeable. However, when one gets to know him better there seems to be nothing more than this front. He never seems to open up and say what he really thinks - there always seems to be a barrier of tension between us which I find very irritating. He seems to be self-interested and lacking in real warmth.

10. Joan — A jolly extravert sort of person who is fun to be with. She seems very capable and copes well with several jobs, 2 children and a difficult husband. She is fairly dominant and a good organiser.

11. Paul's wife — A lovely, bubbling person, who has many facets to her personality. She is very warm and always shows interest in what other people are doing and thinking - she is fairly dominant and sometimes when I'm talking to her I feel I ought to make more effort instead of letting her 'do all the work' She seems rather a deep person at times with a feeling for 'things mystical'.

12. Joan's husband — A rather moody person who can be a little frightening when he's in one of his dour moods. In normal conversation though he's quite jolly and friendly. He's not madly sociable and doesn't seek out the company of others, preferring to be alone in the great outdoors.

13. Isaac's sister — Self-assured and sophisticated, always looks glamorous which, when I first knew her, used to make me feel very scruffy and ill at ease. Now I know her better I like her very much - she is easy-going, interested in people and has the same general outlook on life as I do. Fun to be with.

14. Jack's wife — Deep and sensitive. Feel very strongly about things. Rather quiet and shy, takes a lot of getting to know - doesn't seem to want a lot of friends - preferring a few close friends. Although she has a fairly intellectual background her world now centres round her home life.

15. Ruth — Different personality in different situations. Amongst Isaac's friends I tend to be submissive and withdrawn, but in my own circle of friends I tend to be rather dominant - even a leader whom people consult. Although I'm very content on the whole with my life at home, there are times when I wish I could be doing something else. In a lot of situations I look to Isaac for a lead and I feel he is far more knowledgeable and intellectual than I am, but I do feel I have a deep down strength and I could carry on with life whatever happened.

16. Ruth's sister-in-law — She has more warmth and is much more straightforward than her husband. There doesn't seem to be much depth to her character though, and she attaches importance to things that I don't consider very important. One of these is physical appearance - it annoys me sometimes that she always looks so immaculate. We have rather different outlooks on life, but if we just stick to talking about children and home we get on fairly well.

Isaac: Element characterisations

1. Ruth's father — A rather bumbling, but basically lovable old bore. He's Ruth's dad so I take rather more notice of him than I would otherwise. There's really not much more to say - that's all there is to the man!

2. Isaac — On occasion can be the life and soul of the party. He can also produce flashes of genuine creativity and inspiration. But this is too often spoilt by silly depression and self-doubts, caused of course by the absence of a real self, on rare occasions when Ruth's away. (actually this is an appalling example of false modesty). Have just discovered he has a solid central core of rock-hard cynicism.

3. Ruth's mother — Oh dear! She is in reality a rather frightened old lady, but with the occasional flash of medium's insight. Mostly she lays on intellectual and cultural pretensions of appalling transparency. Her humour is schoolgirlish, and pretentious. But I think I love her really.

4. Paul — Usually I think he's bright. But I'm not always sure. Still he's always stimulating and nice to have around. I'm convinced that there's a deep destructive urge in him. (No, really) This worries me. He is sometimes intolerant of others' views. Especially if they are logical positivists.

5. Jack — How can I get over this feeling of intellectual distance while wanting to become closer to both of them? A person who really does care for people. Someone to learn from. But prone to a dangerous gullibility, could easily be swallowed by some freakish sect. He and his wife have affected our relationship in a positive way. Maybe we are, however, patronising in the way we admire their worldly innocence.

6. Isaac's mother — Mum. Mother earth. Totally commited to her children. Her neuroses don't matter, she would do anything for her brood. Some would say her view of the world was a norrow one. I resent her making me afraid of horses, cows and dogs, though.

7. Isaac's brother-in-law — Took my sister away - the coarse Australian git, used to see him as a revolting Barry Mackenzie personified, but the recent visit made me see him as a normal, outgoing, humorous drinking partner. He still took my sister away though.

8. Isaac's father — Distant but honourable. Never really knew him, but admired his hard-working persistence hugely. Hated his job but stuck it for years, just for us. Now he's a pathetic old figure, struck down by Parkinson's disease. Occasional marvellous evenings of old-time reminiscences. Ruth loves him too. Will I get to know him before he dies?

9. Isaac's brother — I love him because he's my brother and would do anything for him. But he is a classic Goffman man. All front, no real caring. Prejudiced, reactionary. Wouldn't go near him if he weren't my brother.

10. Joan — Lively, bubbling; copes marvellously with silly old husband. Quite attractive too. But how can she possibly believe in God? Some dreadful flaw there. Pity.

11. Paul's wife — Lively, stimulating fun and nice to be with. But she also cares for others. An unusual combination. Something there though, that I can't put my finger on - What is it that she's afraid of? Never mind, a lovely pair - hope these sessions won't put them off! Actually have we really got to know Paul's wife? I feel I know Paul's fears better. But Paul's wife has the basic loving mother earth touch which swamps the mysterious side. Just can't say how she affects our relationship - don't know.

12. Joan's husband. — Poor old Joan's husband. Thick, impulsively aggressive. Confused. Nice to be with when happy, but when he is down can be most unpleasant. Avoid in times of trouble.

13. Isaac's sister — My lovely sister. Not quite sure how much is real. Perhaps she has a rock-hard core of confidence; just a chance it's a learned act. Would bet on the former. Warm and loving.

14. Jack's wife — Has learned to live the simple, good life but occasionally yearns for the old. Depends totally on Jack, in an alien country. She is almost too 'nice' for her own good. Flashes of temper save her. She depends on Ruth now, too.

15. Ruth — Why so difficult to write about? She means more than I can say. Do I resent this deep-structure dependency? Perhaps not, as it has its complement on her kind of dependency on me. Perhaps it's like trying to write about the meaning of life. Wish she wouldn't use the hoover when I'm reading the paper. (Actually she's stopped that now).

16. Isaac's sister-in-law	"My dear, arn't these socialists dreadful". Id she weren't my sister-in-law, she would be unbearably ghastly. Except for her body.

Ruth: Verbatim construct descriptions

Rating value = 1	Rating value = 7
Grid 1	
1. Concerned about people for their own sake	Concerned about what people think of him/her (actions rather than appearance)
2. Intellectual	Non-intellectual
3. Happy with domesticity alone	Discontented with just domesticity
4. Appreciates nature - enjoys growing things, etc.	Doesn't appreciate same
5. Relaxed	Tense
6. Placid	Excitable
7. I think I can tell what they are feeling	Don't know what they are feeling
8. Outgoing, sparkling	Withdrawn
9. Dominant	Submissive
10. Happy and contented in general	Discontented
11. Like Ruth in character	Not like Ruth in character
12. Like Isaac in character	Not like Isaac in character

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Grid 2	
13. Kind and loving	Not kind and loving
14. Enjoys crude humour	Doesn't
15. Dissatisfied with the social system - leftist	Content with social system - rightist in views
16. Creative	Not creative
17. Puts on a 'front'	Straightforward
18. Makes me feel at ease	Makes me feel tense

Isaac: Verbatim construct descriptions

Rating value = 1	Rating value = 7
Grid 1	
1. Warm and loving	Cold and distant
2. Intelligent	Unintelligent
3. Physically attractive	Not physically attractive
4. Progressive in social attitudes	Reactionary in social attitudes
5. Genuinely feels for nature and the countryside	Really a 'towny'
6. Person who I love because of the kind of person he/she is	Person I don't really love at all because of the person he/she is
7. Person I love because of the relationship he/she has to me	Person I don't love at all because of the relationship he/she does not have to me
8. Deep down strong as a person	Deep down weak as a person
9. Lively and stimulating	Passive and not stimulating
10. Culturally sophisticated	Culturally naive
11. Like Ruth in character	Not like Ruth in character
12. Like Isaac in character	Not like Isaac in character

.....

Grid 2	
13. Straightforward	Devious
14. Rather pathetic and dull	Esteemed and interesting
15. Relaxed	Tense
16. Sense of humour	No sense of humour
17. Bachanalian	Puritan
18. Serious	Lighthearted

Ruth: Day 1 Grid Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	CIG	CAG
1	4	1	2	2	3	3	6	4	6	4	2	5	5	2	3	5	4	2
2	4	1	3	1	5	7	6	5	7	2	2	6	5	3	4	7	11	8
3	4	4	6	6	1	1	5	2	5	4	4	5	4	2	1	1	3	12
4	2	3	2	5	1	3	4	3	7	2	5	2	4	1	2	6	6	10
5	1	6	5	6	2	2	4	3	4	5	6	6	4	3	1	1	10	5
6	3	5	4	5	1	4	2	5	7	3	5	6	3	1	2	3	5	4
7	6	2	4	5	3	4	6	6	7	3	5	6	5	2	1	3	12	6
8	6	1	2	2	4	5	3	6	3	2	1	5	1	3	3	6	7	7
9	4	1	2	2	4	6	2	5	3	2	2	3	2	3	3	7	9	11
10	4	2	5	2	1	3	3	4	7	4	2	6	3	1	1	3	2	3
11	3	5	4	6	3	4	7	6	7	3	5	7	5	2	1	4	1	1
12	7	1	4	2	5	6	3	6	6	3	2	5	2	4	5	7	8	9

Ruth: Day 31

1	5	1	2	2	1	2	3	6	7	3	2	5	2	1	1	6	5	3
2	4	1	2	1	5	6	5	5	7	3	2	7	4	2	3	7	7	9
3	3	7	5	7	4	1	4	2	4	5	6	3	5	3	5	1	4	11
4	3	2	3	5	1	2	4	2	7	3	5	3	4	1	2	6	8	10
5	1	6	6	5	2	1	3	2	4	5	6	5	4	3	2	1	10	12
6	4	5	5	5	1	5	2	3	7	5	4	6	4	3	2	3	11	15
7	3	1	2	5	1	2	2	6	7	3	4	7	4	1	1	5	3	4
8	6	1	3	3	4	5	4	7	4	2	1	7	2	3	4	5	13	13
9	5	1	3	2	4	5	3	5	4	2	2	4	3	3	4	7	12	16
10	5	3	4	4	2	4	4	5	5	4	3	5	3	2	2	4	2	7
11	6	1	4	3	5	7	5	6	6	4	2	6	4	3	3	7	1	1
12	4	1	3	2	3	3	3	6	7	4	2	5	2	2	1	5	6	6
13	4	3	3	5	2	2	4	7	7	5	6	7	3	2	1	2	9	2
14	2	1	5	2	3	7	1	3	2	4	2	4	3	3	4	6	18	18
15	5	2	4	2	2	6	5	6	7	3	2	4	4	1	3	7	17	17
16	6	2	2	3	4	3	6	6	6	4	3	4	5	4	5	5	16	14
17	6	5	4	4	7	6	6	5	1	3	4	5	3	6	5	7	15	8
18	2	1	2	3	3	5	3	6	7	4	3	5	3	2	4	5	14	5

Isaac: Day 1 Grid matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	CIG	CAG
1	4	1	2	3	3	1	5	7	6	2	1	5	2	1	1	5	2	4
2	2	1	2	1	4	7	5	3	6	3	2	7	3	3	1	6	5	3
3	7	2	5	3	3	6	2	7	3	2	1	4	1	2	1	2	7	7
4	6	2	5	1	2	7	4	7	5	5	1	5	4	2	2	6	9	6
5	3	4	4	4	1	5	6	6	6	3	5	2	3	1	1	5	8	9
6	5	2	3	2	2	1	5	5	7	3	2	7	1	2	1	4	11	11
7	5	2	5	4	4	1	5	2	2	4	4	4	1	4	1	3	12	12
8	5	5	5	4	2	3	4	3	7	2	4	6	2	3	1	5	3	8
9	5	1	4	2	5	6	4	7	3	3	1	4	2	3	3	4	4	2
10	2	1	1	1	6	5	6	4	6	4	1	7	3	3	2	6	10	5
11	3	2	5	4	1	1	6	5	7	4	2	4	2	1	1	5	6	10
12	4	1	4	2	3	2	5	6	4	3	1	5	3	3	2	6	1	1

Isaac: Day 31

1	4	2	3	3	2	2	3	6	6	3	3	6	2	1	1	4	1	3
2	2	1	2	1	3	6	1	3	5	3	2	6	2	1	1	6	9	4
3	7	3	6	3	2	5	3	7	3	2	1	5	1	1	1	2	17	16
4	4	1	4	1	1	6	4	7	7	5	2	6	4	1	2	6	2	6
5	3	3	3	4	1	6	4	7	7	4	4	3	3	1	1	7	12	12
6	3	3	3	2	1	3	3	5	6	3	2	5	2	1	1	4	3	10
7	4	4	4	4	4	2	3	1	2	5	4	5	2	4	2	3	15	17
8	3	3	3	3	2	2	2	2	7	3	3	6	2	3	1	4	8	9
9	5	1	3	2	4	6	2	7	3	2	1	5	2	2	3	6	6	5
10	4	2	2	2	3	6	5	6	7	5	2	7	3	2	3	7	14	2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	CIG	CAG
11	5	1	6	2	4	5	3	7	4	5	2	6	3	2	3	7	11	15
12	1	3	2	3	1	1	4	3	7	2	3	4	4	3	2	3	10	1
13	4	4	4	5	2	3	5	6	7	5	5	7	4	3	1	6	18	18
14	1	7	4	7	5	2	4	1	2	5	7	2	6	5	6	2	16	7
15	1	3	1	4	1	4	2	2	7	2	3	2	3	2	1	2	13	13
16	5	1	2	3	4	6	3	3	1	3	3	3	4	3	2	4	5	1
17	7	2	5	2	4	7	3	6	5	5	2	3	4	4	3	5	7	14
18	1	6	3	4	2	2	2	3	2	2	2	2	3	2	4	3	4	8

I 2 Cumulative PCA soluitons

The following pages list 6 PCA solutions; two individual grid (IG) solutions for each subject testing occasion, and one aggregate grid (AG) solution for each testing occasion. Significant components only are listed, together with central element vectors and representative construct loadings (underlined), and total variance accounted for by significant components.

RUTH IG1

COMPONENT	ROOT	AS PER CENT
1	238.6660	40.79
2	206.1808	35.24
3	44.3545	7.58
4	37.6546	6.43
5	21.5298	3.68
6	18.1670	3.11
7	6.9783	1.19
8	5.3409	0.91
9	3.6692	0.63
10	1.3748	0.23
11	1.0376	0.18
12	0.1291	0.02

ELEMENT	VECTOR	VECTOR	VECTOR
1	0.2466	-0.0324	0.4444
2 ISAAC	-0.3954	0.2095	-0.0633
3	-0.2018	0.0117	0.3919
4	-0.3777	-0.0242	-0.1077
5	0.2204	0.2854	0.0029
6	0.3261	-0.0096	-0.0722
7	-0.0633	-0.1880	-0.2301
8	0.2015	-0.1869	0.1491
9	0.0044	-0.5640	-0.1599
10	-0.1572	0.1455	0.1969
11	-0.3223	0.0259	-0.2452
12	-0.0336	-0.3651	0.4029
13	-0.1404	-0.0392	-0.3050
14	0.0528	0.4029	0.0820
15 RUTH	0.1921	0.4004	-0.0885
16	0.4522	-0.0719	-0.3982
CONSTRUCT			
1	2.3003	-4.1174	-0.9743
2	5.8901	-4.2965	-1.5623
3	-5.3509	-3.3869	1.7872
4	-1.8251	-4.2320	-4.5925
5	-5.6603	-1.8067	0.5967
6	-2.4350	-4.6894	0.5033
7	-0.5279	-6.0590	0.8217
8	5.9765	-1.8629	1.9960
9	5.7273	-0.7878	-0.6381
10	-0.0529	-5.7900	2.5668
11	-2.4754	-5.9827	-1.0346
12	6.6440	-2.0240	1.8288
	P	C	P

VARIANCE ACCOUNTED FOR = 83.61%

ISAAC IG1

COMPONENT	ROOT	AS PER CENT
1	322.1846	50.22
2	99.6664	15.53
3	86.6656	13.51
4	49.4724	7.71
5	34.5534	5.39
6	20.0856	3.13
7	15.8941	2.48
8	5.7974	0.90
9	4.0788	0.64
10	1.7050	0.27
11	1.2130	0.19
12	0.2460	0.04

ELEMENT	VECTOR	VECTOR	VECTOR	VECTOR
1	-0.1212	0.0038	0.5029	0.3335
2 ISAAC	0.3005	-0.2307	0.0622	-0.2286
3	-0.0053	-0.1661	0.4030	0.0685
4	0.2054	-0.3247	0.1487	0.0404
5	0.0905	0.3270	-0.2234	0.4214
6	-0.0625	0.6307	0.0978	-0.4778
7	-0.2447	-0.2083	-0.2219	0.0115
8	-0.3583	0.1252	0.4504	-0.0725
9	-0.3719	-0.3252	-0.2308	-0.2561
10	0.0530	0.0342	-0.0682	0.0370
11	0.3101	-0.2908	-0.0470	-0.1674
12	-0.3272	0.0358	-0.2952	0.3551
13	0.2008	0.1255	-0.1490	-0.2477
14	0.2358	0.1089	-0.1254	0.3049
15 RUTH	0.3697	0.1707	-0.0637	0.0457
16	-0.2748	-0.0156	-0.2404	-0.1478
CONSTRUCT				
1	-6.9122	-1.6196	0.0636	0.9415
2	-5.8323	2.7758	-4.0240	-1.2878
3	-4.2743	2.4128	5.7307	0.8044
4	-6.2450	2.9175	2.3739	-1.8408
5	-3.5434	-2.5482	1.3479	-4.5961
6	-5.5779	-2.7763	-0.4668	1.8224
7	-0.7612	-2.2747	0.7054	3.7755
8	-1.4839	-3.6627	0.0944	-0.3256
9	-4.1613	3.9419	2.2695	1.0130
10	-5.0114	2.7464	-4.9258	0.6714
11	-5.6453	-4.3737	0.1858	-0.7654
12	-5.2751	0.0610	0.0578	1.4220
	C	P	P	P

VARIANCE ACCOUNTED FOR = 86.97%

RUTH & ISAAC AG1

COMPONENT	ROOT	AS PER CENT
1	145.7725	40.492
2	90.5785	25.161
3	32.7398	9.094
4	25.7390	7.150
5	16.0180	4.449
6	13.1540	3.654
7	10.9040	3.029
8	8.3397	2.317
9	7.1669	1.991
10	2.8738	0.798
11	2.6747	0.743
12	2.0702	0.575
13	1.1562	0.321
14	0.6000	0.167
15	0.2126	0.059

ITEM	VECTORS 1.	2.	3.
1	0.1527	-0.1560	-0.5329
2 ISAAC	-0.3442	0.2573	0.0386
3	-0.0370	0.1744	-0.4512
4	-0.1941	0.3334	-0.0912
5	-0.1147	-0.3627	-0.0327
6	0.1027	-0.3570	0.1858
7	0.1973	0.1718	0.1049
8	0.3375	-0.1250	-0.2043
9	0.4103	0.3290	0.3123
10	-0.1221	0.0410	-0.0838
11	-0.2075	0.2937	0.1300
12	0.3126	0.1537	-0.1223
13	-0.1391	0.0690	0.3064
14	-0.2734	-0.2255	-0.1105
15 RUTH	-0.3223	-0.3435	0.1712
16	0.2952	-0.2587	0.3197

CASE	LOADINGS 1.	2.	3.
CASE 1 (ISAAC)			
1	3.4032	0.4614	-0.2334
2	2.8359	-0.6154	1.4033
3	2.0647	-0.8415	-2.4605
4	3.0404	-1.0237	-0.5212
5	2.0511	1.6663	0.8279
6	3.2218	1.1978	-0.7766
7	0.1367	0.9661	-2.4906
8	2.1273	2.1651	-0.4932
9	2.4274	-2.3165	-1.2872
10	2.7411	-1.0077	1.3057
11	2.7653	1.9948	-0.1879
12	3.2056	-0.5627	-0.6074
CASE 2 (RUTH)			
1	2.9763	0.0613	1.2944
2	3.0028	-1.4571	1.5251
3	0.2684	3.4736	-1.1467
4	1.4903	1.8935	2.2951
5	-0.8277	3.3730	-0.2597
6	1.5152	2.5692	0.2146
7	2.7074	1.8739	-0.4182
8	2.7133	-2.5037	-0.8825
9	2.1029	-2.7271	0.4932
10	2.9121	1.6255	-0.5539
11	2.1431	2.7220	0.6492
12	2.6537	-2.3446	-0.5134
	CRI	CR	P

VARIANCE ACCOUNTED FOR = 74.74%

RUTH IG1+2

COMPONENT	ROOT	AS PER CENT
1	196,6825	43,707
2	132,1471	29,366
3	29,5947	6,577
4	26,0300	5,784
5	15,3475	3,411
6	13,7502	3,056
7	12,1855	2,708
8	5,8811	1,307
9	4,4256	0,983
10	3,7451	0,832
11	3,3014	0,734
12	2,7710	0,616
13	1,9352	0,430
14	1,1167	0,248
15	1,0864	0,241

ITEM	VECTORS 1.	2.	3.
1	-0,1865	0,1316	-0,0708
2 ISAAC	0,4424	-0,1275	0,1252
3	0,1616	-0,1080	0,4112
4	0,2204	-0,2860	0,0094
5	0,0881	0,3834	-0,1186
6	-0,1972	0,2760	0,4278
7	-0,0408	-0,0435	-0,5036
8	-0,3430	0,0060	0,0464
9	-0,3818	-0,4654	-0,1764
10	0,1245	-0,1141	0,1257
11	0,2545	-0,2386	-0,0758
12	-0,2470	-0,2432	0,3449
13	0,0927	-0,0979	-0,3162
14	0,2446	0,3004	0,0168
15 RUTH	0,1542	0,3610	-0,1381
16	-0,3867	0,2610	-0,0481

ISAAC IG1+2

CASE	LOADINGS 1.	2.	3.
CASE 1			
1	-2,9207	-0,6953	-1,7891
2	-3,2617	0.8126	-0,5512
3	0.7213	-3,2949	-0,0271
4	-1.3319	-2,0758	-1.3174
5	1.6957	-3,1306	0.7594
6	-1.1111	-3,1039	1,3121
7	-2,1390	-2,4134	-0,6931
8	-3,1038	1,6999	0.6591
9	-2,8142	2.1604	0,7025
10	-2,4115	-2,4047	0,9513
11	-1.3376	-2,9414	-0,4909
12	-3,1933	1,6203	0,6030
CASE 2			
1	-3,4047	-1.3354	-0,1902
2	-3,4722	0,3081	-0,2454
3	3,0733	-1.6932	-0,6447
4	-1.3332	-2,3916	-1,2182
5	2.2149	-2,8815	0,7743
6	-0.5615	-2,8963	1,4873
7	-2,4994	-2,4338	0.1400
8	-3,1442	0.9118	0,6457
9	-3,2368	1,7724	0,1658
10	-2,7198	-2,0465	0,8260
11	-1,3436	-3,0693	0.1320
12	-3,6205	0,7258	0,3540
13	-3,3649	-1,1120	0,2721
14	-1,3608	1,6980	2,3108
15	-3,4578	-0,3039	-0,1452
16	-2,5336	0,3604	-2,4923
17	-0,2004	3,0496	0,1366
18	-3,0784	-0,6624	0,1614
	P	C	P

VARIANCE ACCOUNTED FOR - 79.66%

COMPONENT	ROOT	AS PER CENT
1	206,5032	45,890
2	83,3286	18,517
3	42,5307	9,451
4	35,4061	7,868
5	22,6402	5,031
6	16,2459	3,610
7	11,9824	2,663
8	8,9552	1,990
9	6,4656	1,437
10	4,5226	1,005
11	4,2859	0,952
12	2,8264	0,628
13	2,3731	0,527
14	1,2270	0,273
15	0,7071	0,157

ITEM	VECTORS 1.	2.	3.
1	0,1303	-0.3317	-0,4216
2 ISAAC	-0,2995	0,2991	0,1154
3	0,0034	-0,0306	-0,2558
4	-0,2129	0,2236	-0,0640
5	-0,1756	-0,2934	-0,1841
6	0,1535	-0,4556	0,4750
7	0,0699	0,1306	-0,1285
8	0,3873	-0,2009	0,1712
9	0,3935	0,5410	0,2410
10	-0,0253	-0,0270	-0,1177
11	-0,2499	0,2316	-0,0257
12	0,3189	0,1351	-0,3656
13	-0,1699	0,0002	0,3559
14	-0,2721	-0,0519	-0,1583
15 CUTH	-0,3529	-0,1584	0,2534
16	0,2958	-0,0117	0,1092

CASE	LOADINGS 1.	2.	3.
CASE 1			
1	3,2143	0,6565	-0,5384
2	2,7570	-0,1617	0,5439
3	2,2720	-1,9162	-0,7062
4	3,2726	-1,4521	0,4998
5	2,1026	1,3048	1,2975
6	3,1191	1,3424	-1,4870
7	0,0296	0,2331	-3,5519
8	2,1238	2,2245	-1,1066
9	2.4460	-2,6399	-0.1275
10	2,5276	-0,2234	0,1312
11	2,6936	1,9439	-0,5811
12	3,0705	-0,3807	-0,8993
CASE 2			
1	3,3390	1,1921	-0,6850
2	2,8988	-0,3570	0,7607
3	2,3763	-1,2157	-1,0446
4	3,5708	-0,1571	0,8861
5	2,9262	0,7490	1,6434
6	3,4671	1,3744	0,2398
7	-1,0812	0,6168	-3,0351
8	2,1537	2,4233	-0,7994
9	2,8159	-2,2394	0,3236
10	3,4704	-0,0567	0,6774
11	2,7633	2.2405	-0,5128
12	3,0737	-1,5595	-0,4240
13	1,3135	3,2116	0,8048
14	-3,5176	1,2641	0,3051
15	1,0369	2,3599	1,7126
16	0,6289	-2,9243	0,1166
17	2,3075	-2,3364	0,4073
18	-1,6259	1,1927	1,3740
	C	C	P

VARIANCE ACCOUNTED FOR = 73.86%

RUTH & ISAAC AG1+2

COMPONENT	ROOT	AS PER CENT
1	393.3370	43.704
2	202.1562	22.462
3	63.0579	7.562
4	52.0527	5.784
5	41.6603	4.629
6	26.9311	2.992
7	25.3056	2.812
8	21.8520	2.428
9	19.4620	2.162
10	17.4747	1.942
11	10.1147.	1.124
12	8.4186	0.935
13	5.4690	0.608
14	4.2762	0.475
15	3.4322	0.381

ITEM VECTORS

ITEM	1.	2.	3.
1	-0.1515	-0.2113	-0.4969
c 2 ISAAC	0.3573	0.2436	-0.0336
3	0.0722	0.0957	-0.4029
4	0.2065	0.2903	-0.0835
5	0.1522	-0.3033	-0.0257
6	-0.1688	-0.3711	0.1572
7	-0.0557	0.0731	0.0425
8	-0.3702	-0.1016	-0.1597
9	-0.4179	0.4059	0.3564
10	0.0672	0.0733	-0.0937
11	0.2443	0.2710	0.0776
12	-0.3010	0.1745	-0.2726
13	0.1273	0.0590	0.3416
14	0.2756	-0.1975	-0.0763
15 RUTH	0.2767	-0.2934	0.2955
16	-0.3201	-0.2167	0.3311

CASE LOADINGS

CASE	1.	2.	3.
CASE 1 (ISAAC)			
1	-3.2221	0.6364	-0.3235
2	-3.8773	-0.4363	1.0104
3	-2.1152	-1.0043	-2.5907
4	-3.2182	-0.9395	-0.5622
5	-3.9605	1.6171	0.0236
6	-3.0045	1.4044	-1.0251
7	1.2135	0.5501	-2.0477
8	-1.9145	2.4472	-0.8385
9	-2.6552	-2.5629	-1.1126
10	-2.0773	-0.7071	1.0011
11	-2.5114	2.0753	-0.2862
12	-3.3553	-0.4911	-0.5981
CASE 2 (ISAAC)			
1	-2.2735	1.5904	-0.8391
2	-2.9115	-0.4756	0.7596
3	-2.1525	-0.2665	-2.0731
4	-3.5537	0.2735	0.3042
5	-2.9927	0.9444	0.9927
6	-3.3602	1.0509	-0.1979
7	1.3555	0.3235	-2.1441
8	-2.0677	2.2775	-0.0107
9	-2.9216	-2.0943	-0.5295
10	-3.3622	-0.1752	0.7532
11	-3.1737	-1.1947	-0.9528
12	-1.3173	2.7059	1.0439
13	-2.5357	2.5157	-0.2033
14	3.5417	1.0634	0.8389
15	-0.9737	2.4925	1.4194
16	-0.3501	-2.5103	-0.3125
17	-2.3510	-1.0977	-0.6950
18	1.7454	0.8737	0.7501
CASE 3 (RUTH)			
1	-2.3424	1.2905	1.1226
2	-2.9923	-1.2117	1.4635
3	0.0996	3.2145	-1.5077
4	-1.4043	2.1551	2.1820
5	1.9120	3.2442	-0.0434
6	-1.6794	2.0171	-0.1601
7	-2.5613	1.9362	-0.7016
8	-2.3425	-2.1957	-0.7818
9	-2.4037	-2.5193	0.6970
10	-2.1952	1.8437	-0.8009
11	-1.3365	2.0375	0.0325
12	-2.8651	-2.0614	-0.1625
CASE 4 (RUTH)			
1	-3.5543	0.6553	-0.0574
2	-3.5523	-0.7772	1.0310
3	2.3003	2.3454	-0.2226
4	-1.5076	2.5707	1.5195
5	1.5834	3.1133	-0.7429
6	-1.1154	2.0902	-0.4321
7	-2.7447	1.9993	0.2566
8	-2.7506	-1.5707	-1.0205
9	-2.7716	-2.4124	0.4344
10	-3.1773	1.3097	-1.3426
11	-3.4753	-1.3954	0.0513
12	-3.5912	0.5794	-0.2147
13	-1.5013	2.0469	-0.9551
14	-1.1700	-2.0415	0.5144
15	-3.4604	-1.2223	0.4409
16	-2.2002	-1.0421	0.8417
17	0.1321	-1.9245	-0.7540
18	-3.3402	0.2115	1.5724
	CI	CR	P

VARIANCE ACCOUNTED FOR = 73.73%

I 3 Level 1 measures

Transformations appropriate to first.-level feedback in the reported case-study were confined to the measurement of construct centrality, (self-relevance) in the individual and aggregate domains. The method of scoring constructs for centrality has been described in Appendix G. In the reciprocal case-study centrality scores were derived for IG and AG solutions for both self-relevance and partner-relevance for each subject on each testing occasion according to the following scheme:-

Relevance	IG solutions	AG solutions
self	$c_k^{IGS} = \sum_{N_{IG}}^{j} L_{kj} V_{sj}$	$c_k^{AGS} = \sum_{N_{AG}}^{j} L_{kj} V_{sj}$
partner	$c_k^{IGP} = \sum_{N_{IG}}^{j} L_{kj} V_{pj}$	$c_k^{AGP} = \sum_{N_{AG}}^{j} L_{kj} V_{pj}$

where N_{IG}, N_{AG} = number of significant components in IG and AG solutions respectively; L_{kj} = loading of kth construct on the jth significant component; V_{sj}, V_{pj} = vector of element SELF and PARTNER, respectively, on the jth significant component. The scores obtained by this scheme are listed for each construct in the following tables.

Isaac : Self-relevant centrality scores

c_k	IGS_1	AGS_1	IGS_2	AGS_2
1	2.66	1.30	1.611	1.922
2	2.93	1.21	1.402	1.442
3	2.33	1.02	1.465	1.044
4	3.12	1.34	1.265	1.469
5	2.73	1.17	1.676	1.529
6	3.10	1.45	1.736	1.898
7	1.65	.42	1.002	1.014
8	1.98	1.31	1.862	1.669
9	2.53	1.49	1.949	1.922
10	2.90	1.25	1.223	1.535
11	2.91	1.47	1.709	1.667
12	1.96	1.26	1.632	1.594
13			1.513	1.404
14			1.569	1.614
15			1.332	1.301
16			1.606	1.736
17			1.615	1.826
18			1.754	1.736

Isaac : Partner-relevant centrality scores

c_k	IGP_1	AGP_1	IGP_2	AGP_2
1	2.88	1.33	1.623	1.941
2	2.95	1.38	1.712	1.590
3	1.40	1.35	1.548	1.659
4	3.04	1.43	1.519	1.240
5	2.05	1.36	1.729	1.658
6	3.05	1.58	1.566	1.726
7	.89	.84	1.714	1.730
8	1.94	1.52	1.792	1.778
9	2.40	1.81	1.525	1.911
10	3.04	1.45	1.520	1.485
11	2.89	1.61	1.506	1.653
12	2.02	1.31	1.585	1.657
13			1.543	1.854
14			1.545	1.568
15			1.433	1.714
16			1.077	1.887
17			1.422	1.915
18			.966	1.954

Ruth : Self-relevant centrality scores

c_k	IGS_1	AGS_1	IGS_2	AGS_2
1	2.18	1.20	1.022	1.457
2	2.99	1.73	.683	1.643
3	2.55	1.48	1.245	1.688
4	2.26	1.49	1.244	2.004
5	2.05	1.47	1.489	1.829
6	2.47	1.41	1.394	1.498
7	2.60	1.59	1.283	1.646
8	2.07	1.81	.903	1.963
9	1.48	1.70	1.170	1.843
10	2.56	1.59	1.271	1.909
11	2.96	1.73	1.334	1.751
12	2.25	1.75	.869	1.704
13			.961	1.365
14			1.142	1.446
15			.665	1.600
16			.865	1.407
17			1.151	1.333
18			.739	1.662

Ruth: Partner-relevant centrality scores

c_k	IGP_1	AGP_1	IGP_2	AGP_2
1	1.83	1.09	1.696	1.682
2	3.33	1.47	1.615	1.528
3	2.94	1.04	1.630	1.717
4	1.51	1.06	1.070	1.596
5	3.05	1.17	1.444	1.540
6	2.01	1.19	.853	1.238
7	1.54	1.44	1.434	1.729
8	2.88	1.55	1.583	1.880
9	2.48	1.45	1.700	1.843
10	1.39	1.43	1.563	1.731
11	2.30	1.46	1.005	1.514
12	3.17	1.54	1.739	1.902
13			1.374	1.593
14			.955	1.105
15			1.355	1.611
16			.998	1.200
17			.819	.991
18			1.220	1.505

I 4 Level 3 classifications

Level 3 data classes for constructs in IG and AG solutions are listed for Ruth and Isaac in Tables 52 and 53. The following table provides a listing of posterior probabilities of construct centrality associated with these outcomes. (probabilities are given to three places, decimal point omitted).

Construct	RUTH				ISAAC			
	IG		AG		IG		AG	
	1	2	1	2	1	2	1	2
1	505	318	505	318	505	650	505	650
2	204	105	505	318	505	650	505	650
3	204	105	505	650	204	318	204	105
4	204	318	204	318	505	650	505	650
5	204	318	505	650	204	318	505	650
6	505	650	505	650	505	650	505	650
7	505	318	505	318	204	105	204	105
8	204	105	505	318	204	318	204	105
9	204	105	505	318	505	650	505	650
10	505	318	505	318	505	650	505	650
11	505	650	505	650	505	650	505	650
12	204	105	505	318	505	650	505	650
13		204		204		505		204
14		204		505		505		505
15		204		204		505		204
16		204		204		505		204
17		505		505		505		505
18		204		204		505		505

I 5 Query Forms

Following the assembly of Level 1 and Level 3 IG and AG displays, constructs obtaining significant discrepancies between (a) subjectively anticipated and observed centrality ranks (Level 1), and (b) expected and observed data classes (Level 3) were listed on Query forms and presented to the subjects to furnish an account of the discrepancies. The following pages depict the responses recorded to these prompts.

ISAAC
L1 IG DAY 1

4 I thought that my interest in politics, and ideology had waned; perhaps it has not.

6 Seems to emphasise that kind of person is more important than ascribed relationship.

8 Don't understand. I'm convinced this is important. But maybe it's important in my rating of Ruth instead of myself

12 ~~[illegible]~~ Because I saw this as too global, and not discriminating enough, I didn't bother with it.

ISAAC
L1 AG DAY 1

2 Does not work because one can't infer that it is related to RUTH intellectual factor.

12 Artifact of the fact that E made me put it at the top.

6 Nice. This is important to me - Apparently to RUTH as well.

11 No comment. Except pleased to see it there

ISAAC
L3 IG/AG DAY 1

5 This construct is important to RUTH not so important to me. Why? Silly question, in fact. A feeling for nature and the countryside is central to RUTH as a person but more peripheral to me. (e.g. Sibelius violin concerto brings out strong emotions in her — wild Finnish woods etc.)

ISAAC
L1 IG DAY 31

4 Family crisis. Drawn towards disliked reactionary members of family.
This probably resulted in social attitudes not being so important at that time;
but having been important for so long maybe I wasn't aware they were not so important at that time. (Probably a temporary phenomenon).

ISAAC
L1 AG DAY 31

17 I think RUTH may now see something like this as important now, whereas she didn't before.

2 Again, I think this is the result of improvement in RUTH'S grid which we discussed afterwards & her
may then have affected the collective thingy here.
10 These three 'go together' anyway in both mine & RUTH'S definition of me
(she has 'intellectual' instead
12 of 'intelligent' & 'culturally sophisticated

ISAAC:
L3 IG DAY 31

3 Recent hot weather & consequent public dishabille has drawn my psyche's attention to this construct.

5 Certain people I feel have ~~been~~ clarified on this concept, including myself.

8 Clarified my own position on this construct, (due to feedback and other events) will lead to more confidence in relationships generally & more relaxed relationship with RUTH in particular.

ISAAC
L3 IG/AG DAY 31

3 Effect: not that much let's say it's taken as a fact of life.

8 Ah. More important. Perhaps I have worried about what I perceived as a 'lack' in myself, whereas RUTH did not do so.

13 Influence of work. Some people I perceive at work to be obsessed by the need to manipulate others for their own political ends; hence I perceive myself in that kind of context (but at the other polar end). RUTH does not need to face that kind of shit at home in TOWN.

15 Take this with 13. Bringing home the workshit I find sense-making, I worry about that. Maybe RUTH doesn't see it quite that badly.

16 Mr. Silly. A dual role for humour 1. Makes relationships fun. 2. covers up or releases tension. Maybe tied in with 13 + 15 ?

RUTH
L1 IG DAY 1

7 I thought this construct didn't apply to me when I was making the prediction, but it is important when rating other people. i.e. "I think I know what I'm thinking" - is inapplicable.

2 I didn't think this was important in isolation - when considering myself on my own - but I suppose it is important to me when comparing myself with others.

RUTH
L1 AG DAY 1

1 This perhaps is a slightly 'woolly' construct, not the same as ISAAC'S 'warm/cold' construct.

6 Maybe to me this seems more important because its at times been a difference between us.

8 I surprised I didn't rate this as important, maybe I thought ISAAC didn't consider it as important as I do.

12 Maybe I tend to concentrate more on the differences between us & ISAAC tends to concentrate more on the similarities.

RUTH

No. L3 IG/AG DAY1

2	I don't think that intellectuality is very important to the definition of me - I feel other things are more important. This is a construct which I think shows up a difference between B & me. He obviously doesn't agree
3	Perhaps I am more aware of the conflict I feel between domesticity & other interests outside the home.
5, 8, 9	When I rate myself on these scales I tend to compare myself with I. so I only rate myself as average, whereas I. tends to compare me with other people & so I come out higher on all these things. (He often says I underestimate myself)
12	I tend not to think of myself as being like I in character ie I concentrate on the differences, whereas I. concentrates on the similarities

RUTH

No. L1 IG DAY31

5	This is probably an important but rather deep down characteristic of myself to which I possibly pay attention only intermittantly.
6	Same as above.
2	My attention has been drawn to this by the feedback from the grid, it is important to me when I compare myself with ISAAC, but not with other people.
12 and 14	Since having the feedback, I have thought more about the similarity between us & not just the differences.

RUTH

No. L1 AG DAY 31

13 1	Quite a few people in addition to myself score highly on these, so these constructs do not distinguish me from other people.

RUTH

L3 IG DAY 31

1 These three constructs were thought of originally with a particular person in mind as being very different from me but now my feelings have
7 softened & I don't feel the difference is so great. I think my relationship has improved with this person, I'm not
10 so antagonistic.

4 I can't really understand why this has changed. Perhaps it just reflected my mood at the time.

Insight from the grid may have
5 affected this. Maybe this has come out as something that distinguishes me from others.

RUTH

L3 A.G DAY 31

1 Since events have changed both I. & my
7 relationship to I'S BROTHER, this has meant
10 that my position on this construct has become less extreme.

2 Feedback from the grid has drawn our attention to this - perhaps we're now trying to play down its importance

Again feedback has made me think that
8 I. rates me higher on these than I would
9 have done myself, so they've become less important in describing me as I'm now not rated as extreme.

When we discussed this after having feedback
12 we realised that ISAAC had concentrated more on the similarities between us & I more on the differences. So now probably we both think this is less important.

RUTH

L3 IG/AG DAY 31

Humour plays a more important part
14 in I's life than in mine, with the consequence that I occasionally get fed up with it.

Same as on the last grid. I think &
3 see the conflict between my domesticity & outside interests. I feel I am different from the people in the grid, when I. would rate highly on this.

I 6 Evaluation of the procedures

Reciprocal grid procedures were evaluated by conducting five independent tests; (a) a test of the distinctiveness of construction of self and partner, (b) a test of shift of salience in construction from self- to partner-relevant predicates, (c) a test of the specificity of self- and partner- relevant predicates, (d) a a test of the relationship between construct centrality on the two testing occasions, and (e) tests for the increase of discriminative control over modelling.

(a) Distinctiveness of self and partner construction.

Firstly, product-moment correlations were computed between the whole figure constructs (LIKE SELF, LIKE PARTNER) on the two testing occasions, Fisher's z transformation applied and differences between the correlations tested. The following table lists correlations, associated z values in brackets.

	$Grid_1$	$Grid_2$
Isaac	.687 $(.842)_a$	-.139 $(-.140)_b$
Ruth	-.172 $(-.174)_c$	.761 $(.999)_d$

Standard error for all comparisons = .392. All correlations based on N = 16. Comparisons:-

a.b. $z_a - z_b$ = .982, z_r = 2.51, p = .006
c.d. $z_c - z_d$ = 1.173, z_r = 2.99, p = .001
a.c. $z_a - z_c$ = 1.016, z_r = 2.59, p = .005
b.d. $z_b - z_d$ = 1.139, z_r = 2.91, p = .002

Secondly, product moment correlations were computed between the elements SELF and PARTNER on the two testing occasions, Fisher's z transformation applied and differences between the correlations tested. The following table lists correlations, associated z values and sample N in brackets.

	$Grid_1$	$Grid_2$
Isaac	-.425 $(-.454, N=12)_a$	.767 $(1.013, N=18)_b$
Ruth	-.679 $(-.827, N=12)_c$	.182 $(.182, N=18)_d$

Standard errors for comparisons:-

a.b, c.d = .422
a.c = .471
b.d = .365

Comparisons:-

a.b. $z_a - z_b$ = 1.467, z_r = 3.48, p .0005
c.d. $z_c - z_d$ = 1.009, z_r = 2.39, p = .008
a.c. $z_a - z_c$ = .373, z_r = .79, p = .215
b.d. $z_b - z_d$ = 1.011, z_r = 2.77, p = .003

(b) Salience of construction

To test salience of construction on self and partner predicates on the two occasions loadings of the first six constructs (out of 10) elicited on the first occasion and the six elicited on the second occasion were listed for AG component 1 (Isaac-relevant) and AG component 2 (Ruth-relevant), and root mean square loadings computed. The following table lists these values.

Construct	Isaac				Ruth			
	Component 1		Component 2		Component 1		Component 2	
	$Grid_1$	$Grid_2$	$Grid_1$	$Grid_2$	$Grid_1$	$Grid_2$	$Grid_1$	$Grid_2$
1	3.23_a	2.58_b	$.65_c$	2.52_d	2.84_e	1.86_f	$.29_g$	2.65_h
2	2.83	3.54	.44	1.06	2.99	1.17	1.21	2.04
3	2.14	.97	1.00	2.49	.10	3.46	3.21	.22
4	3.22	.85	.94	2.51	1.40	2.21	2.14	.64
5	1.96	2.35	1.62	1.90	1.01	.18	3.24	2.92
6	3.00	1.75	1.40	.87	1.63	3.04	2.82	.20
r.m.s. loading	2.78	2.22	1.09	2.01	1.94	2.27	2.41	1.84

Mann-Whitney U tests were then computed between construct samples, as follows:

a.b. U(6/6) = 10, n.s.
c.d. U(6/6) = 6, p = .032 (one-tailed)
e.f. U(6/6) = 13, n.s.
g.h. U(6/6) = 9, n.s.
a.e. U(6/6) = 6, p = .032 (one-tailed)
a.c. U(6/6) = 0, p = .001 (one-tailed)
b.d. U(6/6) = 18, n.s.
b.f. U(6/6) = 18, n.s.
c.g. U(6/6) = 7, p = .047 (one-tailed)
d.h. U(6/6) = 15, n.s.
e.g. U (6/6) = 13, n.s.
f.h. U(6/6) = 14, n.s.

(c) Specificity of self and partner predicates.

To test the specificity of self and partner construction, the loadings of the two whole figure constructs on AG component 1 (Isaac-relevant) and AG component 2 (Ruth-relevant) were first listed in the following table.

	Component 1		Component 2	
	$Grid_1$	$Grid_2$	$Grid_1$	$Grid_2$
ISAAC-LIKE SELF	-3.05	-1.31	- .49	2.80
ISAAC-LIKE PARTNER	-2.51	-3.04	2.09	-1.19
RUTH-LIKE SELF	-1.83	-3.48	2.69	-1.40
RUTH-LIKE PARTNER	-2.87	-3.59	-2.06	.58

Two tests were then conducted on the differences in these loading values in relation to the population of differences in loadings of all constructs applied on the two testing occasions; (i) a test based on the difference in absolute loadings on the two testing occasions. Here, a positive difference indicates the increasing relevance of a given construct to the component, a negative difference decreasing relevance. Table (i) below lists the distribution, mean and standard deviation of observed differences in absolute loadings of replicated constructs ; (ii) a test based on algebraic differences between loadings on the two testing occasions. This test takes account of changes in the polarity of relevance, in that a positive and negative loading of the same value for a given construct on the two testing occasions (indicating a reversal of relevance on a component) would be concealed by the former test. Table (ii) below lists the distribution, mean and standard deviation of observed algebraic differences between loadings of replicated constructs.

As these difference distributions represent the entire population of differences, z scores were computed for obtained differences on the two whole-figure constructs for each subject, and tested by approximation the normal distribution probability density function. Z scores and associated one-tailed probabilities are listed below each table.

(i) Differences between absolute construct loadings on the first two components over testing occasions.

Construct	Ruth Comp. 1	Ruth Comp. 2	Isaac Comp. 1	Isaac Comp. 2
1	.711	.544	.014	.944
2	.340	- .435	.141	- .030
3	2.702	- .870	.009	- .758
4	.106	.244	.341	- .737
5	.571	- .104	.932	- .673
6	- .515	- .198	.301	.233
7	.244	.164	1.135	.299
8	.148	- .684	.133	.031
9	.492	- .303	.457	- .269
10	.243	- .479	.912	- .532
LIKE RUTH	1.640_a	-1.292_b	$.529_c$	$-.891_d$
LIKE ISAAC	$.726_e$	-1.482_f	-1.740_g	2.307_h
M	.617	- .403	.264	- .006
S	.829	.606	.733	.908

Z scores and associated one-tailed probabilities:-

a. $z = 1.234$, $p = .109$
b. $z = -1.459$, $p = .072$
c. $z = .362$, $p = .359$
d. $z = -.975$, $p = .165$
e. $z = .131$, $p = .448$
f. $z = -1.772$, $p = .038$
g. $z = -2.734$, $p = .003$
h. $z = 2.547$, $p = .005$

(ii) Algebraic differences between construct loadings on the first two components over testing occasions.

Construct	Ruth Comp. 1	Ruth Comp. 2	Isaac Comp. 1	Isaac Comp. 2
1	- .711	.544	- .014	.944
2	- .340	.435	- .141	.030
3	2.702	- .870	- .009	.758
4	- .106	.244	- .341	1.143
5	.571	- .104	- .932	- .673
6	.515	- .198	- .301	.233
7	- .244	.164	1.135	.299
8	- .148	.684	- .133	.031
9	- .492	.303	- .457	.269
10	- .243	- .479	- .912	.532
LIKE RUTH	-1.640_a	-4.082_b	$-.529_c$	-3.231_d
LIKE ISAAC	$-.726_e$	2.640_f	1.740_g	3.239_h
M	- .072	- .060	- .075	.298
S	1.047	1.530	.779	1.485

Z scores and associated one-tailed probabilities:-

a. $z = -1.493$, $p = .067$
b. $z = -2.629$, $p = .004$
c. $z = -.583$, $p = .280$
d. $z = -2.410$, $p = .008$
e. $z = -.625$, $p = .266$
f. $z = 1.765$, $p = .039$
g. $z = 2.330$, $p = .010$
h. $z = 2.014$, $p = .022$

(d) Construct centrality

To test the extent of change of relevance of constructs to self and partner definitions, centrality scores for self and partner in the IG solution (see I.3) were ranked and Spearman rank-order correlations obtained between testing occasions:-

Construct	Isaac				Ruth			
	IGS_1	IGS_2	IGP_1	IGP_2	IGS_1	IGS_2	IGP_1	IGP_2
1	7	7	6	5	9	9	9	3
2	3	9	4	4	1	12	2	5
3	9	8	7	8	5	6	4	4
4	1	10	2	11	7	7	11	10
5	6	5	9	2	11	1	3	8
6	2	3	1	7	6	2	8	12
7	12	12	12	3	3	4	10	9
8	10	2	11	1	10	10	5	6
9	8	1	8	9	12	8	6	2
10	5	11	3	10	4	5	12	7
11	4	4	5	12	2	3	7	11
12	11	6	10	6	8	11	1	1
Rho	- .028		- .622*		.070		.490	

* denotes significance at the 5 percent level (one-tailed)

(e) Discriminative control

To test for increases in accuracy of discrimination of cues associated with predication centrality, self-relevant centrality scores in IG and AG solutions were ranked and Spearman rank-order correlations calculated between obtained ranks and rankings obtained for subjective estimates of self-relevance in Module B. In addition, increments or decrements in correlations over the two testing occasions were tested by applying Fisher's transformation. The following table lists the rankings on each testing occasion, for IG solutions (a) and AG solutions (b), where S represents subject's ranking, and O observed centrality rank.

(a) Centrality in individual grid solutions

Construct	Isaac				Ruth			
	P_1	O_1	P_2	O_2	P_1	O_1	P_2	O_2
1	2	7	1	9	4	9	5	11
2	5	3	9	14	11	1	7	17
3	7	9	17	13	3	5	4	6
4	9	1	2	16	6	7	8	7
5	8	6	12	6	10	11	10	1
6	11	2	3	4	5	6	11	2
7	12	12	15	18	12	3	3	4
8	3	10	8	2	7	10	13	13
9	4	8	6	1	9	12	12	8
10	10	5	14	7	2	4	2	5
11	6	4	11	5	1	2	1	3
12	1	11	10	7	8	8	6	14
13			18	12			9	12
14			16	11			13	10
15			13	15			17	18
16			5	10			16	15
17			7	8			15	9
18			4	3			14	16
Rho	- .315		.428		.175		.472	
z	- $.326_a$		$.457_b$		$.177_c$		$.513_d$	

(b) Centrality in aggregate grid solutions

Construct	Isaac				Ruth			
	P_1	O_1	P_2	O_2	P_1	O_1	P_2	O_2
1	4	6	3	1	2	12	3	14
2	3	9	4	14	8	4	9	11
3	7	11	16	17	12	9	11	8
4	6	4	6	13	10	8	10	1
5	9	10	12	12	5	10	12	5
6	11	3	10	3	4	11	15	13
7	12	12	17	18	6	6	4	10
8	8	5	9	7	7	1	13	2
9	2	1	5	2	11	9	16	4
10	5	8	2	11	3	7	7	3
11	10	2	15	8	1	3	1	6
12	1	7	1	10	9	2	6	7
13			18	15			2	17
14			7	9			18	15
15			13	16			17	12
16			11	6			14	16
17			14	4			8	18
18			8	5			5	9
Rho		.147		.364		- .091		- .022
z		$.148_e$		$.381_f$		$-.091_g$		$-.022_h$

Standard error for all comparisons = .422

Comparisons:-

a.b. $z_a - z_b$ = .783, z_r = 1.855, p = .031

c.d. $z_c - z_d$ = .336, z_r = .796, p = .212

e.f. $z_e - z_f$ = .233, z_r = .552, p = .291

g.h. $z_g - z_h$ = -.069, z_r = .164, p = .436