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Canter, David V.

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4 A Multiple Sorting Procedure for Studying Conceptual Systems

Constructs and categories

Many psychologists have emphasised that the ability to function in the world relates closely to the ability to form categories and to construct systems of classification by which nonidentical stimuli can be treated as equivalent (e.g., Miller 1956; Bruner et al, 1956; Rosch, 1977). As Smith and Medin (1981) have recently reiterated, if we had to deal with objects, issues, behaviour, or feelings on the basis of each unique example, then the effort involved would make intelligent existence virtually impossible. Thus, an understanding of the categories people use and how they assign concepts to those categories is one of the central clues to the understanding of human behaviour. As consequence, one of the important questions for many investigations is the nature and organisation of the concepts that people have, specific to the issues being explored.

In the present chapter, a procedure for exploring the categories and systems of classification that people use in any given context will be described. It is known as the *multiple sorting procedure* and it allows a flexible exploration of conceptual systems either at the individual or the group level. The rationale for the procedure will first be discussed and then examples of its use for answering a variety of different research questions will be presented.

In this discussion of the nature and organisation of people's conceptual systems, an important distinction must be made between the underlying categorisation processes and the 'ordinary' explanations that people give for their actions. It is the former that is the focus of this chapter; the latter will be discussed in another chapter by Brown and Canter.

As Brown and Canter argue, many research questions are best answered by reference to 'ordinary' explanations, especially when the expertise of the individual being questioned and the unique understanding that he or she can bring to the situation are central. Alternatively, in those studies where the research questions focus on the general conceptual processes underlying the explanations people might give, it is frequently fruitful to explore the categorical organisation of those conceptual processes.

For example, if the research were questioning the compromises involved in administering a prison, then the explanations of the prison governor would be

*We are grateful to Judith Sixsmith for her comments on this chapter

crucial to the study. On the other hand, if the differences in the experiences of inmates of different prisons were being explored, then it would be important to examine the classification schemes which prisoners applied to their prison experience.

The study of personal systems of classification and of explanations are not inevitably distinct. They are both part of the general psychological approach that places an emphasis on understanding the individual's own framework for dealing with and making sense of the world. They do, however, place an emphasis on different aspects of people's conceptualisations, and are consequently of particular relevance for different types of research question.

Thus, although the study of the personal categorisation processes people use in thinking and acting can be recognised as being part of the general exploration of meaning, it does focus especially on subjective or personal meaning. In the book they edited, *Personal Meanings*, Shepherd and Watson (1982) show with many examples that in both a clinical and a scientific mode of operation, practitioners need to construe the personal meanings of others. This construal requires, they argue, the development of a framework for describing the professional understanding of the meanings utilised by others. For such a framework to be authentic, Shepherd and Watson insist, following Harré and Secord (1972), that it must draw upon an intensive rather than extensive approach to data collection. This involves working directly with individuals in their own terms, respecting their ability to formulate ways of thinking about the world and their experience of it. This contrasts with the use of standard questionnaires or structured interviewing procedures in which the researcher has formulated views on what the respondent will wish to comment upon, and so the researcher is, in effect, checking the extent to which the respondent will endorse the experimenter's speculations.

The intensive study of personal meanings also has strong parallels in the studies of *subjective meaning* carried out by Szalay and Deese (1978). They argue for a clear distinction between 'lexical' and subjective meaning. The former being an attempt to define in the public forum (as in a dictionary) the commonly held meanings of words, the latter being an account of what is salient to an individual together with an indication of its affectivity. They see the study of these meanings as being crucial to the understanding of culture.

It is their focus on culture that leads Szalay and Deese to refer to *subjective meaning*, and the client-oriented perspective of Shepherd and Watson which leads them to deal with *personal meaning*. Yet they both have much in common. They both emphasise the need to understand the conceptual system of the individuals being studied or helped. The conceptual framework of constructs and the categories on which the respondent draws are seen by both as the starting point for understanding the respondent's actions in the world.

In Britain, at least, the concern with understanding the personal conceptual systems of individuals was spurred on by the writings of Kelly (1955) and helped along by the prolific enthusiasm of Fransella and Bannister (e.g., Fransella and Bannister, 1977). Yet, the view that each individual had a unique way of construing the world was not alien to William James many years earlier (1890) and

was emphasised in some of Allport's writings (1937), when he argued for the value of an idiographic approach. Anthropologists and sociologists, especially those with a structuralist orientation, have also emphasised throughout the present century the importance of understanding individuals' systems of meaning (cf. Douglas, 1977). Furthermore, social psychologists, in studying the role of situations in human behaviour, have established the importance of the interpretations people make of those situations in which they find themselves (Argyle et al, 1981).

Restrictive explorations

The brief review above reveals that there are two common themes in many disparate writings on psychology. One is the need to explore the view of the world as understood by the respondents in any enquiry. The second is the recognition that world view is built around the categorisation schemes people employ in their daily lives. Yet, unfortunately, psychologists have been influenced by a further consideration, which has tended to dilute the impact of these two themes: the desire for quantitative, preferably computer analysable, results. Most computing procedures have limitations that are so fundamental that they are taken for granted and rarely challenged, thus influencing the data collection procedures in ways so subtle that researchers are unaware of them. A self structuring cycle is then set in motion. Data are collected in a form that fits known methods of analysis. Standard analytical procedures gain in popularity and are easy to use because they fit the usual data. Data are then commonly collected in the form appropriate to the standard procedures. Thus the existing capabilities of readily available computing procedures help to generate standard forms of data collection, even if those computing procedures are inappropriate for the psychological issues being studied. Without going into a lot of technical detail, a number of restrictions imposed by conventional, widely used, statistical procedures can be summarized:

1. The most commonly used statistics tend to limit data to those having a strong, clear, linear order. Categorical data are seen as being difficult to accommodate. Thus, rating scales (e.g., 7-point) are much preferred to qualitative categories.
2. The procedures limit the structure of the set of variables, so that there are the same number for each respondent. Furthermore, the number of divisions into which each variable is coded is constrained, so that it is the same for all people. Analysis is limited to the manipulation of arithmetic means and correlations over large groups, but this requires that the actual organisation of the data for each respondent is identical.
3. Because of their computational efficiency and mathematical elegance, statistical models have tended to be restricted to those that are based on assumptions of underlying linear dimensions and that consequently generate dimensional explanatory models. Qualitative models, although increasing in popularity, are still rare.

These constraints on the analysis of data have become more apparent with the increasing availability of other computing procedures that do not have these limitations and with the strengthening of the idiographic perspective. Indeed, it is being recognised that the popularity of procedures such as the semantic differential (Osgood et al, 1957) are due to the ease of data analysis rather than any conviction that they are measuring important aspects of human experience. The semantic differential with its 7-point scales, standard set of items, and factor analysis of results, has been shown to be insensitive to differences between cultures (Osgood, 1962), and, although this may be of interest to cross-cultural psychologists, it does not suggest itself as a technique that will reveal important differences between individuals.

In effect, the semantic differential constrains the concepts people can reveal by providing them with a set of terms to which to respond and by giving precise instructions as to how that response can be structured. Procedures that allow some possibility for the respondent to frame his/her own answers are essential if the essence of any given individual's conceptual system is to be established. Thus, open-ended procedures, especially those built around the interaction potentials provided by the one-to-one interview, recommend themselves to the student of conceptual systems.

Many researchers (unaware of the range of analyses now available) are fearful of embracing open-ended procedures because they are concerned that their results will be difficult to interpret and the report or publication they seek will be difficult to structure. Thus, even when they are interested in their respondents' understanding of the world, they explore it through multiple-choice questions or very constrained rating procedures. Yet, serious researchers will still insist on what is usually termed 'good pilot research'. This does involve talking to people in a relaxed, open-ended way and learning from them about the concepts they use in a particular context. It is often at this stage that the real objectives, and in effect the major findings, of the research emerge. Subsequent research frequently only clarifies a little, or provides numerical support for, the insights gained at this 'pilot' stage. This is a curious state of affairs when data comes from one part of the research activity and insights from another. Research would be more effective if procedures allowed the interviewees to express their own view of the issues at hand, in their own way, whilst still providing information that is structured enough for systematic analysis and reporting.

Beyond the repertory grid

The interview, with its potential for subtle interactions and its concern with the interviewee's understandings, is a fruitful context in which to explore people's concepts. Over the past few years a number of procedures have emerged for generating and examining people's conceptual systems within that context. One of the most popular is Kelly's repertory grid (Kelly, 1955). As many authors have noted (e.g., Fransella and Bannister, 1977; Adams-Weber, 1979; Bonarius et al,

1981), the repertory grid, deriving as it does from a theory of people that puts emphasis on their conceptual systems, does have much to recommend it; yet the Role Repertory Test, which has evolved from Kelly's original proposals, is often used with less sympathy for Kelly's Personal Construct Theory than might be expected. Furthermore, the forms of statistical analysis known to Kelly limited the forms of development in grid analysis procedures, which has had direct consequences for the forms of grid which he and his followers have developed.

Fransella and Bannister (1977) comment on many of these weaknesses of the grid as used. They point out:

1. The grid 'has been turned into a technology which generates its own problems and then solves these problems. Such problems do not necessarily relate to any attempt to understand the meaning which the person attaches to his universe' (p. 113).
2. Grid use has been limited by the 'requirement that the subject present his judgements in handy grid statistical format before we can analyse pattern' (p. 116).
3. It is a fair guess that it is the mathematical ingenuity of the grid which has attracted psychologists rather than its possibilities as a way of changing the relationship between 'psychologist' and 'subject' (p. 117).

Recent developments in computing procedures have weakened some of these criticisms, especially interactive on-line computing, which allows a much more flexible exploration of construct systems (cf. Shaw, 1982), but the main point made by Fransella and Bannister, that the grid technology as such has masked other possibilities for exploring personal constructs, still remains.

The repertory grid technique is neither as unique in its contribution nor as definitively special to personal construct theory as its users often claim. Kelly himself traces the origins of the grid to the sorting procedures used by Vygotsky (1934) and others, and thus puts his grid technique firmly in the realm of the exploration of categories and concepts. He writes:

Methodologically the Repertory Test is an application of the familiar concept formation test procedure. It uses as 'objects' those persons with whom the subject has had to deal in his daily living. Instead of sorting *Vygotsky blocks* or *BRL objects* the subject sorts people. The technique bears some resemblance to the sorting employed in the Horowitz Faces Test. It is also somewhat similar to Hartley's later procedure in which he used pictures in a sorting test. Rotter and Jessor have also experimented tentatively with the formation of 'social concepts' in the sorting of paper dolls of the Make a Picture Story (M.A.P.S.) Test. (Kelly, 1955, Vol. 1, pp. 219-220)

He emphasises that his test differs from these other procedures in two ways. First, it is concerned with content, 'how the items are dealt with', as well as the more usual concern for the level of abstraction involved. Second, it is 'aimed at

role constructs'. This latter emphasis was seen as being relevant to clinical practice, not an inevitable emphasis for all studies of personal construct systems.

Instead of Q-sorts and paired-comparisons

The Q'-sort' technique was, like the repertory grid, developed as a way of examining the critical concepts people hold about role figures or events of significance to them (Stephenson, 1953). But, while this method enables people to assign elements to categories, the categories themselves are specified, usually as increments of an adjectival scale. Moreover, the Q-sort is typically used in a form whereby the interviewee is required to assign elements to the categories in a specified (almost always an approximately normal) distribution (Pitt and Zube, 1979). The use of an enforced distribution is defended, in part, on the grounds that the procedure provides data that is more conveniently processed (Block, 1961), and eliminates the problem, inherent in rating scale procedures, of different individuals calibrating the scale in different ways (Palmer, 1980). These restrictions on the interviewee's sorting behaviour thus make the Q-sort more akin to the semantic differential technique than to the intensive one-to-one interview procedure we are advocating.

Other highly restrictive sorting procedures have recently been developed as an alternative to paired-comparison judgements of similarity. For example, Ward (1977) and Ward and Russell (1981) have used sorting procedures, in which both the sorting criteria and the number of categories are specified, as a means of generating similarity matrices. Although Ward argues that the process of sorting is probably more 'natural' for the interviewee than similarity judgements, the key argument for its use seems to be that it is less time consuming than paired-comparisons while at the same time provides equivalent similarity data that is suitable for multidimensional scaling procedures.

Indeed, the development of multidimensional scaling procedures grew out of the analysis of similarity judgements of pairs of stimuli. Schiffman et al, (1981) see similarity judgements as 'the *primary* means for recovering the underlying structure of relationships among a group of stimuli' (p. 19). They go on to state that they think that similarity judgements are to be preferred to verbal descriptors because such descriptors are 'highly subjective and often conceptually incomplete' (p. 20). The view of the authors of the present chapter is that, whilst there may be some validity to this contention in the experimental study of perceptual stimuli, to which Schiffman and her colleagues repeatedly make reference, such a view of all human conceptualisations is unnecessarily restrictive and has not been defended with any theoretical strength.

It is our contention that perceived similarity is a more complex phenomena than can accurately be described by a single rating. Perceived similarity may, in fact, be defined by a set of multiple categorisations based on a wide variety of criteria. In many cases it is the overall patterns that emerge as a result of the concepts people themselves naturally apply to the objects or elements that is of psychological

concern. Even when people are unable to put words on their categorisation of elements, it is the structure they impose on the world that should be the starting point for the psychologist, rather than any general mathematical theory.

For, although interview-based sorting procedures do have a long history, it is only recently that the full possibilities of this approach have become apparent. These possibilities attempt to avoid the limitations of earlier procedures. The multiple sorting procedure does not impose a view of the likely structure and content of an individual's conceptual system on the interviewee. It minimises the 'technique for its own sake' syndrome by allowing the exploration of both the nature and the organisation of concepts about any issue, maintaining the freedom and open-ended qualities considered so essential by many researchers, yet still providing for systematic analysis of individuals or groups. The use of the multiple sorting procedure and systematic analysis of data from it is possible, in part because of developments in nonmetric multidimensional scaling procedures, the use of which will also be illustrated later in this chapter.

Sorting as a focus for an interview

As has been noted, many of the explorations of which interviews are a part are aimed at coming to grips with the conceptualisations of the interviewee, whether it is a market research study, such as that looking at the corporate image of banks (Frost and Canter, 1982), or a more theoretical exploration of architects' use of stylistic terms (Groat, 1982), or even research of a more pragmatic nature, looking at why people move house (Brown and Sime, 1980). In all cases it is the particular categories and concepts people use that is at issue, as well as the way in which they use them. The interview is especially suited to these types of exploration, because the interviewer and the interviewee can explore each other's understandings of the questions being asked and because the one-to-one situation can accommodate a more intensive interaction.

Unfortunately though, the potentials of the interview are frequently its pitfall. Asking open-ended questions in the relaxed way thought to increase rapport is the formula for unanalysable material. What is needed is a way of providing a focus for the interview to guide and structure the material produced without constraining the interviewee unduly. Bruner et al (1956) were some of the first to show clearly the possibilities for exploring the nature of the concepts people have by studying how they assign elements to categories. Such a procedure provides a focus for the interview, allowing other related material beyond that generated by the sorting to be noted. Yet few have followed this lead out of the laboratory by using as elements material of direct significance to the responding individuals.

Sorting procedures of various types have probably been used most frequently in the environmental psychology field, perhaps because they enable researchers to use illustrations and other visual material which are difficult to accommodate within other procedures. Specific applications of sorting technique within environmental psychology have ranged from those used simply to generate similarity matrices

(Ward, 1977; Horayangkura, 1978; Ward and Russell, 1981) to those seeking to integrate the sorting process with the verbal descriptions and explanations inherent in a one-to-one interview situation (Gärling, 1976; Palmer, 1978; Groat, 1982). In the case of the latter, the researchers have intentionally used the sorting technique precisely because it is free of the limitations discussed earlier.

In the case of social psychology, one of the earliest approaches to the sorting stimuli is found in the work by Thurstone and Chave (1929), who used the judgements people made of questionnaire items as a basis for assigning weights to those items. It was the discovery that the attitude of the judges influenced the pattern of judgement that led Sherif and Sherif (1969) to develop the 'own categories' procedure and direct measure of 'ego-involvement' in attitudinal issues. In the 'own categories' procedure, judges assign attitudinal items to categories in terms of how extreme the attitudes expressed are thought to be. The distribution of the items in the categories is then used as a measure of the intensity of the judge's own attitudes. This differs from the clinical object sorting procedure, which Kelly discussed, in that the distribution of items to categories in a predetermined sorting concept is the main concern.

Contemporary psychologists such as Eckman (1975) have also used free sorting procedures in their work on normal verbal communication. In a related manner, Tajfel (1981) developed a theory of social categorisation to explain 'in' and 'out' group behaviour. Tajfel (1978) states: 'The role of categorisation in perceptual and other cognitive activities has been for many years one of the central issues in psychological theory' (p. 305).

Tajfel's work involves organising information in certain ways, examining differences and similarities between the content of categorisations. The chief function of this process resides in its role as a tool in systematizing the environment for action. However, Tajfel argues that assigning items to categories is influenced by the other categories in the structure of a person's experience. His experimental work was aimed at unravelling the complexities of prejudice through the process of category assignments.

Clearly then, in using the sorting procedures as an interview focus, the interviewer's task is to identify the interviewee's salient categories and the pattern of assignments used to relate categories to elements. The more freedom the interviewee can be given in performing this task the more likely that the interviewer will learn something of the interviewee's construct system rather than just clarifying his own. Such freedom should extend to the range and structure of the categories, of which the constructs are composed, as well as to constructs and elements sorted.

The multiple sorting procedure

The multiple sorting procedure advocated here asks little of the interviewees other than that they assign elements to categories of their own devising; it differs from the other previously discussed response formats in that no limitations are necessarily placed on how the sorting is to be done. In fact, the respondent is

encouraged to sort the elements, using different criteria, a number of times. The rationale for this less restrictive version of the sorting process is the belief that the meanings and explanations associated with an individual's use of categories are as important as the actual distribution of elements into the categories.

The actual act of sorting items is a common activity. For example, in choosing a house, people will literally sort through the particulars sent to them by estate agents. In many other areas of choice, whether it be clothing, books, partners, or political parties, there is an explicit selection on the basis of a personal categorisation scheme. But even when a selection is not overtly involved, such as in evaluating how successful a given setting is likely to be for a given activity, or an essay in gaining a good mark, the judgement is based on an implicit categorisation scheme. The multiple sorting procedure aims to bring to light these personal schemes.

To carry out the multiple sorting, a person is presented with a set of elements and an introduction and instructions as follows:

I am carrying out a study of what people think and feel about *children* [A] so I am asking a number of people *chosen at random* [B] to look at the following *pictures* [C] and sort them into groups in such a way that all the pictures in any group are similar to each other in some important way and different from those in the other groups. You can put the picture into as many groups as you like and put as many pictures into each group as you like. It is your views that count.

When you have carried out a sorting, I would like you to tell me the *reasons* [D] for your sorting and what it is that the pictures in each group have *in common* [E].

When you have sorted the pictures once I will ask you to *do it again* [F], using any different principles you can think of and we will carry on as many times as you feel able to produce different sorts. Please feel free to tell me whatever occurs to you as you are sorting the pictures.

The items underlined and indicated with letters in [] are those components of the instructions that are likely to change for different procedures in relation to different research questions. It must be emphasised, however, that these instructions are only a general statement of what is possible. The flexibility of the procedure is such that many different variations of the instructions are possible. Pilot work is always essential in order to discover what particular instructions are appropriate for each study, although typically all components [A] to [F] must be explicitly dealt with.

The elements to be sorted ([C] in the instructions), depending on the research question, may be generated by the interviewee or the interviewer; they may be labels, concepts, objects, pictures, or whatever, as will be illustrated. The person is usually asked to look through the elements to familiarise him/herself with them; also, the purposes of the research enterprise are explained (relating to instructions components [A] and [B]). In particular, it is pointed out that the interviewer is interested in the interviewee's ways of thinking about the elements presented. The interviewee is then asked to sort the elements into groups so that all the elements in any given group have something important in common, which distinguishes them

from the elements in other groups. Thus, a number of groups are produced which may vary in the number of elements in them, and of course the number of groups produced may also vary from person to person and from one set of elements to another.

After this initial sort, further sorts may be carried out by the same individual, a number of times. But let us consider the initial sort before moving to multiple sorts.

An individual example

Consider a preliminary example, here drawn from a multiple sort carried out with a gambler we will call Ace. We were interested in Ace's views of various casinos, as part of a larger project to study what it was that gamblers enjoyed about gambling. The particular purpose of the sorting procedure was to see the basis on which a gambler selects which Casino to visit and to get some understanding of his view of the Casinos available. We wanted to know what sort of world a gambler moves around in, what type of choices he sees as being available to him.

Ace was asked to list on cards all the casinos he knew in any detail and to assign names for his own convenience. For the researcher's convenience, each card was numbered on the back. On his first sort, Ace chose to divide the cards into three groupings. These groupings were recorded as shown in *Table 1*, by the simple process of noting under each group the letter for the card.

At this stage, the researcher has an indication, without any verbal labelling, of one category scheme for the respondent. Such information can be very valuable, especially when working with groups of people who are not especially articulate. But there are a number of further developments of the procedure possible within the same framework. The verbal concomitants of the category scheme can be explored by asking the interviewees to indicate the basis on which they have carried out the sorting, as in the instructions [D] and [E]. This generates two levels of description. The first is a superordinate description of the principle for the sorting, from instructions [D], for example, 'whether the casinos have frills or not, or 'the amount of money to play the lowest stake'. The second is a set of category labels for each of the groups (instructions [E]), for example, for the 'frills' sort, Ace's categories were 'places with no frills', 'places with sedate dining', and 'vaudeville'; for the 'stakes' sort, Ace's categories were 'less than £5', 'between £5 and £25', and 'greater than £25'.

A useful way of recording this verbal information shown by reference to Ace's sorting of casinos is also in *Table 1*. The categories are summarised with a description of the category scheme for the sort as well as labels for each of the groups within this sort. Other comments and points of clarification made by the respondent can easily be accommodated within this format, as well as any order that might be given to the category groupings. Given the value of the procedure as a focus for exploring a content domain, these comments may generate material of considerable value in their own right. Thus, the researcher need not reduce the responses to bipolar scales, which are often ambiguous when considered at some

time after the interview.

Table 1

Record of Ace's Sorts

First Sort: 'Class of Casino'

1. 'Gaming Halls': G, H, D, A
2. 'Middle Class': B, C
3. 'High Class': E, F

Second Sort: 'Type of Frills'

1. 'Just Gambling': A
2. 'Baudeville': B, G, H
3. 'Sedate Dining': E, D, C, F

Third Sort: 'Size of the Stake'

1. 'Less than £5': A
2. 'Between £5 and £25': G, H, B
3. 'Greater than £25': C, D, E, F

Fourth Sort: 'Most likely place for me to make money at'

1. 'Most likely': A, G, H
2. 'Not so much': B
3. 'Too expensive': C, D, E, F

Fifth Sort: 'Preference'

1. 'Most preferred': A, G, H, E
 2. 'Solid Casinos': C, D
 3. 'Bit Quiet': F
 4. 'Did not like at all': B
-

*Casinos: A-Golden Nugget; B-Playboy; C-Park Lane; D-Palm Beach; E-Hereford; F-Park Tower; G and H-Las Vegas casinos.

Unlike the analyses discussed by Schiffman et al (1981), and used, for example, by Ward and Russell (1981), the multiple sorting data need not be reduced to association matrixes, typically aggregated across groups. Both the superordinate description and the category labels can be subjected to content analysis and to multivariate statistical analyses, but it should be noted that no structure or order to these descriptions is initially assumed or implied. This is particularly important for the category labels. The bipolar dichotomies of rating scales are not assumed, nor is the order of items from ranking or scaling. If the interviewee specifies a particular order, as in the 'amount of the stake' example, then note can be taken of that, but if any order might be more obscure, as in the 'frills' example, then that can be utilised as well. Indeed, category schemes frequently emerge that are not simply bipolar; and this raises important questions about the extent to which such bipolarity, assumed in much research, is an actual feature of psychological processes or an artifact of the structured measuring instruments used. Furthermore, in some cases an interviewee may choose to sort some of the elements and leave

others as irrelevant to the overall sort taken into account. This irrelevant group is treated as forming a further category and can be incorporated in the subsequent analysis without any loss of information or imposition of a superordinate categorisation on all the elements.

Having produced one sort of the elements, it is of value in many projects for the multiple sorting to continue by asking people to examine the elements again and to try and produce another category scheme with new descriptors (instructions [F]). Table 1 gives a summary of all five sortings produced by Ace in the interview conducted with him. Analysis of this will be discussed later. It should also be noted that the number of elements sorted here (eight casinos) is limited by the number of casinos to which anyone has ready access in London, and might not give the richest picture possible. The process can continue as many times as the interviewee feels able to sort the elements. In research carried out to date, two or three sorts are common, but up to seven or eight are frequently possible, with 15 or more occurring in some cases. The number of elements that it seems fruitful to use is in the region of 15 to 25. Depending on the individual, of course, a complete set of sorts may take anything from 10 minutes to well over an hour, which may also be extended insofar as the sorting is used as a focus for other issues explored in the interview.

Hypothesis testing

The example used so far, from the casino sortings, is simple enough to illustrate the procedure in use with one person, as a basis for getting to understand some particular aspects of that individual's conceptual system. But the power of the multiple sorting task as a means for testing hypotheses of conceptualisations common across a number of people can also be readily illustrated. Let us consider, for example, the work of Bishop (1983).

Bishop had as a central concern the role the age of buildings played in people's views of their surroundings. However, he was aware that his own fascination with the age of buildings might have given him a particular perspective and that this way of thinking about buildings might not have been very important to most people. However, since it is clear that people can comment on a building's age, any direct questioning about age or its significance might have given a spuriously high weighting to the role of age. Bishop therefore carried out a multiple sorting with a number of respondents. He did this by preparing a set of photographs of buildings which differed in age and gave them to people to carry out a set of free sorts, as described above.

Bishop's hypothesis was strongly supported. Thirty of the thirty-five people he asked used age as a basis for sorting, although only eight used it as the basis of their first sort. Bishop went a step further and classified his respondents in terms of the type of age sorting they made, showing quite convincingly that their understanding of architectural age varied very greatly, although they spontaneously used the concept. This differentiation of his groups laid the foundations for the

development of his study.

To see the potential range of uses of, and variation on, the multiple sorting procedure and ways of analysing data from it, we will now turn to other specific examples.

Variations in elements sorted

The types of elements that can be used for sorting are limited only by the imagination of the investigator and the practicalities of what can be carried about and sorted on the surfaces available. Indeed, the development of microcomputers offers some intriguing possibilities for increasing the range and variety of elements that can be sorted; for example, moving objects, even for monitoring the process of sorting by recording the hesitations and false starts that might otherwise get lost in a paper and pencil record. From the initial uses of sorting procedures, as noted earlier, a great number of different objects have been sorted. But in the more recent explorations of the content and structure of free, multiple sortings, a variety of representations of objects, or simulations, have also been used. Groat (1982), for example, used *photographs* of buildings taken from architectural magazines, books and slide collections, to explore how architects' ways of thinking about famous buildings compared with the conceptual systems of accountants. Oakley (1980) used *labels* of places to stay such as hotel, parents' home, or hospital, to examine the views residents had of Salvation Army hostels in which they were living. Grainger (1980) had architects and their clients sort the *activities* a proposed building might house, in order to establish their different understandings of what the building's functions were to be.

Focus of the elements

In general, the more concrete and specific the elements are and the more familiar the respondent is with the elements, the more likely it is that they will be able to produce a number of rich and varied sorts. Abstract labels of possible emotions, for example, are likely to encourage relatively few sorts, whereas a set of detailed descriptions of actual places a person has direct experience of is likely to lead to the generation of a great many sorts from each respondent. The selection of elements will always need to be guided by an awareness of what the respondents are normally used to considering and whether the research is best served by a simulation, a representation of some entity, or by reference to the actual phenomenon itself.

A further consideration in selecting the range of elements to use is how big a variation to select. If general stereotypic sorts are of interest, then a very broad range across the element domain is advisable. For example, a study of conceptualisations of medical specialities among medical students would possibly be best studied using a list of all the specialities as organised in a medical text book. On the other hand, if students' individual choices of future careers were being

explored, then a subset of specialities described in relation to their working context and with reference to the students' direct experience may well generate more specific sortings, revealing the idiosyncrasies of particular individuals' conceptual systems.

Generation of the elements

In considering how the elements should be generated, two matters need to be considered: (1) whether the elements are to be generated by the investigator or not, and (2) whether the elements will have a specified structure or be a sample of some identified population.

If the researcher is setting out to test some hypotheses about people's conceptual systems, then it is likely that the elements will be identified by the researcher. For example, Groat (1982) chose photographs of buildings to test her particular hypotheses about architects' conceptions of styles. On the other hand, in the example with Ace described above, it was essential to elicit the casinos of which he had direct experience. Similarly, Groat ensured that her set of photographs included three specified styles and four building functions, whereas for the gambler, all the casinos he had actually visited were used.

The generation of the elements thus has a direct bearing on whether the sorting procedure is to be used for exploratory, heuristic, or descriptive purposes or hypotheses testing. This procedure then has potential at many different stages and in many different areas of research endeavour.

Construct elaboration

As has already been mentioned, the sorting procedure allows constructs to be elaborated in many different ways, depending on the goals of the research activity and on the capabilities of the respondents. If the research is aimed, for example, at identifying whether residents of a hostel think of its function differently as a consequence of how long they have been there, then a knowledge of which other places of residence they think are similar to their own hostel may be of great value. For instance, Oakley (1980), in his study of hostel residents, generated data from the sorting procedure without probrity for labels of the categories being used. His respondents did find verbalisation difficult, but the groupings of the elements themselves provided him with some useful basic data, which enabled the Salvation Army to clarify some of the principles on which to consider the provision of new hostels.

On the other hand, if the aim of the research had been to look directly at the processes of individual rehabilitation, it would have been necessary to uncover the concepts residents use for deciding where they are going to stay. In this case, labels associated with each category, or group of elements, would have to be elicited. It is likely that a different set of elements would have been of use in such a study, so that respondents with few verbal skills could be encouraged to express their understanding of what is available to them.

Foci of analysis

The reluctance of earlier researchers to use procedures as open ended as the multiple sorting task, may to some extent be due to the difficulty they perceive in analysing the data generated. However, besides the developments in content analysis, discussed by Barbara Mostyn in an earlier chapter, all of which can be directly applied to the category descriptions generated during the sorting, it is possible to use nonmetric MDS procedures. These enable the analysis to be focused on different issues depending on the research question.

What is meant here by 'focusing' is that the research procedure can be tuned to any of a number of different aspects of the material potentially available. The researcher can, for example, choose to deal with differences between groups or to concentrate on particular sorting criteria within individuals. The multiple sorting procedure as such has no special limitation as to the research enterprise for which it is appropriate. It is simply a data generating procedure which can be harnessed to the goals of a wide range of projects.

First, we shall consider studies of group differences, looking at the relationships between elements and then the relationships between categories. Second, we shall consider studies of differences within individuals.

Group differences

Elements, concepts, and people. In any study of conceptual systems there exist three broad ways in which the data can be examined: by considering differences between the people, differences between the elements, or differences between the concepts and categories to which the elements are assigned. The data matrix that is always possible can be thought of as a cube, as shown in *Figure 1*.

The importance of the data cube is that it shows the variety of possibilities there are for data analysis. In essence, each of the planes of the cube, A, B, or C, provides a different analysis possibility by aggravating combinations of the dimensions. For example, in the prison study described below only one aspect of the concepts was dealt with - similarity to 'this prison'. Thus, it was plane A, elements across people, which was the focus of analysis. A study centring on the structure of the concepts a group of people have across one or many elements would be dealing with the data in plane C, because it would require the differences between people to be ignored. A study comparing people in their conceptualisations would be drawn from plane B.

Figure 1 can be used as a guide to help clarify the research question by showing which 'slice' through the cube is being used and what 'collapsing' of data from another dimension is necessary. It is extremely complex to carry out analyses that combine all three aspects of the data in one operation. It is usually more appropriate to proceed through the analysis in stages, working with one plane of the data cube at a time.

One of the most obvious uses for the multiple sorting procedure is to compare the conceptual systems of different groups. There is now a large literature showing how

different groups of individuals addressing the same topic may have quite different conceptualisations about it, which in turn give rise to different evaluations of the issues at hand and related actions. However, as Canter (1977) pointed out, studies using standard response formats, such as the semantic differential, tend to underestimate the difference in perspectives between individuals. Indeed, such procedures tend only to indicate small differences in emphases rather than revealing the radical differences in conceptual systems commonly present when different groups interact in relation to some common object.

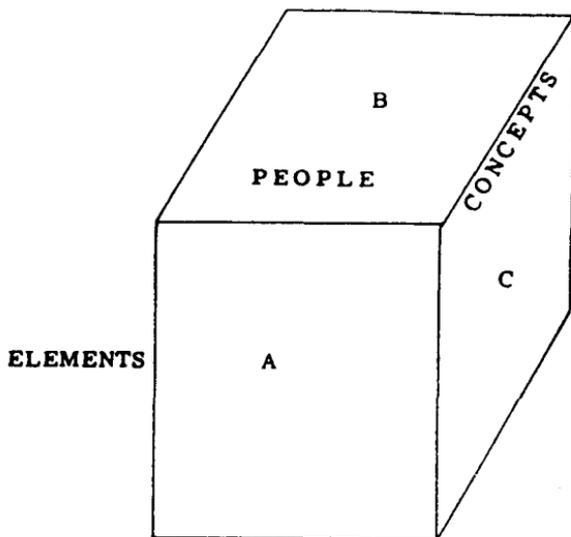


Figure 1 The data cube

The repertory grid is commonly used for group comparisons and frequently with some success (Adams-Webber, 1979); but it does have severe practical limitations, both in the number of elements that can be dealt with in any given study and in the overall time taken to complete a grid (Canter et al, 1976). For comparisons of groups it is also frequently the case that much of the detail generated by the grid is superfluous and not used in analysis. An open, free sorting procedure often has the advantages of individual sensitivity without the procedural disadvantages of the grid.

Ambrose showed the value of a sorting procedure for revealing group differences in a study reported in Canter (1980). In a study of different prisons, inmates and members of staff were asked to sort labels describing places in which people might live. One of the labels to be included in this sort was 'this prison'. A matrix was derived for each respondent showing which other card was put into the same sort as the cards specifying 'this prison'. This matrix, in effect, consists of a series of profiles for each individual indicating whether or not they saw their particular prison as similar to all the other places listed. A multidimensional scalogram analysis (MSAI; see Lingoes, 1973, and Zvulun, 1978 for details) was carried out

interesting to see here that through individuals' free sorts, the perspective shared by prisoners and staff on the nature of the institution is revealed. In this particular case the role groups may well be assumed to be individuals who would not necessarily be expected to work together. Nonetheless, the sorting demonstrates that they do share an understanding of the nature of the institutions.

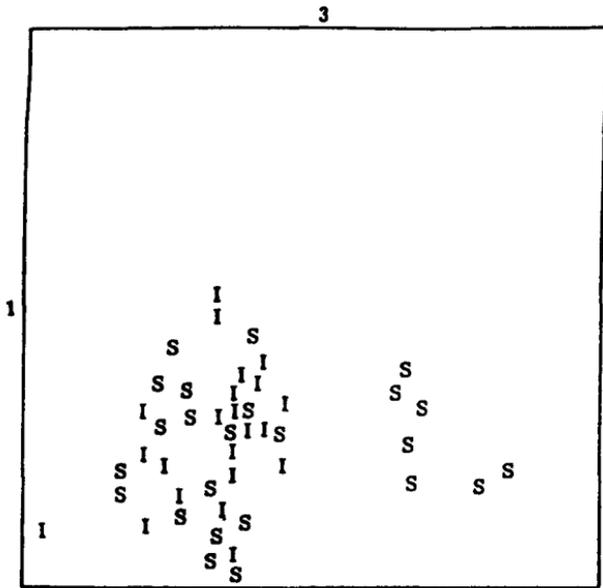


Figure 3 MSAI card sort of residential settings showing staff and inmate respondents: S, staff; I, inmates.

The significance of this finding is increased when it is realised that there is no easy way in which the prisoners could have guessed what the prison officers would have done in a free sort, especially across three different institutions. Yet, in a conventional questionnaire it would have been very difficult to remove social desirability bias from such a situation. Furthermore, the language requirements in terms of fluency and vocabulary that would have been necessary to question people about these subtleties would also have been demanding on many prisoners. However, in the present circumstances a simple assigning of cards to sorting categories appears to have been sufficient to reveal some intriguing differences. Of course, a detailed understanding of the conceptual basis of these differences would not be achieved without a further analysis of the concepts used by staff and inmates. Unfortunately, because of the constrained nature of what was possible within the prison system, the details of the conceptualisations were not explored fully by Ambrose. We will therefore turn to another example to illustrate these more elaborated studies.

The structure of the elements. In some situations it is of particular interest to try and identify the type of conceptual system groups are using. In other words, the structure and content of elements shared by groups of individuals need to be established. With the prison example this was less possible because only one sort was made by each individual, and the particular analysis carried out (reported above) focused on the relationship of one element to all the others. However, it is also possible to carry out analyses that look at the comparison of every element with every other element. Hawkins (1983) did just such an analysis using labels of a variety of possible places with residents of different psychiatric day centres.

Hawkins asked each individual to sort a set of cards labelling places where they might spend their day. Three different day centres were involved in this study, and Hawkins was able to compare the structure of the elements for each of these. She did this by creating an association matrix containing the frequency with which every element was assigned to the same group as every other element, across all sorts and respondents (plane A in Figure 1). A Smallest Space Analysis was carried out on each of the association matrixes created for each of the day centres (cf. Lingo, 1973; Shye, 1978 for details).

This analysis generates a plot showing that elements more similar to each other in the pattern of sortings to which they are subjected are closer together. *Figure 4* shows the SSA plot for the three different hostels; to aid interpretation regions have been indicated on these plots. It can be seen that the overall structures have a number of similarities. They all show the existence of five groups of elements: work, leisure, service, therapy, and residential. They also show that these groups are qualitatively sequenced, around a circle, rather than having a simple, quantitative linear order to them. Yet, there are some clear differences in the way the residents of the three day centres see the various places. In other words, it is not solely their view of the location of their own particular hostel that is different, but the residents of each day facility actually have a different system of thinking about other possible locations. For example, to the residents of centre C the therapeutic group, including 'this day centre' is seen as being between leisure and residence, whereas for the people in centre A it is between work and residence. This reflects a differing emphasis on rehabilitation to work in the various centres. For centre B, 'this centre' and the other therapy elements are confused with residential items coming close to hotel and house. This relates to the fact that the residents of these day centres have typically been using them for up to eight years and they are more chronic and indeed settled into their daily use of these places as somewhere to go.

This is particularly important for both design and development of therapeutic programs. If the whole regime of a particular psychiatric day centre relates to the way the residents conceptualise the opportunities available to them, and this consequently differs from one centre to another, then any generalised guidance suggested for use in all day centres, which aimed to help people to move into the community, would be ineffective if it did not take into account the conception of 'the community' particular to any given day centre. The results indicate that the attempts to move individuals from their centre out into the community require subtle understanding of how those individuals actually conceive of the community

itself.

The structure of constructs. Another focus for analysis is the establishment of the underlying constructual processes the individual brings to bear on a pattern of elements. This issue is particularly well illustrated by the work of Groat (1982) to which reference has already been made. She was concerned with whether or not architects would conceptualise works of architecture in different ways from accountants. She was able to establish quite clearly, using procedures like those described in earlier sections, that the actual sorting of the elements was different for the two groups. However, it was important to Groat's work that she should establish what types of conceptual issues were actually paramount in the judgements being made.

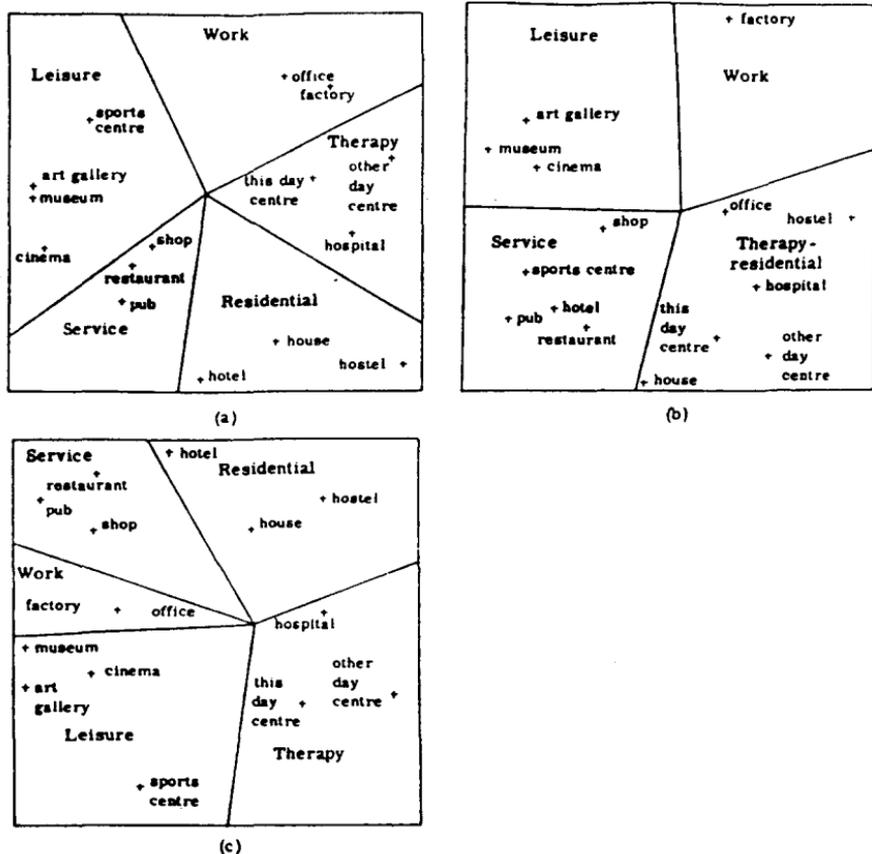


Figure 4 Position of each place on SSA-I plot looking at the frequencies from (a) centre A, (b) centre B, and (c) centre C.

In order to examine the conceptual issues, she developed a matrix based on the categories within similar sorts. In other words, she first identified, through context analysis, the types of sort used by each of her groups of respondents. For example, both groups contained a number of individuals who referred to both the function and the style of the building. Two separate matrixes were produced, one for the function categories, and one for style. In each of these matrixes, the categories were the columns and the 24 buildings sorted were the rows (plane C of Figure 4). The cells of this matrix were a dichotomous score indicating whether that particular building was ever assigned to that category. Smallest Space Analysis of this data showed that the structure of the 'function' categories was very similar for both groups. They both divided the photographs into domestic and non-domestic buildings and within each of these groups distinguished the buildings in terms of scale. However, the style categories were quite distinct. The accountants made a big distinction between what they saw as 'traditional', 'modern', and 'futuristic' buildings, whereas architects used a classification scheme clearly drawn from the literature of architectural criticism, distinguishing 'Expressionist', 'Brutalist', and 'Post-Modern'.

Groat's study thus shows very well how a detailed analysis of the structure of the conceptualisations of the two groups can reveal subtle differences and similarities in their category schemes. Such differences would normally be hidden by structured questionnaire and interviewing procedures and would be extremely difficult to establish with repertory grids, unless separate grids were developed for each respondent with the consequent time consuming analysis that would involve.

Differences within individuals

In our initial example of a multiple sorting we referred to Ace, a gambler. As part of the same study, a casino manager also went through a sorting procedure using the casino and parts of casinos of which he had direct experience. The results of these sortings are given in *Table 2*. The sortings from these two people, taken together, serve to illustrate the way in which very specific foci can be developed for analysis, dealing directly with the unique, idiosyncratic conceptualisations of particular key individuals.

When individuals carry out detailed sorts on elements that are special to themselves, there is always a possibility that over a variety of sorts they repeat similar categories, simply assigning different labels to each categorisation. Thus, an individual who is fluent but not especially cognitively complex may generate a large number of apparently different sorts, which on closer examination are found to have little in the way of variation between the different sortings.

This is an especially important point if comparison is to be made of individuals, because it is the key aspects of their conceptual systems that we need to understand, not simply how many words they can string together. Thus, it is necessary to do an analysis for each individual and to reveal the main conceptual structure within which the individual is working. In regard to the gambler and the manager separate

Table 2

Record of Casino Manager's Sorting^a**First Sort: 'Staff Recruitment'**

1. 'Career Staff': A, B, C, F
2. 'Recruit from outside': E, D, G

Second Sort: 'Staff Training'

1. 'Little training': A, B, C, F
2. 'More training': E, D, G

Third Sort: 'Staff Benefits'

1. 'Mainly for senior Staff': A, B, C, F
2. 'Also for lower Staff': E, D, G

Fourth Sort: 'Sex of Staff'

1. 'Male only': A, B, C, E, D
2. 'Male and Female': F, G

Fifth Sort: 'Staff Contact with Customers'

1. 'None': A
2. 'Good with company support': G, E, D
3. 'Good with no company support': F
4. 'Unclear': B, C

Sixth Sort: 'Staff Experience'

1. 'Trainee Staff': A, B, C
2. 'Mixed': E, D
3. 'Inexperienced Staff': F, G

Seventh Sort: 'Whether Takes Cheques or Cash'

1. 'Cash': A, B, C
2. 'Mixed': E, D
3. 'Cheques': F, G

Eighth Sort: 'Concern for Customer Quality'

1. 'Quantity only': A, B, C, E
2. 'Quality and Quantity': D
3. 'Quality': F, G

^aCasinos: A-Golden Nugget; B-Palm Beach; C-International; D-Hereford; E-Park Lane; F-Curzon House; G-Gladbroke.

analyses for each was carried out and a schematic representation prepared to facilitate a comparison of their two conceptual systems.

The analysis here again used MSAI. In this case each of the sortings acted as a separate variable and each individual had a separate matrix. The matrix consisted of the elements as rows and the sortings as columns (a slice through plane B of Figure 1). The cells of the matrix are numbers indicating the sorting categories to which the different elements were assigned. Each matrix was put into a separate MSA analysis. The analysis, in this instance, generates a configuration in which each element (in this case, casinos) was a point in the space. The closer together any two casinos are in this spatial representation the more similar they are in terms

of the categories that are assigned to them over the number of sorts carried out by each individual.

Table 3 shows the data matrix derived from the sorts illustrated in Table 1. Figure 5a shows the MSA for the gambler and Figure 5b shows the MSA for the manager.

The partitioning of these figures is derived from an examination of the way in which each individual sort contributes to the spatial configuration. Thus, it is clear that the manager divides casinos up on the basis of how they deal with the clientele and how the overall casino management deals with their staff. This gives a two-way classification of casinos: those that select their staff carefully but are not too selective of their clientele; those selective about their clientele but not so careful of their staff; and those not especially careful about how they chose their staff or their clientele. This reveals the division the manager makes between the staff and the clientele and the way in which his perspective relates to selectivity and overall standards. At first sight, the gambler's MSA reveals a very different sorting.

Table 3

Data matrix derived from the sorting produced by age^a

Elements (Casinos)	First	Second	Third	Fourth	Fifth
A	1	1	1	1	1
B	2	2	2	2	4
C	2	3	3	3	2
D	1	3	3	3	2
E	3	3	3	3	1
F	3	3	3	3	3
G	1	2	2	1	1
H	1	2	2	1	1

^aNumber in cells are categories derived from sortings as shown in Table 1.

Essentially, there is a two-way division between those casinos that are very up-market and those casinos that are more general. The gambler makes a more precise distinction within the more general casinos between those that have added frills like the famous Playboy Clubs, or those that are just large gaming halls with little extra, and a group in between. Clearly, the gambler makes much more refined judgements about the nature of the action going on within the casino than does the manager. However, they both share the superordinate categorisation of how selective the casinos are.

This selectivity of casinos throws an interesting light on the whole gambling

experience. It shows that an individual, in effect, is playing himself into some sort of exclusive club. These casinos, then, unlike those in the United States, may gain some of their important qualities from the way in which both the management and the gamblers draw lines between who can afford to be in which places. Certainly, further discussion of these conclusions with the respondents here as well as with other management groups would be necessary to test that hypothesis more fully.

Again, it would be difficult to see quite how such a result could be derived from a conventional questionnaire procedure. Open-ended interviews could well have revealed the same sort of material, but they might have hidden the underlying structures in people's conceptualisation, while of course emphasising other aspects of casinos that may well be important.

Complex comparisons of categories and construct systems

As a final illustration of the foci of analysis that can be derived from sorting procedures, the work of Grainger will be briefly mentioned. Working from a model of place (Canter, 1977), Grainger asked a variety of individuals associated with the design of a fire station to carry out sortings of three groups of elements, each of which was generated by the individual in the course of discussion. One group of elements was the activities that were to be housed in the building; the second group, the physical properties the building required; and the third group, the concepts that would be associated with the design - the concepts of the design objects. Grainger asked individuals to do this at different stages in the design process and carried out a series of analyses to show the way in which the conceptual systems of the individuals changed over time in relation to one another. What emerged was that the activity constructs, which were initially very similar in the architects' minds to their physical constructs, became more distinct, and in so doing they became similar to the clients' conceptualisation of the activities the building was to house. Grainger was thus able to reveal the dynamic evolution of the design brief by showing how the discussion between client and architect about both the intended activities and physical form can generate a common understanding of the building's future character.

Some important questions for the future

The examples presented so far have served to illustrate the variety of possible uses for the multiple sorting procedure. They have shown that the multiple sorting procedure derives from a variety of psychological techniques and a melding of approaches to psychological problems. However, the use of the multiple sorting procedure as a focus for open-ended interviewing is relatively recent and still only rarely utilised. There are a number of questions about the use and analysis of the multiple sorting procedure that remain unanswered. Some of the more important ones will now be considered. All of them are amenable to empirical tests drawing on the data collection and analysis procedures that have already been described.

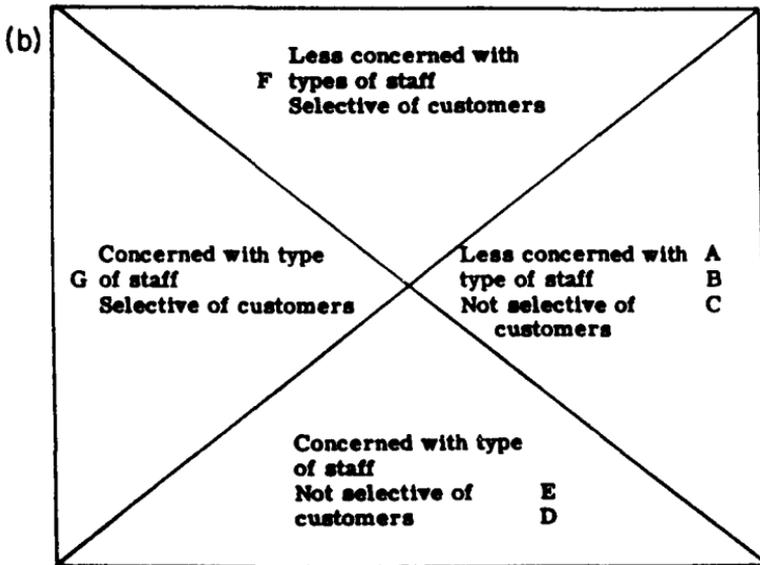
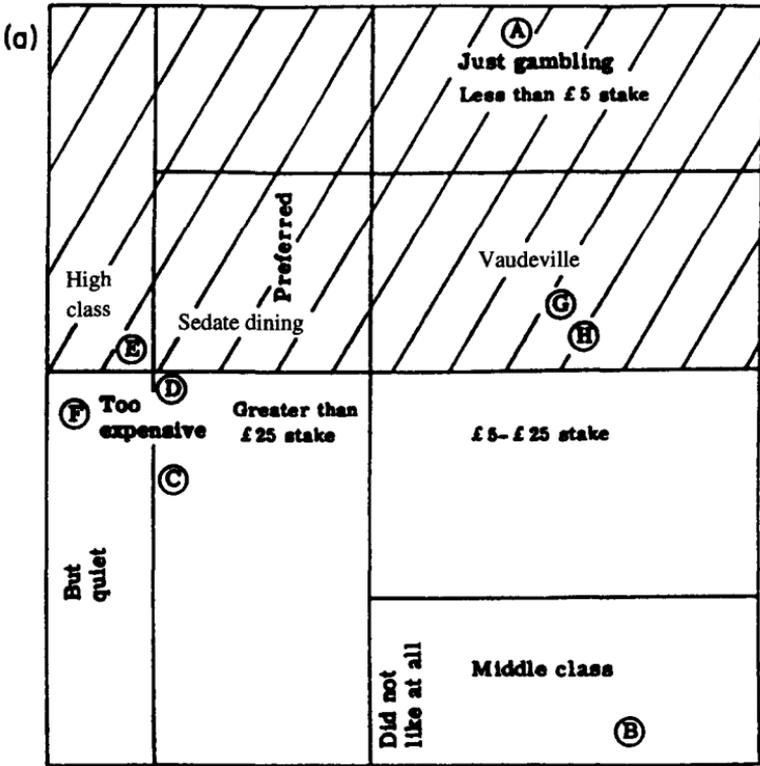


Figure 5 Summary MSAI of (a) Ace's sortings (see Tables 1 and 3 for basis), and (b) Casino Manager's Sorting (see Table 2 for basis).

Questions in analysis and use

Category salience. One aspect of the categories employed in sorting that is especially amenable to exploration, but not as yet examined, is the salience or significance to the individual of the categories used. The role of any categorisation scheme in the overall sorting structure has been explored, as discussed above, but the importance to the individual of one sort over another has not been scrutinised. Yet, the sorting procedure does lend itself to such examinations by virtue of a number of properties that potentially might reveal salience.

The range of sort convenience. One way in which the importance of different concepts can be examined is in relation to the appropriateness of those categories for all the elements involved. Kelly (1955) discusses the importance of establishing what he calls the 'range of convenience' of a construct, which he defines as covering 'all those things to which the user found its application useful' (p. 137). In the sorting procedure, it is always possible for the respondent to produce a sort which only covers a subset of the elements and for the remaining elements to be assigned to a general class indicating their irrelevance to the sorting criteria. Measures and content analyses of the range of items to which different category schemes were applied would help to clarify the salience of different sorting categories.

The significance of sort order. In a multiple sorting task it is clear that sorts follow each other in a distinct order. The question is therefore raised as to what the significance might be of the order in which sorts are elicited. In their study of different numbers of sorts Rosenberg and Kim (1975) came to the conclusion that sort order carried no significance. Unfortunately they only examined the first two sorts rather than looking at a larger number. Informal discussion with respondents does suggest that there may be contexts in which the order does carry significance and relates to the salience of the sorting categories being used. Some instructions may heighten this possibility, particularly instructions emphasising the use of sorts that the respondent believes reveal 'important aspects of the elements being sorted'.

Studies asking the respondent directly what importance they attach to different sortings are quite feasible as well as content analyses of sorts in terms of sort order. Such studies would be of value not only because little is known about the significance of sort order, but also it may reveal some interesting properties of conceptual systems not illuminated by other procedures.

The relevance of category distribution. As discussed above, an early version of a sorting task was used by Sherif and Sherif (1969) in the development of Thurstone attitude scales. They had judges assign attitudinal statements to an ordered set of categories. They argued that the distribution of items in a sorting revealed something of the intensity of the sorter's judgements; the more skewed the distribution of categories the more extreme the judges' views. In other words, if people assigned a similar number of elements to each category, then they were

likely to hold much less extreme views than someone who put most of the elements in one or two outlying categories.

Although the Sherif and Sherif 'own categories' procedure, as they called it, is different in a number of important respects from the multiple sorting task, it does point to the possible value of studying the number of categories used and the number of items assigned to each category. Simple indexes of the distribution of items per category could easily be devised and used as a basis of this study. Such indexes could be directly related to the literature on cognitive complexity (Bieri, 1971; Streufert and Streufert, 1978) and thus provide an important link to the discussion of the role of cognitive structure in attitude change.

Theoretical clarification

As discussed, the multiple sorting procedure has evolved out of a variety of origins in clinical, experimental, environmental, and multivariate psychological research. It is consequently inevitable that some of the differences of opinion between practitioners in these areas has provided a basis for some confusion in the theoretical issues underlying the use of the multiple sorting procedure. All of these issues require debate and open up interesting areas of possible research.

Categories and constructs. Kelly (1955) makes it very clear that constructs are distinct from category schemes, although the labels given to categories may usefully identify constructs in certain circumstances. He even writes that he uses the term construct 'in a manner which is somewhat parallel to the common usage of "concept" ' (p. 69). One important assumption about constructs in Kelly's terms is that they are dichotomous. They enshrine bipolarity of aspects of the similarity and differences between elements.

In this sense, categories to which elements in a sort are assigned are the constructs of the user, although only one pole of the construct may be specified. However, in Kelly's terms, the bipolarity of the constructs is an assumption of his theory, it is not open to test within his theory, nor as a consequence can it be tested using a repertory grid. This is not the case for multiple sorting. If a person assigns elements to categories that can be ordered from least to most along a single bipolar concept, then that category scheme reveals a construct (e.g., Ace's sorting according to size of minimum bet). If, however, the sorting produces a set of categories that are multipolar, then it would be inappropriate to regard this category scheme as consisting of constructs (e.g., Groat's architects' classification of building styles as Brutalist, Post-Modern, Expressionist, etc).

Thus, the multiple sorting procedure does allow one of Kelly's fundamental assumptions to be tested. Indeed, it is the emergence of classification schemes that are not obviously constructs which is one of the starting points for considering the multiple sorting procedure rather than the repertory grid. But this leads to the question of the conditions under which people use constructs as opposed to multipolar category schemes and the possibility of converting one system of classification into the other.

Individual differences in sorting competence. Anyone who uses the multiple sorting procedure will come across respondents who will find the task difficult and challenging to complete. This raises the question of how natural the task is to all people and of what differences there might be between people in their ability to carry out a multiple sorting task. Of course, the specific nature of the task itself does need to be considered. A sorting of abstract concepts is likely to be more difficult than a sorting of places to go on holiday. It is also necessary to distinguish between difficulties people may have in understanding what they are to do and difficulties in actually doing it.

These individual differences are of interest because the procedure does have roots in clinical psychological concerns with understanding the difficulties people have in coping with the world. If there are circumstances in which respondents find it difficult to form categories stable enough to describe, then the reasons for this should be searched out. The comments people make when carrying out sorts can give a valuable clue here to the difficulties they are facing and these can be related to measures such as the number of sorts and the time taken to complete a sort. The exploration of who finds what type of sorting difficult and why is likely to repay the effort involved.

Should sortings be reliable. The sorting task is likely to be a self-exploration for the individuals doing it, a learning process in which they come to understand more about their own conceptual system. As a consequence it is possible that an individual would not give the same sortings twice. Certainly the order in which he/she carried out his/her sortings is likely to vary from one session to the next. What is being studied is the overall conceptual system a person uses. It is likely that using two parallel sets of elements, in analogy with parallel forms of reliability testing, would not obviate the effects of the increase in self-understanding associated with a sorting task.

No published studies can be found dealing directly with these issues, but advocates of repertory grid procedure (e.g., Fransella and Bannister, 1977, Chapter 6) have gone to some length to argue that reliability can easily be a measure of the insensitivity of a procedure to changing circumstances rather than a valuable psychometric property. With respect to the multiple sorting procedure, it is likely that stable individuals would generate reliable responses over two or three sorting sessions, but only if the procedure itself did not contribute to a fuller understanding of their conceptual systems or their personal growth. Only direct tests of these important questions can help answer them. Here, as with the other questions, the comments people make during the sorting procedure could provide valuable clues.

Exploring face validity. The validity of a sorting must depend a lot on the conditions under which it is carried out. The essence of a sorting task is to establish the individuals' own understanding of their personal conceptual system. The extent to which individuals will feel able and be able to generate that system will depend on how they understand the instructions, the personal relevance of the elements,

and so on. Thus, as much as any other data collection procedure, the conditions under which the data are collected need to be carefully reported and interpreted, in terms of how the procedure was experienced by the respondent.

In this framework, face validity is given considerably more prominence than in other psychometric procedures. This is because one very important meaning to the validity of a sorting task is the extent to which the respondent and the investigator have a shared understanding of what the procedure is measuring. In this respect the details of the results, both in content and structure, can be examined to see what they reveal of the respondent's understanding of the task as presented. For example, consider the situation in which the sortings generated are all based on objective, physical aspects of the elements, such as their weight and size, yet the investigator was apparently looking for emotional significance of the elements. This suggests the procedure was not tapping what the investigator thought it was, and so careful scrutiny of the details of the procedure and its context may reveal the basis of this lack of apparent validity. For instance, perhaps the investigator introduced himself as a designer and thus set up expectations as to the type of sorting that would be appropriate.

The consequences of subtle changes in the instructions or context of a multiple sort for the results produced are directly amenable to empirical study. Here the vast literature on interviewing procedure and threats to its validity would have many points of relevance. The consequences of interviewer sex and experience are obvious examples from this literature, but there are many others mentioned throughout the present volume.

Modifications and developments of the sorting procedure

The following are possible ways in which the sorting procedure can be developed and modified in order to answer some research questions more directly:

1. The creation of element sets to sort can be taken a number of steps. The selection of a carefully matched set of elements, possibly factorially designed is one step. But by adding other descriptors, experimentally varied sets of elements can be produced.
2. Sorting procedures in which one set of elements is sorted into another set offer a number of prospects for exploring the relationship between different conceptual domains. If both sets of elements are sorted independently as well as together, there is the possibility of a very close analysis of the fit between domains.
3. Asking people to sort elements into provided category schemes as well as free sorts generates links to studies using other methods of concept exploration.
4. Ranking and rating of sorts against different criteria such as importance provides the opportunity for the development of classifications of sorts themselves - higher-order sorting.
5. Group sorting procedures have been used from time to time and can add

greatly to the cost effectiveness of data collection. However, these procedures are likely to be limited to groups that are quite sophisticated or to very simple aspects of sorting, such as paired comparisons.

Values and contraindications

As mentioned throughout this chapter, the sorting procedure has the flexibility to be applied to answer a wide variety of research questions, but there are some types of questions for which it may be inappropriate. Only further use will help to clarify the boundaries of advantageous and disadvantageous uses, but a few pointers can be given now.

The multiple sorting procedure clearly has strength when the elaboration of the meaning of a concept is central to the research question. Studies of how people use the word 'home', or whether 'post-modern' architecture has an identifiable public recognition, or the conditions under which people will describe their actions as 'panic', all lend themselves to exploration using a sorting procedure. If these concepts have a common but highly ambiguous currency, then the demands of the sorting procedure may well help to disentangle the different meanings. Also, when conceptual systems are being explored with groups whose verbal fluency may be restricted such as children or psychiatric patients, then a sorting procedure may be especially useful.

There are two types of research questions, however, for which multiple sorting may be less appropriate; they fall into two general classes. The first are those questions in which a very personal, idiosyncratic perspective is what is being sought. The indepth psychotherapeutic interview can never be replaced by sorting tasks. The second class of research questions are those concerned with a direct understanding of processes, especially sequences of action. For example, studies of how people make decisions under stress or cope with bereavement are less likely to prove fruitful if built around a study of personal category schemes than if they focus directly on the stages through which people go and what moves them from one stage to the next.

Conclusions

This chapter has presented a detailed account of multiple sorting procedures, with respect to both their theoretical origins and their numerous applications to open-ended interview situations. As the first section of the chapter has demonstrated, the multiple sorting procedure has roots in both the early clinical object sorting techniques and the paired comparison procedures advocated recently by multidimensional scaling enthusiasts. But more important, the multiple sorting procedure derives from two parallel concerns in psychology: the significance of the respondents' own view of the world, and the recognition that world view is built around a pattern of categorisations. In this respect, the multiple sorting procedure reveals theoretical links to Kelly's work in the development of the repertory grid

and to other more recent research in social and clinical psychology.

With respect to its applications to the interview process, the second portion of this chapter has provided examples of its adaptability, and ease of administration. However, it is clear that one of its primary virtues may also be a burden to the researcher: it probably makes even greater demands than the repertory grid on the intellectual stamina of the investigator, forcing her or him to clarify exactly what it is that he/she is looking for and why. In this respect it serves as an appropriate complement to other forms of the interview procedure, such as the use of ordinary explanations. The multiple sorting task thus takes its place amongst the family of interviewing procedures, but only future developments and use will establish the role it is to play.

References

- Adams-Weber, I.R. (1979), *Personal Construct Theory: Concepts and Applications*, Wiley, Chichester.
- Allport, G.W. (1937), *Personality: A Psychological Interpretation*, Holt Saunders, New York.
- Argyle, M., Furnham, A. & Graham, I.A. (1981), *Social Situations*, Cambridge University Press, London.
- Bieri, I. (1971), *Cognitive Structures in Personality*, in H.M. Schroder and P. Suedfeld (eds), *Personality Theory and Information Processing*, Ronald Press, New York.
- Bishop, R. (1983), *The Perception and Importance of Time in Architecture*, Ph.D thesis, University of Surrey.
- Block, I. (1961), *The Q-sort Method in Personality Assessment and Psychiatric Research*, Charles C. Thomas, Springfield, Illinois.
- Bonarius, H., Holland, R. and Rosenberg, S. (eds) (1981), *Personal Construct Theory: Recent Advances in Theory and Practice*, Macmillan, London.
- Brown, I. & Sime, I. (1980), 'A methodology for accounts', in M. Brenner (ed.), *Social Methods and Social Life*, Academic Press, London, pp. 157-188.
- Bruner, J., Goodnow, J. & Austin, G. (1956), *A Study of Thinking*, Wiley, New York.
- Canter, D. (1977), *The Psychology of Place*, London Architectural Press.
- Canter, D. (1983), *The Potential of Facet Theory for Applied Social Psychology, Quality and Quantity*, Elsevier Scientific Publishing Co, Amsterdam.
- Canter, D., Ambrose, I., Brown, I., Comber, M. & Hirsch, A. (1980), *Prison Design and Use, Final Report to the Home office*, University of Surrey.
- Canter, D., Brown, I. & Richardson, H. (1976), *Constructs Without Tears: Is There Life Beyond the Grid*, paper presented to the British Psychological Society Annual Conference, Exeter.
- Douglas, M. (ed.) (1977), *Rules and Meanings*, Penguin, Harmondsworth.
- Eckman, P. (1975), 'Unmasking the Face', Prentice Hall, New Jersey.

- Fransella, F. & Bannister, D. (1977), *A Manual for Repertory Grid Technique*, Academic Press, London.
- Frost, A. & Canter, D. (1982), 'Consumer psychology', in S. Canter and D. Canter (eds.), *Psychology in Practice: Perspectives on Professional Psychology*, Wiley, Chichester.
- Gärling, T. (1976), 'The Structural Analysis of Environmental Perception and Cognition', *Environment and Behavior*, Vol. 8(3), pp. 385-415.
- Grainger, B. (1980), *A Study of Concepts in the Building Design Process*, Msc. Dissertation, University of Surrey.
- Groat, L. & Canter, D.V. (1979), 'Does Post-modernism Communicate', *Progressive Architecture*, December, pp. 84-87.
- Groat, L. (1982), 'Meaning in Post-modern Architecture: An Examination Using the Multiple Sorting Task', *Journal of Environmental Psychology*, Vol. 2(3), pp. 3-22.
- Hane, R. & Secord, P. (1972), *The Explanation of Social Behaviour*, Blackwell, Oxford.
- Hawkins, C. (1983), *Differing Conceptualisations of Users of Three Psychiatric Day Centres*, MSc Dissertation, University of Surrey.
- Horayangkura, V. (1978), 'Semantic differential structures', *Environment and Behaviour*, Vol. 10(4), pp. 555-584.
- James, W. (1890), *Principles of Psychology*, Holt Saunders, New York.
- Kelly, G. (1955), *The Psychology of Personal Constructs*, Norton, New York.
- Krampen, M. (1979), *Meaning in the Urban Environment*, Pion, London.
- Lingoes, I. (1973), *The Cuttman-Lingoes Nonmetric Program Series*, Ann Arbor, Mathesis Press, Michigan.
- Miller, G. A. (1956), 'The Magical Number Seven, Plus or Minus Two', *Psychological Review*, Vol. 43, pp. 81-114
- Nasar, J. (1980), 'On Determining Dimensions of Environmental Perception', *Edra*, Vol. 11, pp. 245-256, Environmental Design Research Association, Washington.
- Oakley, R. (1980), *Profiles and Perspectives of Hostel Residents*, Msc. Dissertation, University of Surrey.
- Oostendorp, A. & Berlyne, D.E. (1978), 'Dimensions in the Perception of Architecture', *Scandinavian Journal of Psychology*, Vol. 19, pp. 145-150.
- Osgood, G.E. (1962), 'Studies in the Generality of Affective Meaning Systems', *American Psychologist*, Vol. 17, pp. 10-28.
- Osgood, G.E., Suci, G.I. & Tanenbaum, P.M. (1957), *The Measurement of Meaning*, University of Illinois Press, Urbana.
- Palmer, I. (1978), 'Citizen Assessment of the Coastal Visual Resource', in *Coastal Zone 78*, New York American Society of Civil Engineers.
- Pitt, D.G. & Zube, E.H. (1979), 'The Q-sort Method: Use in Landscape Assessment Research and Landscape Planning', in G. H. Elsner (ed.), *Our National Landscape*, Pacific Southwest Forest and Range Experiment Station, Berkeley.

- Rosch, E. (1977), 'Human Categorization', in N. Warren (ed.), *Advances in Cross-cultural Psychology (Vol I)*, Academic Press, London.
- Rosenberg, S. & Kim, M. P. (1975), 'The Method of Sorting a Data Gathering Procedure in Multivariate Research', *Multivariate Behavioral Research*, October, pp. 489-502.
- Schiffman, S.S., Reynolds, L.M. & Young, F.W. (1981), *Introduction to Multidimensional Scaling*, Academic Press, London.
- Shaw, M.L.G. (1982), 'The Extraction of Personal Meaning from a Repertory Grid', in E. Shepherd and I.F. Watson (eds), *Personal Meanings*, Wiley, Chichester.
- Shepherd, E. & Watson, I.P. (1982) (eds), *Personal Meanings*, Wiley, Chichester.
- Sherif, M. & Sherif, G. (1969), *Social Psychology*, Harper and Row/John Weatherhill, New York/Tokyo.
- Shye, S. (ed.) (1978), *Theory Construction and Data Analysis in the Behavioral Sciences*, Jossey-Bass, San Francisco.
- Smith, A.E. & Medin, D.L. (1981), *Categories and Concepts*, Harvard Press, London.
- Stephenson, W. (1953), *The Study of Behavior: Q-technique and its Methodology*, University of Chicago Press, Chicago.
- Streufert, S. & Streufert, S. (1978), *Behavior in the Complex Environment*, Holt Saunders, New York.
- Szalay, L.B. & Deese, I. (1978), *Subjective Meaning in Culture: An Assessment Through Word Association*, Hillside, NJ: Erlbaum.
- Tajfel, H.G. (1978), *The Structure of our Views about Society* in H. Tajfel and G. Fraser (eds), *An Introduction to Social Psychology*, pp. 302-321, Penguin, Harmondsworth.
- Tajfel, H. (1981), *Human Groups and Social Categories*, Cambridge University Press, Cambridge.
- Thurstone, L.L. & Chave, E.J. (1929), *The Measurement of Attitudes*, University of Chicago Press, Chicago.
- Vygotsky, L. (1934), *Thought and Language*, MA: MIT Press, Boston.
- Ward, L.M. (1977), 'Multidimensional Scaling of the Molar Physical Environment', *The Journal of Multivariate Behavioral Research*, Vol. 12, pp. 23-42.
- Ward, L.M. & Russell, I.A. (1981), 'Cognitive Set and the Perception of Place', *Environment and Behaviour*, Vol. 13(5), pp. 610-632.
- Zvulun, E. (1978), 'Multidimensional Scalogram Analysis: The Method and its Application' in S. Shye (ed.), *Theory construction and Data Analysis in the Behavioral Sciences*, pp. 237-264, Jossey-Bass, San Francisco.