Certain Aspects of Visual Perception in Some "Autistic" Children.

A thesis submitted to the University of Cape Town in fulfillment of the requirements for the degree of Master of Arts in Psychology

by

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CHAPTER XI

The Study : Subjects and case studies.

A. Subjects.

As was noted in previous discussion (Chapter II), the selection of Ss for a study of aspects of functioning in "autistic" children presents numerous problems. Any method of selection therefore, is open to criticism and the best that can be done at present is to provide as precise a description of the sample as possible, together with an indication of the criteria used in selection.

The three "autistic" Ss of this study were selected on the basis of psychiatric diagnosis, the criteria used being those of Creak et al (1961). Two of the Ss were considered relatively clear cases of "autism", while the third was labelled "psychotic" because of certain reservations regarding the extent of identity with the nuclear diagnosis. None of these Ss showed clear evidence of brain damage, in contrast to other potential Ss, in whom there was reason to suspect brain damage or other possibly confounding factors and who were, therefore, excluded from the study. Diagnostic information, obtained from a questionnaire (see Appendix C), which was completed by the consulting psychiatrist for each of the "autistic" Ss., has been summarized, together with other relevant S characteristics, in Table 2.

Table 2: Descriptive and diagnostic information regarding the three "autistic" Ss of this study.

	Subject Code		
	A	W	R
Sex	M	F	M
Age[1]	5-6	7-10	7-3
Socioeconomic status[2]	II	III	IV
Siblings	None	None	two younger
Current residential placement	parental home	institution	parental home
Previous "schooling"[3] (years)	nursery school (1 yr.)	day care centre (6/12 yr.)	individual "remedial" teaching (18/12 yr.)
Speech on entry to school	babbling	few words; echolalia	phrases
Nature of atypical behaviour first noted and age when noted	vomiting, screaming, unresponsive; no speech; "without understanding" (?2-0)	no speech, head rolling; slow motor development (? age)	excessive crying, restlessness (? 2-0)
Age at first consultation	2 - 8	3 - 10	5 - 0
Results of EEG	normal for age	normal for age	normal for age
Query minimal brain damage	excessive crying, vomiting, irritability	-	hyper-kinetic
Diagnosis	"autistic"	"autistic"	psychotic
Age at diagnosis	2 - 8	3 - 10	5 - 1
Severity: diagnosis[4]	severe	severe	serious
School[5]	severe	severe	serious
Prognosis: School[5]	very poor	very poor[6]	fair

1. Age in years and months at the midpoint of study of each S.
2. Based on parental occupation (Hollingshead and Redlich, 1958).
3. That is, prior to entry to the School where most of the study took place.
4. As judged at the time of diagnosis.
5. As judged at the time of entry to the School.
6. Prognosis for this S was heavily influenced by extremely unfavourable environmental circumstances.

Further information regarding behaviour of "autistic" Ss at the time of entry to the School, where most of the study took place, and when testing was completed, was collected by means of a detailed questionnaire, based on behaviour held to be characteristic of ECA (see Appendix C). The results of this questionnaire, completed by the teacher of each S and by the E, were, however, disappointing from the point of view of inter-rater agreement, perhaps because the descriptive statements of behaviour were not sufficiently concrete and were thus open to interpretation, or because the behaviour concerned was rated under different circumstances by the teachers and the E. In view of the low inter- rater reliability, it did not appear worthwhile to report data from the questionnaire.

Control Ss were selected in accordance with the criteria, set out in the original design (cf. pp. 123 - 125) and individually matched (directly or indirectly) with each of the "autistic" Ss. Descriptive information derived from intelligence testing and a questionnarie completed by the class teacher of each control S (see Appendix C) has been summarized in Table 3.

As may be seen from the table, in most cases, the control Ss fulfilled the selection criteria as regards sex and age. One exception as regards sex was A (S/CA), a girl having been selected instead of a boy, after testing at numerous schools failed to produce a male S with appropriately low intelligence. As regards age, in most cases Ss differed by a month or less from their criterial age; one S was, however, four months older than her criterial age, while another differed from the criterial age by three months. As regards intelligence, normal control Ss were within criterial limits (IQ 90 - 110), mean IQ being 103, with a range of 10 points. Subnormal controls within the criterial range (IQ 55 - 75) were, however, not easily obtainable, despite testing in ordinary classes, special classes and institutions; hence, the sample obtained had an average intelligence (mean IQ was 74) somewhat higher than desired, with a rather wide range of 23 points.

Teachers' ratings of Ss' school performance, emotional disturbance and relationships have been presented, but must be regarded cautiously. Particularly with regard to school performance, it appeared that the particular S tended to be judged in terms of standards prevailing in his class or school, rather than more generally; thus,

Table 3: Descriptive information regarding normal and subnormal control Ss of each "autistic" S.

"Autistic" S	A (male; CA 5-6)				W (female; CA 7 - 10)				R (male; CA 7-3)			
Control Ss	N/CA	S/CA	N/MA	S/OLD	N/CA	S/CA	N/MA	S/OLD	N/CA	S/CA	N/MA	S/OLD
Sex	M	F	M	M	F	F	F	F	M	M	M	M
Criterial age (CA)[1]	5-6	5-6	3-4	9-2	7-10	7-10	4-8	13-1	7-3	7-3	4-4	12-1
Actual CA	5-5	5-10	3-7	9-2	7-11	7-10	4-9	12-11	7-1	7-3	4-5	12-0
IQ	100	83	107	60	98	63	103	75	104	82	108	80
Test	WPPSI	WISC	M-P	WISC	WISC	WISC	WPPSI	WISC	WISC	WISC	WPPSI	WISC
Educational status[2]	NS	Ord.	NS	Spec.	Ord.	Ord.	NS	Ord.	Ord.	Ord.	NS	Ord.
No. of yrs. in spec. class/repeated in ord. class	-	-	-	2	-	2	-	2	-	-	-	1
Performance in school[3]	aver-age	sub-norm.	aver-age	border-line	aver-age	severe-ly sub-norm.	aver-age	aver-age	aver-age	border-line	aver-age	aver-age
Emotional disturbance[4]	slight	slight	slight	serious	slight	slight	none	none	none	none	slight	none
Relationships: teacher	good	fair	fair	fair	good	fair	v.good	fair	v.good	fair	good	fair
peers	good	poor	good	poor	good	fair	good	good	v.good	fair	fair	fair
Socioeconomic status[5]	II	V	II	V	IV	V	II	IV	V	IV	I	IV

1. Varying according to whether matching was on the basis of CA or MA.
2. Whether in nursery school (NS), ordinary class (ord.), or special class (spec.).
3. The available categories ranged from "well above average" through "average" and "slightly below average" to "borderline normal", "subnormal" and "severely subnormal" (see Appendix C).
4. A rating based on teacher's comments; "slight" indicating reference to an isolated, probably temporary difficulty; "serious" indicating more widespread disturbance, probably meriting professional attention.
5. Based on parental occupation (Hollingshead and Redlich, ibid).

"below average" performance might have been "average" in relation to another class or school. This unreliability was particularly evident between schools drawing upon different socioeconomic groups. As regards the criterion of no serious emotional disturbance, it appeared that most Ss were entirely suitable. One S, however, A (S/OLD), did appear to have significant emotional difficulties, apparently associated with general immaturity, as indicated also by low intelligence (IQ 60). As regards socioeconomic status of Ss, eight out of twelve controls fell in classes IV and V, the remaining four falling in classes I and II, in comparison with "autistic" Ss, two of whom fell in class IV, the remaining one falling in class III. In respect of socioeconomic status, therefore, both control and "autistic" Ss were rather heterogeneous.

The "autistic" and control Ss described above were individually studied in accordance with the revised research design. "Autistic" Ss were seen for the greater part of the study at the special school which they all attended from the beginning of 1970; prior to their admission to school they were seen in their places of residence. Control Ss were all tested at the schools they were attending, special facilities being provided, so that individual testing in quiet surroundings was possible.

B. Case Studies.

Detailed case studies for each "autistic" S and comparative reports on his or her controls have been provided below. However, in order to avoid excessive repetition, a detailed report regarding rapport and discrimination set has been presented in only one case study, that of A. More condensed reports have been presented in the case of W and R, comparison with A being sufficient to indicate the essentials of rapport and discrimination. Full reports regarding perceptual factors have, however, been presented for all three Ss.

Case Study No. 1 : A (male; CA 5 - 6).

(1) Rapport.

"Autistic" S : A.

Pre-task sessions:

Pre-task sessions were conducted initially at A's home, for approximately 45 minutes in the mid-afternoon. At first, A's mother remained in the house to assist with any emergencies which might arise; later, she left the house when the E arrived. Attempts to interact with A were thus relatively free of parental pressure.

The first few sessions were devoted mainly to observing A's behaviour under relatively unstructured and undemanding conditions. From the first session, A showed little objection to being left alone with the E. He babbled continuously, but there was little eye-contact. He did not respond to his name being called. He was rather hyperactive and did not persist for long at any activity. Interest in the box of toys brought by the E was fleeting, with no attempt at constructive play, although certain features of the toys, such as the noise of an alarm clock and the whirring wheels of a car did, on a few occasions, elicit some attempt to imitate the E's actions in producing the noises. Repetitive activities occupied some part of each of the early sessions. Activities included spinning round objects and twirling pieces of string or grass. Finger-play was noted occasionally. Outside, in a small enclosed garden, A frequently ran round its perimeter, stopping now and then for a moment, before continuing. Approaches to the E consisted in leading her from room to room or outside and using her hand as an instrument for obtaining food or drink. Distress was shown on a number of occasions, varying from mild rocking and moaning to severe screaming, head-banging and occasional tears. Distress sometimes appeared inexplicable, but at other times could be related fairly directly to other events, such as A's wetting his pants or adults talking and apparently ignoring him. Attempts to comfort him were rejected through avoidance of bodily contact, more direct pushing away or increasing the volume of screaming as he was approached by the would-be comforter. In most cases, during the early sessions, however, distress did not last long and stopped as suddenly and inexplicably as it had started.

Sessions in the next phase were characterized by indications that A recognized the E, the presence of some eye-contact (although it was not sustained) and a more positive response to bodily contact. Body play, such as swinging, bouncing and jumping, was, in fact, greatly enjoyed by A and could be used to initiate contact when he seemed somewhat withdrawn and to counteract incipient distress, although, in the latter role, body play was not invariably successful. Interactional play, such as simple "hide-and-seek" behind curtains and under covers, "catch" and baby games with fingers, toes and naming facial features increased. Although the E was always the active partner - the "seeker", "catcher", "counter" - A demonstrated an awareness of the interactional, if not the reciprocal nature of such activities, by hiding, running away and anticipating the outcome of the activity. Such activities usually provoked spontaneous laughter, but occasionally resulted in over-excitement and a retreat (usually temporary) to rocking. During these sessions some demands - in the form of attempting to extend the time spent in one room or to engage A in one activity beyond his customary momentary interest - were made in an attempt to assess the extent of rapport, but these demands met with a negative reaction.

Between about the tenth and sixteenth sessions, the tone of the sessions was generally quieter. Recognition of the E was shown in A's taking her off to one of the rooms when she arrived and sporadic eye-contact continued to occur. There was less hyperactivity and less fluctuation between extremes of apparent enjoyment and distress. More approaches were made to toys, although little that was constructive was done with them. Interactional play continued to occur. Much time was spent in repetitive, obsessive play with water or twirling pieces of string. Bodily contact was permitted and apparently enjoyed, but little interest was shown in more vigorous body play. Distress was shown in rocking, but seldom persisted for long and attempts to comfort A were not rejected as firmly as previously. A more positive response was shown to demands, although acquiescence was frequently followed a little later by rejection of the E, as in avoidance of bodily contact or pushing her out of the room. Demands included interruption of obsessive activities, staying in one room for increasing periods of time (varying, at this stage, between 10 and 25 minutes), obeying simple commands, such as picking up toys and drawing (the latter consisting at this stage of rather feeble marks on paper). Interest in one activity for more than a few minutes could, however, seldom be maintained and imitation was minimal. Body play was used successfully as a reward and inducement to co-operate in some of the above activities. (As A ate only mashed food and showed great changeability in likes and dislikes as regards drinks, it did not seem feasible to use food or drink as a reward).

From about the seventeenth to the twenty-third session, there was considerable fluctuation in rapport, due largely to extraneous factors, namely that A had a bad cold and, just as he was recovering, a family crisis necessitated his parents' absence for a few days, when he was looked after by a neighbour. During this time, A continued to show recognition of the E and continued to permit and enjoy bodily contact. Renewed interest was shown in body play and towards the end of the phase, hyperactivity increased. Minimal interest in toys was shown, but interactional play continued and appeared to be enjoyed. Response to demands by the E was negative and accompanied by rejection of the E and, frequently, distress. A was in fact easily distressed at this stage, shown in rocking, screaming and, on two occasions, angry, deliberately aggressive actions towards inanimate objects. Towards the end of the period, however, a more positive tone was evident.

The next phase saw A's entry to school and a temporary setback in rapport with the E. Although he showed recognition of the E, he was generally unresponsive or negativistic to demands, on such occasions rejecting the _E_. He showed distress on numerous occasions, usually in response to regulation of his movements in and out of the school building and to aggression by other children. Rocking occurred regularly and screaming and head-banging were not infrequent. _A_ spent much time engaged in repetitive activities, dropping sand or stones and twirling pieces of string. On a few occasions, he engaged in body play, but was otherwise very withdrawn.

More positive responses were made in the next phase, towards the end of the first term at school. Although _A_ continued to engage in repetitive activities, he began to show some interest in investigating toys and other objects in the environment. He engaged in body play, interactional play and showed enjoyment of music and singing. Episodes of distress were less frequent and less prolonged. He demonstrated some attachment to the _E_ by taking her with him round the garden and showing temporary distress when the _E_ paid attention to other children. Response to demands was increasingly positive. Drawing was now much firmer, more directed and continued for longer.

After the school holidays, there was again a temporary setback in rapport, although less prolonged than formerly, but fluctuations in mood continued to be characteristic. Repetitive activities continued to occupy much of _A_'s time, but some approaches to toys and other children were occasionally made. _A_ continued to engage in and apparently enjoy body play and interactional play, which he now sometimes initiated, for example, running away, looking over his shoulder mischievously, as if inviting pursuit. A's response to demands during sessions to sit at the table and draw was usually a resigned acquiescence, although resistance continued to be displayed occasionally. Persistence at the task improved, drawing became more directed and attention was shown to alterations of his drawings by the E. Co-operation could be extended by intermittent bouts of body play or singing when he became restless.

By this time, A could be engaged in activity for periods of up to thirty minutes, looked at drawings and specific parts of them at the direction of the E and imitated gestures of drawing by the E. Thus, after some 50 sessions, it appeared possible to attempt training of task behaviour.

Task sessions:

During the remaining 18 sessions before the mid-year holidays, attempts were made to train A in appropriate task behaviour and to investigate certain hypotheses regarding his perceptual behaviour. During these sessions, rapport was generally very good, as judged by relative infrequency of distress, positive response to familiar demands, such as sitting at the table, and, where demands were rejected, an increasing tendency, nevertheless to retain an even mood. The maintenance of rapport appeared attributable in large measure to the time spent by the E in pleasurable, relatively non-demanding activities with A outside the sessions. In addition, A was at this time showing increasing interest in people, making approaches both to adults and, more tentatively, to children. In fact, towards the end of this phase, A's interest in interaction with the E tended to interfere with task behaviour which appeared to hold very little intrinsic interest for him and in which he engaged apparently only to satisfy the E.

The main area of difficulty in task behaviour was, however, distractibility and inability to persist at the task for long. Engaging in body play or singing served to prolong slightly the sessions, but rapport was insufficient to overcome distractibility, which seemed a fundamental problem. On the other hand, it was clear that without the degree of rapport which did exist, training of task behaviour would have been much more difficult and perhaps impossible, particularly since this S did not appear responsive to more concrete rewards, such as food.

Immediately following the mid-year holiday, there was considerable fluctuation in rapport, apparently reflecting A's problems in readjusting to school routine and the presence of a number of other children. He did, however, show clear recognition of and affection towards the E, as well as evident recall of task behaviour.

Response to demands was initially negativistic and there was considerable distractibility. Within about seven sessions however, _A_ had apparently readjusted to school and there were no further major episodes of distress affecting task behaviour for some time.

Response to demands tended, however, to be fair rather than positive and appeared to reflect the effect of a number of variables, including the fact that _A_'s general development was in directions not entirely compatible with task behaviour. At one time, for instance, _A_'s formerly passive behaviour began to be replaced by tentative experimentation with behaviour such as biting and banging objects; such behaviour was continued in sessions, in which attempts to bite or bang the apparatus held far more interest for him than did co-operation in task-oriented behaviour. Occasionally, interference with task behaviour through preference for interaction with the _E_, as had previously occurred, also recurred.

Distractibility continued to interfere with task-oriented behaviour and although, as before, body play and singing could on occasion be used successfully to prolong sessions, the effect of such activities declined towards the end of sessions, as distractibility increased. What could only be described as boredom, consequent on the numerous repetitions necessary to provide an indication of the consistency of behaviour and to compensate for negativistic behaviour which prevented valid assessment, was a major factor affecting task-oriented behaviour. The term, boredom, seemed justified in that the introduction of a new assessment task usually resulted in a temporary decrease in distractibility and increased attention to the display which, however, seldom lasted more than between one and three sessions.

It appeared, in fact, that without the extent of rapport with the E which did exist, task oriented behaviour would have been even more difficult to elicit. The impression was very strong that frequently demands were complied with only to satisfy the E. The extent of rapport was illustrated also in behaviour outside the sessions when A sought out the E and showed possessiveness towards her. Engaging in pleasurable activities outside the sessions thus continued to be a key means of maintaining rapport.

Following another school holiday and, soon afterwards, considerable disruption of the activities and atmosphere of the school due to the death of one of the children, there was again a short period of readjustment during which A displayed considerable fluctuation in mood outside the sessions, although rapport in the sessions remained at very much the same level as prior to the holidays. During the sessions of the last term (which also concluded the testing programme), response to demands was fair rather than positive, the effect of rapport declined towards the end of the sessions, as distractibility increased and, while rapport was sufficient to elicit some task-oriented behaviour, it was insufficient to counteract some dgree of loss of interest due to repetition.

In summary, it appeared that the degree of rapport established in pre-task sessions was somewhat extended during the second term, when training of task behaviour was initiated. Subsequently, the level of rapport was maintained, although its effect was somewhat abated by lack of interest in the task due to its repetitious nature and other preoccupations of A during this time.

Control Ss : A.

N/CA: Although a little shy and hesitant on first meeting the E, this S appeared quite at ease by the end of the session spent administering the intelligence test, in which he participated and co-operated well. Subsequently, during task sessions, he was co-operative and generally showed interest in the tasks.

S/CA: This S was extremely shy and spoke only in whispers throughout the session spent administering the intelligence test and in many of the subsequent sessions. She did, however, participate and co-operate well in the intelligence test and in the subsequently presented perceptual tasks, maintained a high level of task involvement, shown for example, in attempts to see the next card before it was presented.

N/MA: This S, the youngest in the series, was initially a little shy during the administration of the intelligence test. Soon however, he appeared quite at ease, to the extent of presenting certain difficulties in retaining his involvement in the tasks of the intelligence test and in containing a certain amount of resistance. Low frustration tolerance was evident in subsequent task sessions and it required some ingenuity to retain his interest for long. Frequent short pauses, involving playful games, were, however, usually successful in prolonging the session for long enough to complete a task. The nature of the tasks, initially designed with somewhat older children in mind, probably contributed, through their lack of variety, to the distractibility and poor frustration tolerance shown by this S, but his teacher's report indicated that, in other activities, too, he was "not keen to conform".

S/OLD: Somewhat anxious at first during the intelligence test, this S later appeared more relaxed and, in subsequent task sessions, seemed quite at ease. He showed interest in the tasks and was eager to know whether he had done well.

In summary, in comparison with A, none of the control Ss presented severe problems as regards rapport. The control S most like A was a young normal child (N/MA), who showed a similar pattern of increasing distractibility and decreasing task orientation throughout each session, but, nevertheless, was sufficiently task-oriented to engage fairly successfully in the tasks.

(2) Discrimination set.

"Autistic" S : A.

The first task presented to A required discrimination of three-dimensional shapes (Shape (3D). The task was initially presented according to the original training procedure, but failure on A's part to display appropriate behaviour led to the introduction of certain modifications to test various hypotheses about A's possible difficulties in developing discrimination set.

The more general features of task orientation showed much fluctuation both within and between sessions and appeared to be dependent on the level of distractibility shown by A (which as mentioned earlier, was not much affected by rapport). Thus, on days when A was easily distracted and towards the end of sessions, when distractibility increased, general features of task orientation tended to show deterioration. Taking his seat at the table, occurring as it did near the start of the session, was the most stable feature of task orientation, occurring fairly readily and without much encouragement in most sessions. In about a third of the sessions involved in attempting to establish discrimination set, however, some reluctance was shown, although, with encouragement, A nevertheless did sit at the table. Interference with the apparatus occurred sporadically, but was most evident in the very early sessions, when the apparatus was novel. Later, interference was brief and easily contained. Ability to wait between presentations, even although the interval was extremely brief, on the other hand, was poor. In most sessions, A was unable to sit out more than one or two intervals and would try to leave his chair to wander about the room, or bang and stamp. He could usually be brought back, but for decreasing periods, until his distress at being restrained began to interfere with further training and the session was terminated.

Gaze orientation and instrumental responses tended to be closely associated, being elicited without great difficulty early in training and, when they were elicited later, tended to be elicited together. Similarly, the absence of these forms of behaviour tended to be associated in a consistent manner.

Looking at the display rather than elsewhere for the major part of a session was established within the first three sessions and continued to be elicited in the majority of the sessions spent in attempting to establish discrimination set with three-dimensional shapes. After only two sessions in which the E lifted A's hand towards the apparatus, he moved his hand voluntarily towards the display, at first touching the display in a vague manner, but with increasing deliberateness in subsequent sessions. Pointing to a specific discriminative alternative, or from the standard to an alternative, was also established by the third session and continued to be elicited without difficulty in the majority of subsequent sessions.

Failure or refusal to look at the display did occur in about a quarter of the sessions, although on these occasions, vague movements towards the display and touching the display were still sometimes evident. During other sessions, looking at the display decreased towards the end of the session, accompanied by an increase in vague movements, as compared with more deliberate movements at the beginning of the session.

Early choices in the training procedure were random, but random choices recurred later only in five isolated sessions, usually towards the end of a session and were almost invariably associated with poor general task orientation, failure or avoidance of looking at the display and generally poor attention. Systematic choices, representing definite strategies were, however, clearly evident in the majority of sessions.

The form of identification strategy employed appeared to be related to the number and arrangement of alternatives presented. Thus, the greater the number of alternatives, the more likely that a positional rather than a matching strategy would be used. Presentation of one of the alternatives in the central position also invariably elicited choice of that position.

Another important determinant of the form of identification strategy used appeared to be the extent to which rapport counterbalanced boredom on A's part. Perhaps related to boredom and certainly to the general features of attention discussed below were changes in the form of identification strategy used during a session. Thus, if a matching strategy was used, it tended to be present near the beginning of a session and was later replaced by other strategies.

As regards features of attention, during training, firstly distractibility was always observed and, as mentioned earlier, seemed to be a fundamental problem, more or less impervious to the effects of rapport. A continually left the table, occasionally returning on his own, but more usually having to be brought back to the table. Even when seated, however, his attention was continually being caught, for example, by features of the room, small pieces of paper, sounds outside the room, the E's clothes or hair. Alternatively, A would gaze blankly in front of him, or to the side, seemingly unaffected by attempts to gain his attention, such as touching him, or waving a hand in front of his face. Such episodes occurred frequently, often betweenevery presentation, although, at other times, usually early in a session, a series of several presentations might occur with evident direction of gaze towards the apparatus and the display and deliberate responses. Episodes of distractibility usually followed each other with increasing rapidity during a session, accompanied by increasing unwillingness to continue with the task, until it became impracticable to continue. Episodes of distractibility might considerably extend the time spent in the session, but without apparently contributing to training in any way. Any responses made during such episodes were vague and choices random and certainly provided no indication of the full extent of discrimination set.

As might be expected, persistence at the task (as defined earlier) was rare, being noted in only five of the 26 sessions of training with three-dimensional shapes. On these occasions, A persisted at the task in a directed manner for between 10 and 15 minutes, in contrast to his usual maximal effort of one or two minutes or less, followed by increasing distractibility. Persistence also appeared related to boredom with the task, as three of the five occasions of persistence were noted in the first five sessions and one of the two remaining occasions occured just following the mid-year holiday of three weeks.

Recall, in the sense of transfer of discrimination set from less to more complex items - in the present task, from geometric to metric figures - appeared adequate, in the sense that performance on the latter was similar to that on the former. Recall of features of discrimination set from one session to the next was good as regards certain features of general orientation, gaze orientation, instrumental responses and identification strategy - the latter in the sense of making systematic rather than random choices, although not invariably in the sense of matching rather than other strategies. As regards failure always to transfer matching strategy to more complex items, an attempt was made to investigate whether poorer performance on more complex items was related to their complexity or to the fact that they were usually presented later in a session, when performance often deteriorated. The relationship appeared an intricate one: the fact that complex items were usually presented later undoubtedly resulted in underestimation of discrimination set on such items: when presented earlier, with only two alternatives, neither one in position 3, there appeared to be no difference in discrimination set as compared with less complex items; but when more than two alternatives were presented, discrimination set appeared less apparent on more as compared with less complex items.

After 26 sessions in which training with three-dimensional shapes was conducted, the only features of discrimination set which could be said to be fairly stable were instrumental responses and the use of systematic identification strategies rather than random choices. Other features of discrimination set showed considerable fluctuation from session to session and during each session and appeared to be adversely affected by boredom.

The extent of fluctuation in performance, in particular, the characteristic deterioration in performance towards the end of a session, rendered the originally suggested criterion for the establishment of discrimination set - correct choices on three successive five-figure displays - impracticable and, to some degree, insensitive as a measure of the extent of discrimination set which did exist. As an alternative, it was considered that consistent use of systematic identification strategies rather than random choices over a series of sessions, might constitute a more accurate reflection of the extent of discrimination set and, in particular, of the extent to which and the conditions under which matching might be expected to occur. Use of such information regarding the limits of discrimination set as shown on training items might then be employed to maximize the extent of discrimination on assessment items, permitting some evaluation, not only of the extent of discrimination with the various task materials, at varying levels of complexity, but of conditions likely to limit or reduce such discrimination.

Since systematic identification strategies were at this stage of training with three-dimensional shapes clearly evident and since some understanding had been gained regarding the effects of number and arrangement of alternatives, together with the decreasingly task-oriented behaviour towards the end of a session, it was decided to proceed with the assessment items of the task, analysis of which is described elsewhere (p. 245ff). Following assessment on the Shape (3D) task, a new task was introduced. Training with the novel materials was carried out with a two-fold purpose: firstly, to induce the necessary discrimination set with regard to the novel materials; secondly, to attempt to extend the extent of discrimination set in comparison with the previous task, thus permitting assessment of whether boredom or a more fundamental deficit was responsible for the limited stability of discrimination set in the earlier task.

Training was, therefore, commenced with colours and continued for ten sessions. Recall from the former task was shown immediately following demonstration by the E and continued to be shown in succeeding sessions, demonstrating that certain non-specific learning had occurred and been retained. Efforts were, therefore, made to extend discrimination set.

As regards general features of task orientation, however, no improvement was noted. On a few occasions, even sitting at the table was not present, although, since refusal occurred in conjunction with severely distressed behaviour, it appeared to reflect interference with rather than disruption of discrimination set. Looking at the display continued to be elicited without much difficulty and continued to be maximal at the start of sessions. Pointing to a specific alternative continued to be elicited easily - deliberately, early in the session, but later tending to become increasingly vague. As regards identification strategy, although random choices were sometimes made, usually towards the end of a session, systematic choices were more common, especially where only two or three alternatives were presented. As in the previous task, the arrangement of alternatives appeared a particularly important determinant of identification strategy in that presentation of an alternative in the centre position almost invariably evoked choice of that position. Masking the centre position, on the other hand, clearly facilitated - although it did not invariably ensure - the use of a matching strategy. Distractibility continued to be evident but appeared somewhat ameliorated by the novelty of the task. That is, in the first few sessions of the series, distractibility tended to be notably lacking in the early part of the session, although increasing later. In later sessions, distractibility increased again, but was associated on some occasions with the distressed behaviour referred to above. Persistence for at least the early part of a session was noted in two sessions and for the major part of two other, longer sessions. As implied in the above discussion, the novelty of the materials appeared to exert a desirable effect on attention, an effect obviously most clear in early sessions in the series. In addition to the aspects of recall referred to earlier, recall of features of discrimination set from less to more complex items, provided the number of alternatives did not exceed three, was good. The inclusion of items intermediate between discrimination amongst very different colours, as opposed to different shades of the same colour, appeared to facilitate transfer in a manner similar to that seen in the pilot study with normal Ss.

Comparison of discrimination set with colours as opposed to three-dimensional shapes thus indicated few significant differences, suggesting that extensive further training with other materials would be unlikely to yield significant improvement in discrimination set. Certain hypotheses regarding conditions under which discrimination set was maximized, were confirmed. In particular, it appeared that masking of the centre position (3) was likely to discourage the use of certain simple positional strategies, increasing the likelihood of matching. Hence, it was decided that in presentation of all other tasks, the centre position should be masked and both training and assessment items in which the match appeared in the centre position be excluded.

The novelty of materials did appear to have a facilitative effect on certain features of discrimination set, especially as compared with the final sessions of the first series. Similarly, with the exception of sessions affected by non-task factors - that is, distress - the smaller number of sessions in the present series saw less deterioration due to apparent boredom. It thus appeared that training for other tasks should be as brief as was compatible with the assurance that <u>A</u> had transferred discrimination set to the new materials, particularly where, as in the next task to be presented, there was a slightly altered relationship between standard and alternatives, or standard and match. It was hoped that, with a brief training period, the effect of novelty would be maintained at a fairly high level on the assessment items, permitting greater assurance regarding the reliability of performance on these items.

Following presentation of the assessment items of the Colour task, training on the Configuration (synthesis) task was commenced. Somewhat surprisingly, in view of the rather different relationship between standard and alternatives on this task as compared with the previous tasks and, in particular, the fact that the match and standard were not identical, clear identification strategies, including matching, were evident within five sessions. Choices in the first two sessions appeared random and were associated with rather vague touching of the display, which seemed to suggest uncertainty as to what was required. A did, however, imitate the E's demonstration of tracing the outline of figures on a few items.

Initial uncertainty regarding the requirements of the task might have accounted for other aspects of behaviour not calculated to enhance discrimination set in the early sessions. Thus, A was rather reluctant to take his seat at the table and, although he did not interfere with the apparatus, he continually left the table between presentations. Looking at the display was vague or absent. Distractibility was great, persistence lacking and the novelty of the task failed to increase attention, possibly because of the uncertainty mentioned above. Recall at this stage of training seemed poor.

By the third session, however, clear matching was evident on the rather simple training items, even amongst three alternatives, provided the centre position was masked. Towards the end of session however, simple positional strategies tended to become evident. The transfer of identification strategies to the new task was accompanied by a general improvement in all other features of discrimination set, including the usually intractable waiting between presentations and persistence. It thus appeared that once the initial uncertainty had been resolved, the novelty of the task materials again had a beneficial effect on performance.

Apparently inexplicably, the next two sessions, when it had been intended to present assessment items, A, although not distressed, was extremely resistant to demands, refusing to sit at the table and banging on the apparatus and table. The sessions had, therefore, to be abandoned. In the following two sessions, however, it was possible to present the assessment items of the Configuration (synthesis) task, followed by introduction of the next task, involving discrimination amongst three-dimensional sizes (Size (3D).

The introduction of novel material again had a beneficial effect on all aspects of discrimination set in the first training session. Recall and transfer were good, a matching identification strategy amongst two, three and four alternatives (with centre position masked) being evident on simpler items. General features of task orientation, gaze orientation and instrumental responses also appeared good and distractibility was not noticeable, at least early in the first session.

In the next two sessions, perhaps associated with the more complex items presented - that is, inter-alternative differences in size were smaller - there was some deterioration in performance, seen in reluctance to sit at the table, interference with apparatus and failure to wait between presentations; and increasingly vague and random responses. In the fourth session, despite continued distractibility, performance was markedly better; although a little reluctant to come to the table, once there, A sat down readily and did not interfere with the apparatus; he directed his gaze at the display, deliberately pointed at specific alternatives and, with the centre position masked, showed clear evidence of matching amongst three alternatives, presented in any of the remaining positions.

Following presentation of the assessment items of the Size (3D) task, the Configuration (analysis) task was introduced. Novelty again appeared to have a beneficial effect on performance in the first session, as, after initial unco-operativeness, A showed task-oriented behaviour, looked at the display, responded in a deliberate manner and persisted at the task. However, despite apparently following a matching strategy, it appeared possible that A was merely imitating the E's demonstration without actually matching himself. Performance in the next session tended to confirm the assumption that A experienced difficulty in transferring discrimination set to the Configuration (analysis) materials, which involved a slightly altered relationship between standard and alternatives especially in that the standard and match were not identical. Thus, with less demonstration by the _E_, a simple positional strategy was evident. Task-oriented behaviour was maximal early in the session, decreasing later as distractibility increased. Performance in the third session seemed unreliable as, despite some task-oriented behaviour, _A_ avoided looking at the display, made vague pointing gestures and appeared to choose randomly amongst three alternatives. In the next two sessions, however, behaviour was task-oriented, the display was oriented, deliberate pointing occurred and matching amongst two or three alternatives (excluding the centre position) was evident for at least part of the session. Despite some distractibility, _A_ persisted at the task for some time. The assessment items were therefore introduced in the following sessions.

The next task involved discrimination amongst two-dimensional shapes (Shape 2D), providing an opportunity for more direct comparison with training on the first task, which involved three-dimensional shapes. Performance during the first session was quite remarkable, being task-directed, with deliberate pointing and clear matching amongst four geometric-figure and two metric-figure alternatives (excluding the centre position). Little distractibility and considerable persistence were shown in the fact that A responded to twelve items without leaving the table and, after a short break, to another four, before refusing to continue. In the remaining three sessions, a similar pattern was evident, although distractibility was more evident, particularly towards the end of sessions, and simple positional as well as matching strategies were evident. On metric as compared with geometric-figure items, more difficulty seemed to be experienced, seen in a tendency to revert to simple positional strategies.

As compared with the earlier presented three-dimensional version, little difference in identification strategies was observed, but other features of discrimination set appeared markedly better in the two-dimensional version, particularly in comparison with the later training sessions of the three-dimensional version. It, therefore, appeared that the decision to adopt a briefer training period rather than continue, probably fruitlessly, to attempt to extend discrimination set, thus introducing the possibly confounding effects of boredom, was justified.

Following presentation of the assessment items of the Shape (2D) task, the materials of the Object Character task were introduced. Again, despite the altered relationship between standard and match, recall and transfer of discrimination set appeared good, and, despite some distractibility, the novelty of the materials appeared to exert a beneficial effect on performance. In the first session, however, it was not altogether clear that matching did not occur on the basis of recognition of general configurational cues derived from the E's demonstration. In the second training session, however, some matching was evident, although, towards the end of the session, choices became increasingly random. A matching strategy did, however, appear sufficiently well established early in the session to permit the introduction of assessment items.

The final task involved discrimination amongst two-dimensional sizes (Size (2D). Despite some distractibility, recall and transfer of discrimination set were clearly evident. Matching occurred amongst three alternatives and performance seemed similar to that on the earlier presented three-dimensional version. Assessment items were, therefore, introduced without further training.

In summary of training with A, it appeared that the more superficial requirements of discrimination set - sitting at the table, looking at the display and pointing to a specific alternative - were fairly easily induced. Similarly, recall and transfer of these features from task to task was accomplished without great difficulty. The more fundamental requirements of discrimination set were, however, induced only with difficulty and showed considerable fluctuation. Thus, although identification strategies rather than random choices were evident fairly early and continued to be present fairly consistently, matching as opposed to simple positional strategies showed considerable fluctuation. Simple positional strategies tended, moreover, to be easily elicited by particular arrangements of alternatives, notably the presence of an alternative in the centre position (3) and where items included more and/or more complex alternatives. Distractibility and lack of persistence, combined with boredom when items were repeated frequently, were major factors interfering with training, but certain aspects of perceptual behaviour seemed more fundamental in preventing the extension of discrimination set, particularly in regard to the full array of five alternatives.

Control _S_s : _A_.

_N/CA_ : Following demonstration by the _E_ of the first four sub-items of the first task (Shape 3D), the _S_ carefully imitated the _E_'s pointing from standard to match, but was unable at first to transfer the relationship to subsequent sub-items, in which alternatives were chosen randomly. After re-demonstration, the _S_ was able to respond correctly to the remaining sub-items of the first item, but was unable to transfer to the next two items without a repetition of the procedure outlined above. On the fourth item presented, discrimination set had evidently been acquired, as no further errors were made and the _S_ indicated his understanding of the basis of matching by commenting, "the same". Thus, within the first session, this S exhibited all the general features of task orientation, gaze orientation and pointed to a specific alternative. His choices reflected systematic matching amongst five alternatives. Little distractibility was evident and a fair amount of persistence and interest.

In most subsequent tasks, transfer of discrimination set occurred without difficulty within the first item and after only one demonstration by the E. Slight difficulty was experienced in relation to the Configuration (synthesis) task, where after immediate transfer on the first two items, some confusion was shown in relation to the third and fourth items, initial error, however, being spontaneously corrected. Similar slight difficulty was shown in relation to the Configuration (analysis) task and somewhat greater difficulty in relation to the Object task, although re-demonstration of one or two items was sufficient to confirm discrimination set. The introduction of novel materials in all cases appeared to exert a desirable effect on attention.

S/CA : Following the E's demonstration and one re-demonstration following an incorrect choice, discrimination set appeared to be established, although some errors in matching were made when the more complex, metric shapes were presented, apparently due to over-impulsive choices. Discrimination set in relation to five alternatives was thus established within one session. In all subsequent tasks, transfer of discrimination set occurred without difficulty, although there was initially some hesitancy on training items of the Configuration (synthesis), Configuration (analysis) and Object tasks. Distractibility was minimal and persistence was shown. The introduction of novel materials in all cases appeared to enhance attention.

N/MA : Following the E's demonstration, there appeared to be little difficulty on the part of this S in choosing the matching alternative, although there was occasionally slight hesitation and a tendency tentatively to choose a non-matching alternative with subsequent spontaneous correction and choice of the match. Discrimination set was thus easily established. Transfer to other tasks occurred with little difficulty in most cases, although slight initial hesitation was shown on the Configuration (synthesis) and Configuration (analysis) tasks, confusion with shape on the Size (3D) task and some distractibility on the Object task, as the S recognized objects and wanted to show that he could label them. A fair amount of distractibility was shown, necessitating frequent pauses as described in discussion of rapport; persistence was minimal. The introduction of novel materials had only a slight and rather brief effect on attention and task-orientation, as this young S, as mentioned in regard to rapport, seemed to find the tasks monotonous.

S/OLD : This S initially appeared rather uncertain regarding the basis used by E in demonstrating choices on the first few sub-items and accordingly appeared to attempt other strategies, before achieving a matching strategy. Most clear was a brief period in which a positional strategy, based on the position designated by the E on a previous sub-item, was employed in choosing an alternative on the current item. Following re-demonstration, in which the E not only pointed to the matching alternative, but also traced its outline and that of the standard with a finger, the S appeared to acquire a discrimination set, choosing amongst five alternatives in terms of a matching strategy on all remaining items. No difficulty was shown in transfer to the remaining tasks, although there was some hesitancy in relation to certain training items of the Object task. Distractibility was minimal and persistence was shown. The introduction of novel materials seemed to enhance attention and task-orientation.

In summary, in comparison with A, control Ss displayed relatively little difficulty in acquiring and transferring discrimination set. General features of task orientation and gaze orientation were elicited without difficulty in most control Ss and instrumental responses were deliberate and specific. All control Ss were able to make use of a matching strategy in relation to five alternatives within one session and, in most cases, showed slight difficulty in subsequent tasks only where the relationship between the standard and matching alternative was slightly altered, as in the Configuration (synthesis), Configuration (analysis) and Object tasks. With the exception of one very young S, distractibility was minimal, persistence was shown and novel materials favourably affected attention and persistence.

(3) Perceptual factors.

"Autistic" S : A.

The number of alternatives presented in different tasks varied according to what had appeared optimal in training and has, therefore, been reported for each task. For each task, (or session, where assessment items were administered over a series of sessions), choices have been analysed in terms of strategies for the total series of items presented, as well as for the first and second halves of the series, in order to assess any change in strategy over time. When five or less items were presented in any session, however, separate calculations for the first and second halves of the series did not seem warranted. Since fewer than five alternatives were presented, no reference has been made in analysis of strategies to central bias.

Shape (3D) task:

As this was the first task to be presented to A, it was subject to the adverse effects of boredom following a long training procedure and to uncertainty regarding the optimal number and arrangement of alternatives. The first item having been refused, a total of nine items, the majority of which were three-alternative items, were presented.

Figure 1: A's choices on assessment items of Shape (3D) task.

Item Number	Stimulus[1] Set	Positions 1	2	3	4	5
1	Ba[1]	[1[2]	.	.	.	6]
2	Bc[1]	.	.	.	4	5
3	Cc	8	9	.	.	5
4	Ca	2	.	.	8	1
5	Dc	5	1	2	.	.
6	Da	4	5	6	.	.
7	Ea	8	9	.	.	.
8	Ec	.	.	.	2	3
9	Fa	4	.	6	.	5
10	Fc	.	9	2	.	1

Key: underlined number = match; dot = masking; circle = choice; lines = successive choices; brackets round item = refusal or omission. Note that this key applies to all other figures.

1. As defined in discussion regarding selection of shape stimuli (cf. Appendix B).

2. Number of stimulus in relation to set of stimuli (cf. 1 above).

The pattern of choices had, therefore, to be considered as suggestive only, the E having decided at the end of the session that A's evident boredom with and lack of interest in the task would render further testing fruitless. Similarly, patterns of visual inspection were considered suggestive only, as indeed such patterns were in relation to all tasks, in view of the limitations of recording.

(a) Identification strategies.

Analysis of the pattern of choices as reflected in Figure 2 has been summarized in Table 4.

Table 4: Proportion of A's choices compatible with various strategies on assessment items of Shape (3D) task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	–[2]	–[2]	.67(3)[1]
preference	.25(4)[1]	.75 (4)[1]	.50(8)
lateral		no bias	
central pref.	1.00(4)	.80 (5)	.89(9)
Alternation	.75(4)	.25 (4)	.50(8)
Discrimination			
matching	.75(4)	.20 (5)	.44(9)
oddity	.25(4)	.80 (5)	.56(9)

1. Figures in brackets represent the total number of items in respect of which the preceding proportion was calculated.

2. Number of items too small to warrant separate calculations.

The strategy most evident in relation to the total number of choices was central preference, as compared with a somewhat smaller proportion of choices consistent with position perseveration. The one exception as regards position perseveration occurred in relation to position 3, where position 2 was chosen instead (item 6). This choice also represented a slight departure from strict adherence to central preference - that is, choosing the position nearest the centre - but nevertheless appeared to fall within the ambit of the latter strategy. Over the whole series of items, proportions of choices consistent with position preference versus position alternation were the same, making comparison inconclusive. Position alternation did, however, appear related to the arrangement of alternatives, occurring always when masking obscured the previously chosen position, leading to choice, in terms of central preference of an alternative central position. The fact that, in addition, only moderate proportions consistent with discrimination strategies occurred, has suggested that over the whole series, an hypothesis of central preference strategy is best able to account for the pattern of choices.

In the first half of the series of items, a comparison of proportion of choices consistent with position preference versus position alternation favoured the latter strategy. However, despite the fairly high proportion of choices consistent with position alternation and matching strategies, central preference strategy appeared to be clearly dominant in all choices, the position nearest the centre being selected in all cases, while outer positions were never selected, despite their availability or the presence of the match in the outer position.

An increase in the influence of simple positional strategies in general was observable in the second half of the series of items. Thus, the proportion of choices consistent with position preference rose, while the proportion of choices consistent with position alternation or matching strategies declined. There was a slight and insignificant fall in proportion of choices compatible with a central preference strategy, attributable to one choice of position 2 rather than position 3, as discussed above. An increase in proportion of choices consistent with a strategy of oddity responding appeared related more to the decrease in the correlated proportion of choices consistent with matching, rather than an effective increase in the use of oddity strategy, in view of the more consistent proportion of choices relevant to positional strategies. The latter increase in proportion of choices consistent with positional strategies appeared related to increased possibilities for the direct expression of such strategies in the second half of the series, arising from a greater number of items where arrangement of alternatives permitted choice of the same position as that previously chosen or of one immediately adjacent.

In summary, choice appeared to be determined jointly by arrangement of available alternatives and central preference strategy. Only a slight deterioration over the session - that is, apparently greater reliance on positional strategies, was evident and appeared related more to the arrangement of alternatives in later items than to increasing distractibility, the latter being evident throughout the session in refusal to stay at the table for more than one item.

No firm conclusion could be reached regarding A's ability to discriminate three-dimensional shapes on the basis of the above performance. It did, however, appear that certain arrangements of stimulation might prevent his exercising whatever discriminative ability he possessed, leading to repetitive, autocentric approaches to such stimulation.

(b) Patterns of visual inspection.

In the first half of the session, scanning the full range of alternatives and inter-alternative comparison was observed, but scanning appeared to decline later, with apparent fixation of only one alternative or the standard.

Colour task:

The items of this task were administered in two sessions, ten items in the first (A) and nine in the second session (B). In session A, three alternatives per item were presented, the centre position masked in all cases except the first item, in an attempt to reduce central preference. In the second session, only two alternatives per item were presented, the centre position masked except in one item where the match was in the centre position, in a further attempt to encourage other than central preference strategy.

(a) Identification strategies.

Analysis of the patterns of choices in the two sessions has been summarized in Figure 2 and Table 5.

Figure 2: A's choices on assessment items of Colour task.

Session	Item Number	Stimulus Set	1	2	3	4	5
A	1	Eg	1	•	3	•	5
	2	Fg	•	2	•	4	5
	3	Gm	3	•	•	6	7
	4	Am	3	4	•	6	•
	5	Fg	5	1	•	3	•
	6	Gm	4	5	•	•	3
	7	Gg	•	4	•	6	7
	8	Bg	6	•	•	3	2
	9	Bm	•	2	•	4	5
	10	Cg	1	2	•	•	5
B	11	Bg	1	•	•	•	5
	12	Dm	6	•	•	•	2
	13	Bm	1	•	•	•	5
	14	Dg	•	2	•	4	•
	15	Gg	•	2	•	4	•
	16	Cg	•	•	5	•	7
	17	Am	9	•	•	•	5
	18	Dg	•	3	•	5	•
	19	Em	[6	•	4	•	•]
	20	Gg	•	9	•	7	•

In session A, over the whole series of items, the highest proportion of positional choices occurred in terms of lateral preference and position preference strategies, with a slightly smaller proportion compatible with a central preference strategy. Only a small to moderate proportion of choices compatible with position perseveration occurred and an even smaller proportion compatible with position alternation. Only moderate proportions of choices compatible with discrimination strategies occurred. Thus, over the whole series, simple positional strategies appeared to be the predominant determinant of choice.

Table 5: Proportion of A's choices compatible with various strategies on assessment items of Colour task.

Strategy	Proportion of choices compatible with given strategy					
	Session A			Session B		
	1st half	2nd half	Total	1st half	2nd half	Total
Simple Positional						
perseveration	-[1]	-	.40(5)	-[1]	-	.75(4)
preference	.50 (4)	1.00 (5)	.78(9)	.50 (4)	1.00(4)	.75(8)
lateral	.60 (5)	1.00 (5)	.80(10)	.50 (4)	.80(5)	.78(9)
central pref.	.80 (5)	.60 (5)	.70(10)	n.a.	n.a.	n.a.[2]
Alternation	.50 (4)	.00 (5)	.22 (9)	.50 (4)	.00(4)	.25(8)
Discrimination						
matching	.80 (5)	.20 (5)	.50(10)	.60 (5)	.50 (4)	.56(9)
oddity	.20 (5)	.80 (5)	.50(10)	.40 (5)	.50 (4)	.44(9)

1. Number of items too small to warrant separate calculations.
2. Only two alternatives per item presented.

In the first half of the series, amongst possible positional strategies, the highest proportion of choices was consistent with central preference, somewhat lower proportions being compatible with lateral preference, position preference and alternation. A high proportion of choices was also, however, consistent with a matching strategy. Inspection of the pattern of choices revealed that, firstly, the outer position was chosen once, suggesting that a strategy of central preference had at least not been altogether consistently employed; secondly, alternation occurred when the match was in a position on the opposite side of the display, even where it would have been possible to maintain position or where a strategy of central preference could have been satisfied on the same side; and thirdly, choice of central positions was also consistent with matching. It therefore, seemed possible, on the balance of probabilities, to assume that a matching strategy was employed in the first half of the series.

In the second half of the series, the proportions of choices compatible with both matching and position alternation strategies were much reduced, in comparison with the first half of the series. High proportions of choices were compatible with position preference and lateral preference. Since all choices consistent with position preference were, however, made on one side of the display, as opposed to runs of position preference being evident on both sides of the display, lateral preference seemed the more accurate label to describe the strategy.

A moderate proportion of choices compatible with a central preference strategy occurred, but since, on some items, choices more consistent with central preference could have been made by choosing a position on the other side of the display, but were not, lateral preference seemed to have been the predominant influence. Oddity responding was suggested by a high proportion of choices of non-matching alternatives, but, as in the case of central preference, seemed subordinate to lateral preference.

In summary, there did appear to be a deterioration in performance over the series. Early choices did appear compatible with a matching strategy, and indicated that some discrimination amongst shades of colours was possible. Later, however, a strategy of lateral preference became increasingly evident, as, to a lesser extent did other simple positional strategies. This increase in positional strategies was associated with increasing distractibility towards the end of the session, as compared with fairly co-operative and persistent behaviour early in the session.

In session B, over the whole series, there was very little difference in the proportions of positional choices compatible with lateral preference, position preference or position perseveration strategies. Central preference could not be evaluated because the two-alternative symmetrical arrangement precluded its consideration on all but one item where the match was in the centre position which was chosen. A low proportion of choices consistent with position alternation occurred and only moderate proportions relevant to discrimination strategies. It thus seemed that positional strategies were predominant over the whole series, although it was not possible to be precise about which positional strategy was the most influential in determining choice.

In the first half of the series, there was virtually no difference amongst the proportions of choices consistent with the various strategies, making it difficult to evaluate their relative influence. There was, however, a slightly raised proportion compatible with matching, together with relatively frequent, but nevertheless not strictly consistent, position alternation, which was suggestive of an attempt to employ a matching strategy, but with some errors in matching occurring.

In the second half of the series, the highest proportions of choices were compatible with position preference and lateral preference. The only deviation from a pattern consistent with these strategies occurred when the match was presented in the centre position, evoking a predictable choice in terms of central preference. No position alternation occurred and discrimination strategies were represented only by moderate proportions of choices. Any matching which did occur was, therefore, probably a chance concomitant of a choice in terms of position or lateral preference.

In summary, it appeared possible that a matching strategy was attempted in the first half of the series, tending to confirm the finding of session A that some discrimination of shades of colours was possible. In the second half of the series, however, performance deteriorated, giving way to choices in terms of simple positional strategies. The latter deterioration was explicable in terms of the increasing distractibility and some resistance to continuing, evident later in the session.

(b) Patterns of visual inspection.

In both sessions, during the first half of the session, scanning the full range of alternatives and inter-alternative comparison was observed, but scanning appeared to decline later, with apparent centring on only one alternative or the standard.

Configuration (synthesis) task:

The items of this task were administered in two sessions, the first (A) very brief due to minimal persistence and co-operation, so that only three items were presented and the second (B) much longer, when fifteen items were presented. In both sessions, three alternatives per item were presented, with the centre position masked to discourage the use of a central preference strategy. To the latter end also, items in which the match appeared in the centre position, were excluded.

(a) Identification strategies.

Analysis of the patterns of choice in the two sessions has been presented in Figure 3 and Table 6.

Figure 3: A's choices on assessment items of Configuration (synthesis) task.

Session	Item Number [1]	Positions 1	2	3	4	5
A	1	a	b	.	.	c
	2	.	a	.	b	c
	3	a	.	.	b	c
B	4	a	b	.	c	.
	5	a	b	.	.	c
	6	.	a	.	b	c
	7	.	a	.	b	c
	8	a	b	.	.	c
	9	a	b	.	c	.
	10	a	.	.	b	c
	11	a	b	.	c	.
	12	.	a	.	b	c
	13	a	.	.	b	c
	14	a	b	.	.	c
	15	a	b	.	.	c
	16	a	b	.	c	.
	17	.	a	.	b	c
	18	.	a	.	b	c

1. Items with match in centre position were omitted; hence 18 rather than 20 items.

In view of the small number of items administered in session A, detailed analysis has not seemed warranted. Moderate proportions of positional choices were compatible with simple positional strategies and position alternation. The highest proportion of choices was, however, consistent with matching and inspection of the pattern of choice indicated that choice of matching alternatives was made across the display and of outer positions. It therefore appeared possible to assume that a matching strategy was employed and that some synthesis of simple, incomplete configurations was possible.

Table 6: Proportion of A's choices compatible with various strategies on assessment items of Configuration (synthesis) task.

Strategy	Proportion of choices compatible with given stgy.			
	Session A	Session B 1st half	Session B 2nd half	Session B Total
Simple Positional				
perseveration	0.0(2)	.33 (6)	.57 (7)	.46 (13)
preference	.50(2)	.57 (7)	.86 (7)	.71 (14)
lateral	.67 (3)	.75 (8)	.71 (7)	.73 (15)
central pref.	.67 (3)	.63 (8)	.57 (7)	.60 (15)
Alternation	.50 (2)	.43 (7)	.14 (7)	.29 (14)
Discrimination				
matching	1.00 (3)	.63 (8)	.43 (7)	.53 (15)
oddity	0.00 (3)	.37 (8)	.57 (7)	.47 (15)

In session B, over the whole series, the highest proportions of positional choices were compatible with lateral preference, position preference and central preference strategies. The most likely of these three strategies, as the predominant influence over the series, appeared from inspection of the pattern of choices to be lateral preference. Thus, in the case of position preference, longer runs of choices were possible, but did not occur; similarly, as regards central preference, outer positions were chosen on both sides of the display, although somewhat less frequently than central positions. As regards the possibility of position perseveration, a moderate proportion of choices was consistent with this strategy; however, position perseveration could have occurred on all except one item (item 9), but did not, and of those choices which could have reflected position perseveration, at least some were also consistent with other strategies, such as matching. Only a small proportion of choices compatible with position alternation and moderate proportions of choices consistent with discrimination strategies were evident. Such alternation as did occur, however, by its very inconsistency, did support an hypothesis of some attempt at matching, as did the fact that other, simple positional strategies were not completely consistent.

In the first half of the series, the highest proportion of choices in relation to positional strategies was compatible with lateral preference, followed fairly closely by centrol preference, then by a moderate proportion of choices consistent with position preference and only a slight proportion of choices relevant to position perseveration. A moderate proportion of position alternation was evident. Some degree of inconsistency in positional choices, together with a proportion of choices compatible with matching similar to the proportions for lateral and central preference, suggested that some attempt at matching was made.

In the second half of the series, there was an increase in the proportion of positional choices consistent with position preference, which, together with lateral preference seemed to provide the clearest account of the pattern of choices. A decline in the proportion of choices which could be associated with central preference appeared attributable to early choices of outer positions, while an increase in position perseveration appeared attributable to an increase towards the end of the series of choices of position 2. Both the latter changes have appeared to reflect the essentially arbitrary decision to compare halves rather than any other divisions of the series. Thus, the first three or four choices of the second half probably reflected a continuation of the matching strategy which seemed to be present in the first half. If, for example, the division had been made after item 14, little difference would have been evident between proportions of choices consistent with, on the one hand positional preference and lateral preference and, on the other, matching strategies in relation to the earlier presented items, while simple positional strategies would have been clearly dominant in relation to later items.

In summary, it appeared that some amount of matching was attempted, suggesting that synthesis of simple, incomplete configurations was possible and confirming the similar finding in session A. The extent of matching was, however, not clear, because of the confounding effects of positional strategies, but it appeared likely that it extended beyond the arbitrary half-way mark of the series. The latter statement also appeared borne out by the greater degree of persistence shown and the occurrence of greater distractibility only near the end of the session.

(b) Patterns of visual inspection.

Throughout the first and second sessions, scanning the full range of alternatives and inter-alternative comparison were observed.

Size (3D) task:

The items of this task were administered in four sessions, items with the match in the centre position having been excluded. In the first session (A), eight items were presented; in the next session (B), the remaining eight items not having the match in the centre position, were presented. The following two sessions (C and D) involved representation of the items presented in session B to check certain hypotheses regarding strategies in session B. Although certain items differed as regards the composition and arrangement of alternatives, the match, of course, remained the same and in the same position. Three alternatives per item, with the centre position always masked, were presented in all sessions, to encourage other than central preference strategies, the remaining alternatives being randomly distributed as to position in successive items.

(a) Identification strategies.

Analysis of the pattern of choices in the four sessions has been summarized in Figure 4 and Table 7.

In session A, over the whole series of items, the highest proportions of positional choices were compatible with lateral preference and position preference strategies, with a somewhat smaller proportion compatible with central preference and a moderate proportion with position perseveration. The proportion of choices compatible with position alternation was slight and that relevant to discrimination strategies was moderate. Since most of the matching choices were also consistent with lateral or position preference, one of the latter strategies appeared the most likely. Inspection of the pattern of choices suggested that position preference was subordinate to lateral preference, since runs of choices occurred on only one side of the display.

Figure 4: A's choices on assessment items of Size (3D) task.

Session	Item Number[1]	Stimulus Set	Positions 1	2	3	4	5
A	1	Bs	5	•	•	8	9
	2	Bc	1	5	•	•	3
	3	Bs	2	3	•	5	•
	4	Cc	9	•	•	7	8
	5	Cs	•	2	•	4	5
	6	Cs	9	10	•	•	8
	7	Cc	12	13	•	10	•
	8	Cs	•	6	•	3	4
B	9	Cs	10	11	•	13	•
	10	Cc	•	3	•	1	5
	11	Ds	13	14	•	•	11
	12	Dc	11	•	•	8	7
	13	Ds	2	3	•	5	•
	14	Dc	•	1	•	3	4
	15	Ds	21	•	•	22	24
	16	Ds	20	16	•	17	•
C	9	Cs	10	•	•	13	9
	10	Cc	4	3	•	1	•
	11	Ds	13	14	•	•	11
	12	Dc	•	10	•	8	7
	13	Ds	2	3	•	•	6
	14	Dc	5	1	•	3	•
	15	Ds	21	•	•	22	24
	16	Ds	•	16	•	17	19

Figure 4. (continued) : A's choices on assessment items of Size (3D) task.

Session	Item Number	Stimulus Set	Positions 1	2	3	4	5
D	9	Cs	10	.	.	13	9
	10	Cc	4	3	.	1	.
	11	Ds	13	14	.	.	11
	12	Dc	.	10	.	8	7
	13	Ds	2	3	.	.	6
	14	Dc	5	1	.	3	.
	15	Ds	21	.	.	22	24
	16	Ds	.	16	.	17	19

1. Items with match in centre position (3) were omitted.

In the first half of the series, the highest proportions of positional choices were consistent with lateral preference, followed by position preference. Only a moderate proportion of choices was consistent with central preference and a slight proportion with position alternation. Moderate proportions of choices were compatible with discrimination strategies. Choice of outer positions did, however, occur, together with failure to perseverate where perseveration was possible, making it difficult to rule out entirely the possibility of a matching strategy. Thus, although positional strategies appeared most evident, analysis was somewhat inconclusive.

Table 7: Proportion of A's choices compatible with various strategies on assessment items of Size(3D) task.

Strategy	Proportion of choices compatible with given strategy											
	Session A			Session B			Session C			Session D		
	1st half	2nd half	Total	1st half	2nd half	Total	1st half	2nd half	Total	1st half	2nd half	Total
Simple positional												
perseveration	–[1]	–	.50(4)	–	–	1.00(5)	–	–	.50(4)	–	–	0.00(4)
preference	.67(3)	.75(4)	.71(7)	.33(3)	1.00(4)	.71(7)	.33(3)	.33(3)	.33(6)	0.00(3)	.25(4)	.14(7)
lateral	.75(4)	.75(4)	.75(8)	.75(4)	1.00(4)	.88(8)	.75(4)	.33(3)	.57(7)	.50(4)	.75(4)	.63(8)
central pref.	.50(4)	1.00(4)	.63(8)	1.00(4)	1.00(4)	1.00(8)	1.00(4)	.33(3)	.71(7)	.75(4)	.50(4)	.63(8)
Alternation	.33(3)	.25(4)	.29(7)	.67(3)	0.00(4)	.29(7)	.67(3)	.67(3)	.67(6)	1.00(3)	.75(4)	.86(7)
Discrimination												
matching	.50(4)	.50(4)	.50(8)	.50(4)	.25(4)	.38(8)	.50(4)	.67(3)	.57(7)	.75(4)	.75(4)	.75(4)
oddity	.50(4)	.50(4)	.50(8)	.50(4)	.75(4)	.63(8)	.50(4)	.33(3)	.43(7)	.25(4)	.25(4)	.25(4)

1. Number of items too small to warrant separate calculations.

In the second half of the series, the highest proportions of positional choices were compatible with central preference, followed by lateral andposition preference. Position perseveration did occur, although not invariably where it could have. Only a slight proportion of choices consistent with position alternation and moderate proportions consistent with discrimination strategies occurred. The clearest account of the pattern of choices appeared to be in accord with strategies of central and lateral preference.

In summary, although the possibility of matching could not be altogether dismissed, a conservative interpretation favoured simple positional strategies, chiefly lateral preference. The somewhat uncertain pattern of choices might have been related to distractibility which increased rapidly after a brief, initial period of persistence.

In session B, over the whole series of items presented, the highest proportions of positional choices were consistent with central preference and position perseveration, followed by lateral preference and position preference. Only small proportions of choices were compatible with position alternation and matching strategies, while a moderate proportion of choices was consistent with a strategy of oddity responding. Some choices of matching alternatives did, however, occur, despite the greater likelihood on any given item of choosing non-matching alternatives, suggesting inconsistency in any use of oddity responding. Positional strategies have, therefore, appeared the most apt basis for the pattern of choices.

In the first half of the series, the highest proportion of positional choices was consistent with central preference and a somewhat lower proportion with lateral preference. Position alternation and discrimination strategies were, however, represented by moderate proportions of choices. Inspection of the pattern of choices suggested the possibility that some matching might have occurred within the confines of a strategy of central preference, an hypothesis which might also account for the somewhat unexpected position alternation, representing a departure from the more easily sustained lateral preference strategy.

In the second half of the series, there was a marked increase in the proportions of choices compatible with all simple positional strategies. No position alternation occurred and choices compatible with a strategy of oddity responding all occurred in positions more evidently compatible with simple positional strategies.

The predominant influence over the series thus appeared to be positional, with no clear indication as to which particular positional strategy was most important. There seemed to be some possibility of a matching strategy within the confines of central preference early in the series, an hypothesis which was further investigated in the next two sessions. The possibility of a decline in performance over the series was borne out by A's behaviour during the session which was characterized by some distractibility throughout the session and by increasing resistance to complying with the E's demands.

In session C, over the whole series, the highest proportion of positional choices was consistent with central preference, but only slightly lower was position alternation. Position perseveration and position preference were represented by only moderate proportions of choices. Moderate proportions of choices were also compatible with discrimination strategies. Inspection of the pattern of choices indicated that outer positions were chosen, even later in the series, while alternation was not altogether consistent as a strategy. The pattern of choices, therefore, appeared capable of interpretation in terms of a matching strategy, with errors in matching occurring.

In the first half of the series, the pattern of choices was identical with that of the previous session, despite the interval of a day and the presentation of slightly different items, in terms of different non-matching alternatives and arrangement of alternatives. As in the previous session, at least one of the choices was a predictable matching error - that is, the alternative only minimally larger than the match was chosen. It thus appeared likely that a matching strategy had been used.

In the second half of the series, in which one of the items was refused, the highest proportion of choices relevant to position was compatible with position alternation. A similar proportion was, however, consistent with a matching strategy and the fact that outer positions were chosen, together with some alternation rather than simple positional choices, has added weight to an interpretation in terms of a matching strategy.

In summary, the hypothesis suggested in the previous session, namely that matching did occur, though obscured to some extent by a strategy of central preference, seemed to be confirmed in session C, where a matching strategy was much more clearly evident. The repetition of the items might have facilitated the use of a matching strategy in the later session, although such facilitation might be expected to be minimal in view of the considerable interval between sessions and the slightly altered displays in the second session. The relatively better performance in session C occurred despite considerable resistance and distractibility on the part of _A_ and a further session was considered necessary to establish that matching performance in the previous sessions had not occurred by chance.

In session D, over the whole series, the highest proportion of positional choices was consistent with position alternation, in contrast to moderate to low proportions consistent with simpler positional strategies. A high proportion of choices was also compatible with a matching strategy. Inspection of the pattern of choices indicated that position alternation was not altogether consistent and departures from an alternation strategy were consistent with a matching strategy; in addition, outer positions were chosen; finally, both choices of non-matching alternatives were predictable matching errors, involving choice of the alternative nearest in size to the match. It thus seemed possible to assume that a matching strategy had been followed, but that errors were made.

In the first half of the series, the pattern of choices was essentially similar to that in the previous two sessions, with the exception that an additional matching choice was made. A matching strategy was, therefore, assumed.

In the second half of the series, similar, fairly high proportions of positional choices were compatible with lateral preference, posi-

-tion alternation and matching. Departure from both the former were, however, largely consistent with a matching strategy.

Performance in session D, therefore, appeared to confirm that matching in relation to three-dimensional sizes was possible. Although some improvement due to a certain amount of practice might have occurred, it appeared that the improved performance in the final session might be largely attributable to the considerable degree of persistence shown in session D.

(b) Patterns of visual inspection.

Patterns of visual inspection appeared to vary between sessions, but remained fairly consistent within sessions. In sessions A and D, scanning the range of alternatives was observed, although inter-alternative comparison did not appear to occur. In sessions B and C, however, little or no scanning was observed, with centring on only one alternative or the standard.

Configuration (analysis) task:

The items of this task were administered in five sessions, items with the match in the centre position having been excluded. In the first session (A), ten items were presented. In session B, seven items were presented in a partial re-presentation of the items of session A in an attempt to check certain hypotheses arising out of theprevious session. In session C, a similar procedure was followed, as well as in session D where some novel items were also presented. In session E, some items presented in session D were repeated and the remaining novel items presented. In all items two alternatives were presented, the centre position always being masked and the two alternatives randomly distributed in successive items in either positions 2 and 4, or positions 1 and 5.

(a) Identification strategies.

The arrangement of alternatives precluded the use of a strategy of central preference and in some cases also precluded the use of position perseveration which, in any case, could only have occurred on very few items per series and did not, therefore, warrant analysis. Analysis of the pattern of choices in the five session has been summarized in Figure 5 and Table 8.

In session A, over the whole series of items, the highest proportions of positional choices were compatible with lateral preference and position preference, while a negligible proportion was compatible with position alternation. Moderate proportions were consistent with discrimination strategies. Over the whole series, therefore, strategies of lateral and position preference appeared the most likely.

Figure 5: A's choices on assessment items of Configuration (analysis) task.

Session	Item Number[1]	Positions				
		1	2	3	4	5
A	1	.	a	.	b	.
	2	a	.	.	.	b
	3	a	.	.	.	b
	4	.	a	.	b	.
	5	a	.	.	.	b
	6	a	.	.	.	b
	7	.	a	.	b	.
	8	a	.	.	.	b
	9	.	a	.	b	.
	10	a	.	.	.	b
B	3	a	.	.	.	b
	4	.	a	.	b	.
	5	a	.	.	.	b
	6	a	.	.	.	b
	7	.	a	.	b	.
	8	a	.	.	.	b
	9	.	a	.	b	.
C	1	.	a	.	b	.
	2	a	.	.	.	b
	3	a	.	.	.	b
	4	.	a	.	b	.
	5	a	.	.	.	b
	6	a	.	.	.	b

1. Items with match in centre position omitted.

Figure 5 (continued) : A's Choices on assessment items of Configuration (analysis) task

Session	Item Number	1	2	3	4	5
D	7	•	a	•	b	•
	8	a	•	•	•	b
	9	•	a	•	b	•
	10	a	•	•	•	b
	11	•	a	•	b	•
	12	•	a	•	b	•
E	7	•	a	•	b	•
	8	a	•	•	•	b
	9	•	a	•	b	•
	10	a	•	•	•	b
	11	•	a	•	b	•
	12	•	a	•	b	•
	13	a	•	•	•	b
	14	•	a	•	b	•
	15	•	a	•	b	•

In the first half of the series, the proportions of choices compatible with the various possible strategies were similar. The greater proportion of choices compatible with position alternation in the first half as compared with the whole series, together with the fact that position alternation

Table 8: Proportion of A's choices compatible with various strategies on assessment items of Configuration (analysis) task.

Strategy	Proportion of choices compatible with given strategy														
	Session A			Session B			Session C			Session D			Session E		
	1st half	2nd half	total	1st half	2nd half	total	1st half	2nd half	total	1st half	2nd half	total	1st half	2nd half	total
Simple positional															
perseveration	-[1]	-	-	n.a.[2]	n.a.	n.a.	-	-	-	-	-	-	-	-	-
preference	.50(4)	1.00(5)	.78(9)	.67(3)	.67(3)	.67(6)	-	-	.60(6)	-	-	1.00(5)	.75(4)	.75(4)	.75(8)
lateral	.60(5)	1.00(5)	.80(10)	.75(4)	1.00(3)	.86(7)	.67(3)	1.00(3)	.83(6)	1.00(3)	1.00(3)	1.00(6)	.80(5)	.75(4)	.78(9)
central pref.	n.a.[3]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Alternation	.50(4)	.00(5)	.22(9)	.33(3)	.33(3)	.33(6)	-	-	.40(5)	-	-	.00(5)	.25(4)	.25(4)	.25(8)
Discrimination															
matching	.60(5)	.40(5)	.50(10)	.75(4)	.33(3)	.57(7)	.67(3)	.67(3)	.67(6)	.33(3)	.67(3)	.50(6)	.80(5)	.75(4)	.78(9)
oddity	.40(5)	.60(5)	.50(10)	.25(4)	.67(3)	.43(7)	.33(3)	.33(3)	.33(6)	.67(3)	.33(3)	.50(6)	.20(5)	.25(4)	.22(9)

1. Number of items too small to warrant separate calculations.
2. Arrangement of alternatives precluded use of this strategy.
3. Only two alternatives per item were presented.

was nevertheless not entirely consistent in the first half did suggest that a matching strategy might have been employed, but the available evidence was insufficient to permit any firm conclusion.

In the second half of the series, the highest proportions of positional choices were consistent with position preference and lateral preference but as runs of choices occurred on only one side of the display, position preference was probably subordinate to lateral preference. A moderate proportion of choices was also consistent with a strategy of oddity responding, but choices of non-matching alternatives seemed in fact to have been an incidental concomitant of positional strategies in relation to the arrangement of matching and non-matching alternatives.

In summary, simple positional strategies appeared to be most consistent with the pattern of choices, although there was a slight possibility that a matching strategy might have been employed early in the series. Behaviour during the session was characterized by unresponsiveness rather than deliberate resistance and by an increasing degree of distractibility, tending to support the conclusion that only simple positional strategies were used.

In session B an attempt was made to check the possibility that a matching strategy was used by A, at least for some items, of the present task. Over the whole series of items, the highest proportion of positional choices was consistent with lateral preference, followed by position preference. Only a small proportion of choices was consistent with position alternation and moderate proportions with discrimination strategies. The point in the series at which position alternation occurred - midway through the series - and consistent with a matching strategy did raise the possibility that a matching strategy had been employed, at least on certain of the items. As in the previous session, however, a conservative interpretation favoured lateral preference.

In the first half of the series, the highest proportion of positional choices was consistent with lateral preference, a moderate proportion with position preference and a rather small proportion with position alternation. A proportion of choices similar to that consistent with lateral preference was compatible with a matching strategy, suggesting that, if matching was employed, it was early in the series. This hypothesis gained further support from the fact that the alternation which did occur, was consistent with matching and that such alternation occurred despite the fact that lateral preference could have been maintained. Adopting a conservative approach, however, no firm conclusion could be reached.

In the second half of the series, the proportion of positional choices consistent with lateral preference rose, the proportions for position preference and alternation remaining the same. The proportion consistent with a matching strategy fell, but the corresponding increase in the proportion consistent with oddity responding appeared explicable in terms of positional strategies in relation to the arrangement of matching and non-matching alternatives. A strategy of lateral preference, therefore, seemed to have been employed.

In summary, simple positional strategies appeared the most compatible with the pattern of choices, although there was again some possibility that a matching strategy was employed, at least in the early part of the series. The quite considerable distractibility throughout the session, together with the fact that certain external factors had necessitated quite a long break between sessions A and B, also tended to support the assumption that simple positional strategies were probably used.

In session C, the highest proportion of positional choices was consistent with lateral preference, moderate proportions with position preference and position alternation. A moderate proportion of choices was compatible with a matching strategy. Inspection of the pattern of choices revealed a pattern essentially similar to choices in sessions A and B for the items in question, but with a slight increase in matching choices. Such alternation as did occur was compatible with a matching strategy.

It thus appeared that a matching strategy might have been employed, although limited to some extent by a tendency towards employing a strategy of lateral preference. Further confirmation of this latter hypothesis was, however, still required.

In the first half of the series, similar moderate proportions of choices were consistent with lateral preference and matching, while in the second half there was an increase in the proportion compatible with lateral preference, the proportion consistent with matching remaining the same. The small number of items made the division somewhat artifical and the conclusion reached in regard to the whole series was probably the fairest estimate of the strategies employed. The possibility that some matching had been employed seemed likely also in view of _A_'s persistence at the task, despite some distractibility, during this session.

In session D, a further attempt was made to investigate the likelihood that _A_ employed a matching strategy, at least to some extent. Over the whole series, the highest proportions of positional choices were compatible with position preference and lateral preference. Since however, runs of choices occurred only on one side of the display, it seemed likely that position preference had been subordinate to lateral preference. The absence of alternation also made it seemed likely that the moderate proportion of choices consistent with matching occurred by chance association with lateral preference.

In the first half of the series, the proportion of choices associated with lateral preference was high, while a moderate proportion of choices was consistent with a strategy of oddity responding. The latter appeared, however, to have occurred by chance association with lateral preference. In the second half, lateral preference was again high and the increase in matching evidently occurred by association with the former. Behaviour during this session was characterized by extreme distractibility, increasing the probability of positional strategies.

In session E, over the whole series of items, the highest proportions of positional choices were compatible with lateral preference and position preference, but position preference appeared from inspection to have been subordinate to lateral preference. There was only a small proportion of choices consistent with position alternation, but the proportion of choices consistent with a matching strategy was nevertheless the same as that associated with lateral preference. Inspection of the pattern of choices revealed that alternation occurred somewhat inexplicably on the first and last items of the series, contrary to _A_'s more usual pattern of increasingly consistent use of simple positional strategies. It thus appeared that, while a conservative interpretation favoured lateral preference, a matching strategy might have been employed either inconsistently or largely within the confines of a tendency towards using lateral preference.

In the first half of the series of items, the highest proportion of positional choices was consistent with lateral preference, followed by position preference, which appeared subordinate to the former. The proportion of choices consistent with matching was the same as that associated with lateral preference, inviting a similar interpretation to that for the whole series. The proportions of choices relative to the various strategies in the second half of the series lent themselves to a similar interpretation. Fair persistence was shown over the whole series, despite some distractibility, lending credibility to an hypothesis of matching within the bounds of a strategy of lateral preference.

In summary of the analyses for the five sessions, it appeared possible that a matching strategy might have been used, at least on some items, but its extent, (if it did occur), was obscured by positional strategies, in particular lateral preference. It did, however, seem probable that A experienced difficulty in perceiving configurations forming part of larger wholes, since even given a relatively simple arrangement of only two alternatives and repeated opportunities for viewing items, positional strategies continued to be more evident than matching.

(b) Patterns of visual inspection.

Patterns of visual inspection, appeared to vary both within and between sessions. In session A, during the first half, scanning the full range of alternatives and inter-alternative comparison were observed but were replaced later by centring on only one alternative or the standard. Session B appeared to be characterized throughout by centring on one alternative or the standard. In session C, inter-alternative comparison was observed only during the first half of the session, although scanning the full range of alternatives appeared to be present throughout. Session D appeared to be characterized by fixation of only one alternative or the standard. In session E, scanning the full range of alternatives was observed throughout the session, while inter-alternative comparison was possibly present briefly only in the first half.

Shape (2D) task:

The items of this task were administered in two sessions, items with the match in the centre position having been excluded. In the first session (A), only four items were presented, while the remaining twelve items were presented in the second session (B). Two alternatives per item were presented, with the centre position always masked and the two alternatives randomly distributed in successive items in either positions 2 and 4, or positions 1 and 5.

(a) Identification strategies.

The arrangement of alternatives precluded the use of a strategy of central preference and in some cases precluded the use of position perseveration which, in any case, could only have occurred on very few items per series. Analysis of the pattern of choices in the two sessions has been summarized in Figure 6 and Table 9.

Table 9: Proportion of A's choices compatible with various strategies on assessment items of Shape (2D) task.

Strategy	Proportion of choices compatible with given strategy			
	session A	Session B		
		1st half	2nd half	Total
Simple positional				
perseveration	n.a.[1]	-[2]	-	1.00(2)
preference	.67(3)	.60(5)	.67(6)	.73(11)
lateral	.75(4)	.67(6)	.67(6)	.67(12)
central pref.	n.a.[3]	n.a.	n.a.	n.a.
Alternation	.33(3)	.33(5)	.33(6)	.33(11)
Discrimination				
matching	.50(4)	.83(6)	.83(6)	.83(12)
oddity	.50(4)	.17(6)	.17(6)	.17(12)

1. Arrangement of alternatives precluded use of this strategy.
2. Number of items too small to warrant separate calculations.
3. Only two alternatives per item presented.

Figure 6: A's choices on assessment items of Shape (2D) task.

Session	Item Number[1]	Stimulus Set	Positions 1	2	3	4	5
A	1	Ba	a	•	•	•	b
	2	Bc	•	a	•	b	•
	3	Cc	a	•	•	•	b
	4	Ca	•	a	•	b	•
B	5	Ea	a	•	•	•	b
	6	Ec	•	a	•	b	•
	7	Fc	a	•	•	•	b
	8	Fa	•	a	•	b	•
	9	Ga	a	•	•	•	b
	10	Hc	•	a	•	b	•
	11	Bc	•	a	•	b	•
	12	Cc	a	•	•	•	b
	13	Dc	•	a	•	b	•
	14	Ec	•	a	•	b	•
	15	Fc	a	•	•	•	b
	16	Gc	•	a	•	b	•

1. Items with match in centre position omitted.

In session A, the highest proportion of positional choices was consistent with lateral preference, followed by position preference. Only a small proportion of choices compatible with position alternation occurred and a moderate proportion compatible with discrimination strategies. Co-operation lasted only for a brief period in which the four choices were made and was succeeded by rapidly increasing distractibility which prevented further assessment. Strategies of lateral and position preference appeared to most likely in relation to the pattern of choices.

In session B, over the whole series, the highest proportion of positional choices was consistent with position perseveration, but as this proportion was derived from only two items, it was difficult to evaluate its significance. The next highest proportions of positional choices were compatible with position preference and lateral preference. Despite a small proportion of choices compatible with alternation, there was, however, a high proportion of choices consistent with matching. The fact that a large proportion of matching alternatives appeared on one side of the display meant that matching could have occurred by coincidental association with simple positional strategies. However, where alternation did occur, it was consistent with a matching strategy, occurring somewhat unexpectedly at the beginning and again at the end of the series, but not in the middle of the series where a run of matching alternatives was presented on the left of the display. The pattern of alternation in particular has appeared to lend credibility to an hypothesis that a matching strategy was used, although its extent was obscured by the possibility of simple positional strategies being used in the middle of the series.

The relative proportions of choices compatible with the various strategies in the first and second halves were virtually identical, but in any case, the pattern of choices over the series as described above made division of the series rather artificial. Although, as indicated by the number of items, considerable persistence was shown over the whole series, periods of co-operation and concentration were interspersed with frequent bouts of distractibility. Since, however, choices tended to be elicited only during co-operative periods, the possibility of a matching strategy having been used seemed to be enhanced.

In summary, it has appeared that _A_ was able to discriminate amongst two-dimensional shapes, at least when discrimination was required between only two alternatives. Although the extent of discrimination was not clear, it appeared to include both simple shapes, presented early in the series, and more complex shapes such as those presented towards the end of the series.

(b) Patterns of visual inspection.

In session A, there was minimal scanning, with centring on only one alternative or the standard. In session B, however, scanning the full range of alternatives was observed, together with inter-alternative comparison, throughout the session.

Object task:

The items of this task, excluding items with the match in the centre position, were presented in six sessions. In the first session (A), only five items could be presented. Nine items, consisting of a re-presentation of the items of session A, together with novel items, were presented in session B. In session C, only four items, all novel, could be presented, while, in session D, seven items - those presented in the previous session, together with some novel items - were presented. In sessions E and F, three and four items respectively were presented, both series being partial re-presentations of session D. In all items, only two alternatives were presented, the centre position always being masked and the two alternatives randomly distributed in successive items in either positions 2 and 4, or positions 1 and 5.

(a) Identification strategies.

The arrangement of alternatives precluded the use of a strategy of central preference and would have permitted only limited use of position perseveration. Analysis of the pattern of choices in the five sessions has been summarized in Figure 7 and Table 10.

Figure 7: A's Choices on assessment items of Object task.

Session	Item Number[1]	Positions 1	2	3	4	5
A	1	•	a	•	b	•
	2	a	•	•	•	b
	3	•	a	•	b	•
	4	a	•	•	•	b
	5	a	•	•	•	b
B	1	•	a	•	b	•
	2	a	•	•	•	b
	3	•	a	•	b	•
	4	a	•	•	•	b
	5	a	•	•	•	b
	6	•	a	•	b	•
	7	a	•	•	•	b
	8	a	•	•	•	b
	9	•	a	•	b	•
C	10	a	•	•	•	b
	11	a	•	•	•	b
	12	•	a	•	b	•
	13	•	a	•	b	•

Fig. 7. (contd)

1. Items with match in centre position were omitted.

In Session A, the highest proportion of positional choices was compatible with lateral preference, only slightly smaller proportions of choices being consistent with position preference and position alternation. A high proportion of choices was, however, also consistent with matching and the pattern of alternation appeared to confirm that a matching strategy had been employed. Behaviour was, however, characterized by rapidly increasing unco-operativeness and distractibility throughout the session, necessitating termination of administration after only a few items had been presented.

In session B, over the whole series, the highest proportion of positional choices was consistent with position alternation, with the proportion compatible with lateral preference somewhat smaller. A moderate proportion of choices was compatible with a matching strategy. Choices inconsistent with a strict alternation strategy tended to be consistent with matching, suggesting that a matching strategy might have been followed, although, in view of the somewhat higher proportion of choices associated with alternation, no firm conclusion seemed possible.

In the first half of the series, the pattern of choices was the same as that for session A, with one exception. The highest proportion of positional choices was compatible with position

Figure 7 (continued): A's choices on assessment items of Object task.

Session	Item Number[1]	Positions 1	2	3	4	5
D	10	a	.	.	.	b
	11	a	.	.	.	b
	12	.	a	.	b	.
	13	.	a	.	b	.
	14	.	a	.	b	.
	15	a	.	.	.	b
	16	.	a	.	b	.
E	10	a	.	.	.	b
	11	a	.	.	.	b
	12	.	a	.	b	.
F	13	.	a	.	b	.
	14	.	a	.	b	.
	15	.	a	.	b	.
	16	.	a	.	b	.

1. Items with match in centre position were omitted.

alternation and a moderate proportion with lateral preference, although the latter appeared from inspection of the pattern of choices to have been subordinate to position alternation. A moderate proportion was compatible with a matching strategy, but, from inspection of the pattern of choices, it did not appear possible to reach a conclusion in favour of matching as opposed to position alternation.

In the second half of the session, there was an increase in the proportion of positional choices compatible with lateral preference, and a decline in the proportion of choices associated with alternation to moderate, together with a moderate proportion compatible with position preference. From inspection of the pattern of choices, it appeared that position preference tended to be subordinate to lateral preference, while choices consistent with lateral preference occurred largely in association with matching choices. As in the first half, departures from positional strategies were consistent with a matching strategy, but since departures from matching also occurred it was not possible to reach a firm conclusion.

In summary, there were indications that a matching strategy might have been used, but it was not possible to make any definite statements in this regard, because positional strategies were also highly likely. Behaviour throughout

Table 10: Proportion of A's choices compatible with various strategies on assessment items of Object task.

Strategy	Session A	Session B 1st half	Session B 2nd half	Session B Total	Session C	Session D 1st half	Session D 2nd half	Session D Total	Session E	Session F
Simple positional										
perseveration	0.00(1)	– [1]	–	0.00(2)	1.00(2)	–	–	1.00(3)	0.00(1)	1.00(3)
preference	.50(4)	0.00(4)	.50(4)	.25(8)	1.00(3)	1.00(3)	1.00(3)	1.00(6)	.50(2)	1.00(3)
lateral	.60(5)	.60(5)	.75(4)	.67(9)	1.00(4)	1.00(3)	1.00(4)	1.00(7)	.67(3)	1.00(4)
central pref.	n.a. [2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Alternation	.50(4)	1.00(4)	.50(4)	.75(8)	0.00(3)	0.00(3)	0.00(3)	0.00(6)	.50(2)	0.00(3)
Discrimination										
matching	.80(5)	.60(5)	.50(4)	.56(9)	.50(4)	.67(3)	.50(4)	.57(7)	1.00(3)	.25(4)
oddity	.20(5)	.40(5)	.50(4)	.44(9)	.50(4)	.33(3)	.50(4)	.43(7)	0.00(3)	.75(4)

1. Number of items too small to warrant separate calculations.
2. Only two alternatives per item presented.

the session was rather unco-operative, but there did appear to be involvement with the requirements of the task.

In session C, the highest proportions of positional choices were compatible with simple positional strategies. There was no alternation and matching appeared to have occurred by chance association with positional strategies. A was rather unco-operative and instrumental responses reflecting choices were made in a manneristic fashion, reminiscent of other stereotyped repetitive behaviour.

In session D, over the whole series, the highest proportions of choices were consistent with simple positional strategies, there was no alternation and only a moderate proportion of matching. Matching, therefore, appeared to have occurred by chance association with positional strategies. Similar patterns were evident in the first and second halves of the session. Behaviour was again rather unco-operative and instrumental responses manneristic.

In session E, the highest proportion of positional choices was consistent with lateral preference, with smaller proportions consistent with the position preference and position alternation. All choices were, however, more consistent with matching, although the small number of items involved made it somewhat difficult to assign significance to the pattern. Initially A was co-operative and task-involved, but rapidly increasing distractibility after only a short while necessitated termination of the session.

In the final session, the highest proportions of choices were consistent with simple positional strategies, which were probably encouraged by the arrangement of alternatives in the series - all in position 2 and 4. The proportion of choices consistent with oddity responding was also fairly high, but this pattern appeared subordinate to simple positional strategies. A appeared bored and uninterested, was unco-operative and resistant, making it seem unlikely that further sessions would clarify the extent of matching possible in relation to the materials of this task.

In summary of the six sessions, although there did appear to be a possibility of a matching strategy being employed, positional strategies were dominant, particularly when alternatives were presented in certain arrangements. Unco-operative behaviour and considerable distractibility added greatly to the difficulties of assessing strategies on this task. It thus appeared that some perception of object character, presented in pictorial form, was possible, but that certain arrangements of alternatives, together with distractibility might hamper A in utilizing such perceptual skill as he did possess in regard to perception of object character.

(b) Patterns of visual inspection.

Patterns of visual inspection showed much fluctuation within and between sessions. In the first session, scanning appeared to be minimal, with fixation of only one alternative or the standard. In session B, there appeared to be scanning of the full range of alternatives throughout the session, but inter-alternative comparison was observed only in the first half of the session. In sessions C and D, throughout each session, scanning appeared to be minimal, with centring on only one alternative or the standard. In session E, scanning and inter-alternative comparison were observed throughout the rather brief session, but in session F, centring on only one alternative or the standard, with little or no scanning, was observed.

Size (2D) task:

Eleven items of this task were administered in two sessions, six items in the first session (A) and five in the second session. The remaining items of the task were not administered, some because they contained the match in the centre position and the others because a number of sessions proved fruitless in eliciting suitably task-oriented behaviour. The number of alternatives per item was not constant, being either two or four in the first session depending on the degree of task orientation shown and in the second session representing an attempt to discourage position perseveration by increasing the number of alternatives and, therefore, the positions which could be chosen. The centre position was masked throughout and, in two alternative items, alternatives were randomly alternated in successive items in either positions 2 and 4, or 1 and 5.

(a) Identification strategies.

The inclusion of items in which more than two alternatives were presented meant that central preference strategy could have been employed for some of the time, although not on all the items. It was, however, difficult to evaluate the significance of any evidence of either central preference or position perseveration because of the small number of choices involved. Analysis of the pattern of choices in the two sessions has been presented in Figure 8 and Table 11.

In Session A, the highest proportion of choices was consistent with position alternation, but there was also a high proportion of choices compatible with a matching strategy. The fact that alternation was also consistent with matching and involved choices of inner and outer positions, however, suggested that a matching strategy had been employed, at least during the first half of the series. The slight decline in number of matching choices in

Figure 8: A's choices on assessment items of Size (2D) task.

Session	Item no.[1]	Stimulus set	Positions 1	2	3	4	5
A	1	Bs	9	5	.	8	7
	2	Bc	1	5	.	4	3
	3	Bc	5	9	.	8	7
	4	Cc	.	12	.	13	.
	5	Cs	3	.	.	.	5
	6	Cc	4	.	.	.	7
B	7	Cs	.	9	.	8	.
	8	Cs	.	7	.	5	.
	9	Cc	1	5	.	3	4
	10	Cs	12	9	.	11	10
	11	Dc	4	.	.	.	5

1. Items with match in centre position were omitted.

the second half did, moreover, seem capable of reconciliation with a matching strategy since the error involved choice of an alternative differing only minimally from the standard. Co-operative, task-oriented behaviour seemed to increase the likelihood that a matching strategy had been employed.

In session B, the highest proportions of positional choices were consistent with position preference and lateral preference. The pattern of choices was nevertheless somewhat difficult to interpret, as a moderate proportion of choices was also consistent with a matching strategy. A conservative interpretation, however, favoured simple positional strategies. The latter interpretation appeared to be supported by the rather unco-operative behaviour shown by A and by the fact that instrumental responses reflecting choices were made in a vague and somewhat manneristic fashion.

Table 11: Proportion of A's choices compatible with various strategies on assessment items of Size (2D) task.

Strategy	Proportion of choices compatible with given strategy: Session A, 1st half	Session A, 2nd half	Session A, Total	Session B, Total
Simple positional				
perseveration	-[1]	-	0.00(3)	.33(3)
preference	-	-	0.00(5)	1.00(4)
lateral	no bias			1.00(5)
central pref.	-	-	.67(3)	-
Alternation	-	-	1.00(5)	0.00(4)
Discrimination				
matching	1.00(3)	.67(3)	.83(6)	.60(5)
oddity	0.00(3)	.33(3)	.17(6)	.40(5)

1. Number of items too small to warrant separate calculations.

In summary, it did appear that a matching strategy was used at least on certain items in the first session and, therefore, that some discrimination of two-dimensional sizes was possible.

(b) Patterns of visual inspection.

In Session A, there was clear scanning of the full range of alternatives, with inter-alternative comparison, throughout the rather brief session. In session B, there appeared to be minimal scanning, with centring on only one alternative or the standard.

Control Ss : A.

Strategies were assessed as for A, although, where 15 or more correct matches were made, with items of five alternatives, no formal analysis was made and a matching strategy merely assumed. Where five-alternative items were presented, central bias was considered in addition to other simple positional strategies.

N/CA: Five alternatives were presented in all items of all tasks.

Shape (3D) task:

(a) Identification strategies.

As only four errors were made over the whole series - all errors involving items where the standard and match were differently oriented - a matching strategy was assumed.

(b) Patterns of visual inspection.

Scanning the full range of alternatives was evident throughout the series, as was inter-alternative comparison.

Colour:

(a) Identification strategies.

Nine errors were made. Analysis of the pattern of choices suggested, during the first half of the series, a tendency towards central bias, but nevertheless related to a matching strategy, since errors in most cases involved choice of an alternative most similar to the match. In the second half of the series, choices were made in all positions and errors always involved choice of the alternative most similar to the match, appearing to indicate that a matching strategy was employed.

(b) Patterns of visual inspection.

During the first half of the series, scanning occurred, but appeared confined to a narrow range of alternatives near the central position, with minimal inter-alternative comparison. Later, scanning and inter-alternative comparison seemed more extensive.

Configuration (synthesis) task:

(a) Identification strategies.

Eleven errors were made. The pattern of choices was suggestive of a position preference strategy, with clusters of choices compatible with such a strategy being evident first on the left of the display, then on the right and then on the left again. This pattern nevertheless seemed to have been a chance concomitant of an attempt to follow a matching strategy, but one based in most cases on matching common elements rather than patterns, despite appropriate matching of patterns during training.

(b) Patterns of visual inspection.

There appeared to be careful scanning, based on initial detailed inspection of the standard, including, on some items, counting parts of the standard.

Size (3D) task:

(a) Identification strategies.

Seven errors were made, but there was no evidence of positional bias and the fact that most errors involved choice of an alternative closest in size to the match further supported the assumption that a matching strategy had been employed.

(b) Patterns of visual inspection.

There was clear scanning of the full range of alternatives, followed by inter-alternative comparison, although the latter appeared to decline later in the series, when more errors were also made.

Configuration (analysis) task:

(a) Identification strategies.

Eleven errors were made, the majority later in the series of items. Early in the series, all positions were chosen, without apparent bias, suggesting that a matching strategy was used.Later, there did appear to be a greater tendency to choose positions near the centre, although the fact that outer positions were still occasionally chosen, together with continued good task orientation and persistence, suggested that a matching strategy was still being followed, although possiblylargely within the bounds of central bias.

(b) Patterns of visual inspection.

Initially, there was careful inspection of the standard, scanning the full range of alternatives and inter-alternative comparison. Later, scanning appeared to be more cursory and confined largely to the three central positions, with less detailed inter-alternative comparison.

Shape (2D) task:

(a) Identification strategies.

Eight errors were made. There did appear to be some degree of positional bias in choices, towards the central positions, although outer positions were chosen occasionally and choices were made across the display. The degree of task orientation shown and the fact that choices were made deliberately and fairly carefully suggested that a matching strategy was used, constrained, where the S was faced with more complex items, in the form of differently oriented standard and match, by central bias.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were observed, although, where errors were made, less detailed inter-alternative comparison and more impulsive responses were observed.

Object task:

(a) Identification strategies.

Ten errors were made and, although the level of task orientation and interest, together with the fact that alternatives in outer positions were chosen, appeared to support a strategy of matching, there did appear to be a slight tendency towards central bias, when there was doubt regarding the appropriate match.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident, but were generally less deliberate than on other tasks.

Size (2D) task:

(a) Identification strategies.

Eleven errors were made. During the first half of the series, a matching strategy appeared to have been used, in view of the fact that alternatives in outer positions were chosen, choices were made across the display and errors always involved choice of an alternative closest in size to the match. Later, however, choices showed positional bias, consistent with central bias, although, since errors involved choices of alternatives closely similar to the match, it remained possible that some matching, constrained by central bias was intended.

(b) Patterns of visual inspection.

Rather cursory scanning and very brief inter-alternative comparison were observed, but were not as deliberate and careful as in previous tasks.

S/CA: Five alternatives were presented in all items of all tasks.

Shape (3D) task:

(a) Identification strategies.

Only five errors were made, clearly indicating that a matching strategy was followed.

(b) Patterns of visual inspection.

Careful scanning and somewhat briefer inter-alternative comparison were observed.

Colour task:

(a) Identification strategies.

Thirteen errors were made, the majority involving choice of an alternative closely similar to the match. Runs of choices consistent with position preference and, to some extent, also position perseveration were evident throughout the series, suggesting that attempts to match were made within the bounds of a strategy of position preference.

(b) Patterns of visual inspection.

Rather cursory scanning and minimal inter-alternative comparison were observed.

Configuration (synthesis) task:

(a) Identification strategies.

Ten errors were made, but despite slight lateral positional bias, the extent of alternation and the fact that alternatives were chosen in all positions tended to support the assumption of a matching strategy, but one which, in later items, was based on common elements rather than patterns.

(b) Patterns of visual inspection.

Scanning and brief inter-alternative comparison were evident.

Size (3D) task:

(a) Identification strategies.

Eight errors were made. During the earlier part of the series, the degree of alternation, the fact that choices were made in outer positions and the fact that errors involved choices of alternatives closest in size to the match, supported the assumption of a matching strategy. Later, over the last five or six items, it appeared possible that a position perseveration strategy has been employed. But, since errors involved choice of an alternative closest in size to the match and since task orientation remained good, it seemed more likely that a matching strategy had continued to be employed, although possibly to some extent constrained by simple positional strategies.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were observed early in the series, although there was some decline in both aspects of visual inspection later in the series.

Configuration (analysis) task:

(a) Identification strategies.

Fourteen errors were made, but although there was a slight positional bias, it nevertheless appeared probable, on the basis of the good task orientation shown, the cautiousness of responses and a fair number of choices across the display, to assume that an attempt was made to choose in terms of a matching strategy.

(b) Patterns of visual inspection.

Careful scanning, detailed inspection of the standard and inter-alternative comparison were evident throughout the series.

Shape (2D) task:

(a) Identification strategies.

Only five errors were made, clearly indicating that a matching strategy was employed.

(b) Patterns of visual inspection.

Scanning the full range of alternatives and inter-alternative comparison were observed throughout the series.

Object task:

(a) Identification strategies.

Eight errors were made, but the extent of alternation, the fact that choices were made in all positions and the extent of task orientation seemed to suggest that a matching strategy had been employed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident, although there seemed to be a decline in both towards the end of the series.

Size (2D) task:

(a) Identification strategies.

Only five errors were made, most of them involving choice of the alternative closest in size to the match, clearly indicating a matching strategy.

(b) Patterns of visual inspection.

Scanning the full range of alternatives and inter-alternative comparison were evident throughout the series.

N/MA: Five alternatives were not presented in all the items of all the tasks; the number of alternatives has thus been reported for each task.

Shape (3D) task (five alternatives):

(a) Identification strategies.

Seven errors were made and one item refused. During the first half of the series, few errors were made and a matching strategy was evidently followed. Later, however, position perseveration in the central position was evident, apparently related to increased distractibility and decreased task orientation.

(b) Patterns of visual inspection.

There was slow scanning and some inter-alternative comparison , with pauses associated with inspection of particular alternatives, throughout the session.

Colour task (five alternatives):

(a) Identification strategies.

Nine errors were made and one item refused. Three phases were evident in the pattern of choices. Initially, a few choices consistent with a strategy of central bias were made. Subsequently, choices were made across the display, included outer positions and greater task orientation was shown. Finally, there was a reversion to a strategy of central bias, when choices were carelessly made, distractibility and poor task orientation also being evident.

(b) Patterns of visual inspection.

There was an initial phase of minimal scanning, with gaze restricted to the centre of the display and the standard; a subsequent phase when scanning and inter-alternative comparison were evident; and, finally, a phase when gaze was directed at the display for only fleeting periods and scanning was minimal.

Configuration (synthesis) task (five alternatives):

(a) Identification strategies.

Eleven errors were made and one item omitted. Throughout the task, choices appeared most consistent with a matching strategy, since choices were made in all positions and across the display, and a considerable amount of task orientation was shown.

(b) Patterns of visual inspection.

There was slow scanning and somewhat cursory inter-alternative comparison.

Size (3D) task (five alternatives):

(a) Identification strategies.

Twelve errors were made. During the first half of the series, choices were made across the display and in all positions. Also consistent with a matching strategy was the fact that errors involved choice of the alternative closest in size to the match. In the second half, however, when distractibility increased, most choices appeared consistent with position perseveration in the central position.

(b) Patterns of visual inspection.

During the first half of the series, scanning and inter-alternative comparison were observed, but later both aspects of visual inspection declined and centring on the central position or the standard was evident.

Configuration (analysis) task (five alternatives):

(a) Identification strategies.

Fourteen errors were made and three items refused. On the first few items, where the standards were overlapping rather than embedded figures, a matching strategy appeared to have been employed, judged by matching choices across the display. Later choices appeared to be determined either by position perseveration in the central position or were made randomly, with little attention to the display.

(b) Patterns of visual inspection.

On the first few items, there was brief scanning, but little inter-alternative comparison. Later, however, gaze was directed at the display only fleetingly or involved fixation on only one alternative or the standard.

Shape (2D) task: (five alternatives on 15 items, four alternatives on five items):

(a) Identification strategies.

Eleven errors were made. In the early part of the series - the first six or seven items - choices appeared to be determined largely by a strategy of central bias, although it appeared possible, in view of a certain number of matching choices in different positions that a matching strategy, within the confines of central bias, was followed. Later, however, choices appeared determined largely by position perseveration and central preference and masking the centre position was insufficient to affect these strategies. Task orientation in the latter period was extremely poor.

(b) Patterns of visual inspection.

At first there was only brief scanning, with minimal inter-alternative comparison, but scanning soon gave way to fixation on one alternative or the standard.

Object task (five alternatives):

(a) Identification strategies.

Ten errors were made. A matching strategy appeared to have been used predominantly, as indicated by choices across the display and in all positions. Towards the end of the series - the last five or six items - however, the careless manner in which responses were made and generally poor task orientation suggested that choices might have been made randomly.

(b) Patterns of visual inspection.

Very brief scanning and minimal inter-alternative comparison were evident throughout the series.

Size (2D) task (five alternatives on 10 items and four alternatives on the remaining 10 items):

(a) Identification strategies.

Nine errors were made. Despite a fairly large number of choices of non-matching alternatives, it appeared that an attempt was made to follow a matching strategy. Choices were made in all positions and across the display and errors in most cases involved choice of an alternative closest to the match in size. A slight lateral positional bias was nevertheless evident and might have contributed to the pattern of choices. At times, too, it appeared that a strategy of position perseveration in the centre position was likely, although this tendency appeared to be offset by masking.

(b) Patterns of visual inspection.

Brief scanning was evident throughout the series, but little or no inter-alternative comparison.

S/OLD: Five alternatives were presented in all items of all tasks.

Shape (3D) task:

(a) Identification strategies.

Only five errors were made, supporting the assumption that a matching strategy was followed throughout the series.

(b) Patterns of visual inspection.

Careful scanning was evident, as was inter-alternative comparison.

Colour task:

(a) Identification strategies.

Nine errors were made. Analysis of the pattern of choices suggested that a strategy of central bias might have been used to some extent. However, since choices were made in all positions and across the display and since errors usually involved choice of an alternative closely similar to the match, an attempt at matching, to some extent constrained by central bias, appeared to have been made.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were observed, especially early in the series, although, later, there appeared to be some decline in inter-alternative comparison.

Configuration (synthesis) task:

(a) Identification strategies.

Since only five errors were made, it seemed clear that a matching strategy was used.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident throughout the series.

Size (3D) task:

(a) Identification strategies.

Two errors, both involving choice of an alternative closest in size to the match, were made, clearly indicating the use of a matching strategy.

(b) Patterns of visual inspection.

Scanning and careful inter-alternative comparison were observed throughout the series.

Configuration (analysis) task:

(a) Identification strategies.

Eleven errors were made. The pattern of choices on the first six items involved matching across the display and seemed to indicate that a matching strategy had been employed. Subsequently, choices appeared for a period to be consistent with position perseveration and position preference. Towards the end of the series, however, choices appeared to be made rather randomly, as appeared also from the increasing uncertainty evident in long hesitation and looking at the E for confirmation of choices.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident until later in the series when the S appeared to respond impulsively, with only cursory scanning of the display.

Shape (2D) task:

(a) Identification strategies.

Seven errors were made. Analysis of the pattern of choices appeared to indicate a slight bias consistent with lateral preference, but as choices were made in all positions and across the display, it appeared that a matching strategy had been employed, but possibly constrained to some extent by lateral preference.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were on the whole clearly evident, although, on certain items, choices appeared to be made impulsively, with minimal inter-alternative comparison.

Object task:

(a) Identification strategies.

Only three errors were made, clearly indicating that a matching strategy was employed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were clearly evident throughout the series of items.

Size (2D) task:

(a) Identification strategies.

Only three errors, involving choice of an alternative closest in size to the match, were made. A matching strategy, therefore, seemed to have been employed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were observed throughout the series of items.

Summary of evidence regarding perceptual factors:

"Autistic" S : A.

(a) Identification strategies.

As indicated in Table 12, the most frequently used strategies were simple positional strategies, of which lateral preference and position preference were the most prominent. The arrangement of alternatives in most cases precluded the use of central preference and position perseveration. Central preference did, however, appear dominant where its use was possible and position perseveration was observed where the arrangement of alternatives permitted its occurrence.

Position alternation as a strategy seemed a possibility in only one session of the Object task; elsewhere the occurrence of alternation seemed more consistent with a matching strategy. It thus seemed that a strategy of position alternation could be excluded as a determinant of A's pattern of choices.

Of discrimination strategies, oddity responding did not seem feasible in relation to the pattern of choices on any of the tasks. Since a high proportion of choices consistent with oddity responding always occurred in association with high proportions consistent with simple positional strategies and since the latter were in any case more frequently observed, choices compatible with oddity responding seemed more plausibly related to simple positional strategies.

It thus appeared that A could probably discriminate amongst alternatives relevant to a fairly wide range of perceptual tasks. Such perceptual skill did, however, appear to be adversely and easily affected by a number of factors, chiefly, the arrangement and number of alternatives and the complexity of the perceptual task, in conjunction with the degree of distractibility and task orientation shown by A at any moment.

(b) Patterns of visual inspection.

Great variability was shown in patterns of visual inspection, but it was possible to ascertain certain suggestive correlates of such patterns (c f.Table 12). Themost obvious feature was that scanning and, particularly, inter-alternative comparison were more likely to occur early than later in a session. Inter-alternative comparison occurred only in conjunction with scanning the range of alternatives, but scanning might occur without inter-alternative comparison. Fixation of only one alternative or the standard tended to occur later in sessions, but was sometimes present throughout the session.

There did not appear to be any association between patterns of visual inspection and number and arrangement of alternatives over a series of items. Nor were particular tasks apparently characterized by markedly different patterns of visual inspection. Exceptions were the Object task, where over all the sessions, a greater

Table 12: Summary of identification strategies andpatterns of visual inspection employed by A.

Task	Sh. (3D)	Colour		Config. (synth.)		Size (3D)				Config. (anal.)					Shape (2D)		Object						Size (2D)		
Session	A	A	B	A	B	A	B	C	D	A	B	C	D	E	A	B	A	B	C	D	E	F	A	B	
No. of alts.	2,3	3	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	4	2	
Strategies																									
Simple pos.																									
persev.																			XX			XX			
prefer.	X		X		X					OO	O			OO	XX	O			XX	XX		XX		XX	
later.		X	X		X	OO	OX			XX	OX	XX	XX	XX	XX	OO	OO	O	XX	XX		XX		XX	
centr.pref.	XX					X	XX																		

A matching strategy appeared to have been employed on at least some items of at least five tasks - Colour, Configuration (synthesis), Size (3D), Shape, (2D) and Size (2D) - and possibly also on certain items of the Configuration (analysis) and Object tasks. The apparent absence of a matching strategy on the Shape (3D) task seemed likely to be related more to external factors such as uncertainty regarding the optimal number and, particularly the arrangement of alternatives, as well as A's boredom with the task, rather than to inability to discriminate amongst three-dimensional shapes. Supporting the latter assumption was A's use of a matching strategy and apparent discriminative ability in relation to certain two-dimensional shapes, given an arrangement of alternatives which prevented the use of a central preference strategy. Matching strategies appeared to be more readily discernible in relation to tasks where discriminative alternatives differed along one dimension such as colour or size, than where alternatives differed in more complex ways, as in the Object and Configuration (analysis) tasks.

Investigation of possible changes in the strategy employed over time during a given session indicated that a matching strategy was more likely to be employed early in a session than later, when there was frequently a reversion to simple positional strategies. A matching strategy was, however, sometimes evident throughout a given session. In general, regression in the kind of strategy used appeared related to increasing distractibility and decreasing task orientation.

It thus appeared that _A_ could probably discriminate amongst alternatives relevant to a fairly wide range of perceptual tasks. Such perceptual skill did, however, appear to be adversely and easily affected by a number of factors, chiefly, the arrangement and number of alternatives and the complexity of the perceptual task, in conjunction with the degree of distractibility and task orientation shown by _A_ at any moment.

(b) Patterns of visual inspection.

Great variability was shown in patterns of visual inspection, but it was possible to ascertain certain suggestive correlates of such patterns (ref. Table 12). The most obvious feature was that scanning and, particularly, inter-alternative comparison were more likely to occur early than later in a session. Inter-alternative comparison occurred only in conjunction with scanning the range of alternatives, but scanning might occur without inter-alternative comparison. Fixation of only one alternative or the standard tended to occur later in sessions, but was sometimes present throughout the session.

There did not appear to be any association between patterns of visual inspection and number and arrangement of alternatives over a series of items. Nor were particular tasks apparently characterized by markedly different patterns of visual inspection. Exceptions were the Object task, where over all the sessions, a greater amount of time was spent in fixation of one alternative or the standard only, than in scanning or inter-alternative comparison; the Configuration (analysis) task where much less time over all the sessions was spent in inter-alternative comparison than fixation of the standard or only one alternative (scanning the range of alternatives occupying an amount of time midway between the others); and the Configuration (synthesis) task where scanning and inter-alternative comparison were maximal and fixation absent.

Patterns of visual inspection thus appeared to be related to the complexity of tasks in a manner similar to that referred to above regarding identification strategies; that is, scanning and inter-alternative comparison were more evident on less than on more complex tasks. Increasing distractibility and decreasing task orientation over time in any given session also appeared to be associated with changes in patterns of visual inspection, although changes over a session were not invariably observed.

(c) Identification strategies and patterns of visual inspection.

The relative frequency of associations between strategies and patterns of visual inspection recorded for the first and second halves of a session over all the sessions has been summarized in Table 13. Matching versus simple positional strategies (doubtful matching being considered as positional) in relation to fixation of the standard or one alternative (minimal scanning) versus scanning the range of alternatives were considered.

Table 13: The relative frequency of associations between identification strategies and patterns of visual inspection over all sessions and all tasks for A.

Patterns of visual inspection	Identification strategies Simple positional	matching
minimal scanning	22	2
scanning all alts.	11	13

(Inter-alternative comparison was disregarded, as its absence might have reflected inadequate observation and as, in any case, it was usually observed together with scanning.)

From the table, it has appeared that simple positional strategies were more likely to occur in association with minimal scanning than was a matching strategy. The reverse did not, however, apply as regards scanning all alternatives.

Comparison between A and control Ss.

(a) Identification strategies.

In contrast with A's performance, which seemed predominantly determined by simple positional strategies, as indicated in Table 14, the performance of all control Ss appeared predominantly determined by matching strategy. Simple positional strategies were not, however, absent from the performance of control Ss, being present usually in the form of constraints on attempts to apply a matching strategy and only occasionally as the predominant influence. In the youngest control S, (N/MA), a fair proportion of choices was consistent with a predominant positional strategy, usually in the second half of the series and associated with considerable distractibility, in this respect being not unlike A; but, even in this S, a matching strategy was most frequently used.

The positional strategies employed by control Ss varied: N/CA made use mainly of central preference; S/CA of limited proportions of position preference, lateral preference and position perseveration; N/MA mainly of position perseveration and central bias; and S/OLD of limited proportions of all simple positional strategies. Despite the lack of masking, control Ss did not show the invariable preference for the centre

Table 14: Summary of identification strategies and patterns of visual inspection employed by control Ss of A.

Subject	N/CA								S/CA								N/MA								S/OLD							
Task	Sh. (3D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Obj.	Size (2D)	Sh. (3D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Obj.	Size (2D)	Sh. (3D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Obj.	Size (2D)	Sh. (3D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Obj.	Size (2D)
No. of alts.		5 alts. on all tasks								5 alts. on all tasks							5	5	5	5	5	5,4	5	5,4		5 alts. on all tasks						
Errors	5	9	11	7	11	8	10	11	5	13	10	8	14	5	8	5	7	9	11	12	14	11	10	9	5	9	5	2	11	7	3	3
Strategies																																
Simple pos.																																
persev.												0					X			X	X	X							X			
prefer.			00							XX																			X			
later.											00													X						00		
centr. pref.																																
centr. bias		0			0	00	00	X										0X				0X				00						
Alternation																																
Discrim. matching oddity	XX	XX	XX	XX	XX	XX	XX	X0	XX	00	XX	XX	XX	XX	XX	XX	X	X	XX	X	X	X	X	X	XX	XX	XX	XX	X	XX	XX	XX
Random																					X		X						X			
Patterns of vis. inspec.																																
only one or std.																		0X		X	X	X										
scans range	XX	XX	00	XX	XX	XX	XX	XX	XX	XX	XX	X0	XX	XX	X0	XX	XX	X	XX	X	X	0	00	00	XX	XX	XX	XX	XX	XX	XX	XX
inter-alt.	XX	X	00	X	X	X	X		XX		00	X0	XX	XX	X0	XX	00			X					XX	X	XX	XX	X	XX	XX	XX

Key: X - probable strategy/pattern; 0 - possible (additional) strategy/pattern; note, for each task, first and second halves of session have been reported, indicated respectively by symbols on left and right of column.

position shown by A where arrangement of alternatives permitted it. A similar contrast was observed with regard to position perseveration.

Position alternation as a strategy did not appear to have been employed consistently by any of the control Ss, Random choices were, however, made by two Ss: in N/MA apparently related to increasing distractibility and lack of task orientation; and in S/OLD, in response to increasing complexity of items. Random choices did not, in contrast, appear characteristic of A's performance, increases in position strategies or refusal to continue being more frequent concomitants of increasing distractibility, decreasing task orientation and, possibly, complexity. Oddity responding did not appear to have been used by control Ss. Although matching strategies were generally more consistently employed by control Ss, they, like A, tended to employ such strategies maximally early in a series and simple positional strategies tended to occur later. In the youngest S, (N/MA), the reversion to simple positional strategies later in the series, accompanied by increased distractibility and decreased task orientation was particularly reminiscent of A's performance, although less marked. In the other Ss, any such reversion occurred rather infrequently and seemed related more to increasing complexity than to increasing distractibility.

As mentioned above, matching strategies were clearly used by all control Ss, although to varying extents in each S constrained by positional strategies and subject to error. The use of strategies other than matching made it difficult to consider error in absolute terms, but rank ordering of tasks in terms of errors for each S revealed similarity in order of difficulty, amongst the three younger control Ss at least. Agreement between N/CA, S/CA and N/MA was high as to the difficulty, in order from easiest to most difficult, of Shape (3D), Shape (2D), Object, Configuration (synthesis) and Configuration (analysis). Size (2D) was relatively easy for S/CA and N/MA, but relatively difficult for N/CA. Size (3D) was relatively easy for N/CA, moderately difficult for S/CA, difficult for S/CA and relatively easy for N/MA. For S/OLD, the order of difficulty of the tasks was rather different, Size (3D) being the easiest, then Size (2D) and Object, Shape (3D) and Configuration (analysis). Nevertheless, S/OLD did show certain points of agreement with other Ss, for example, with S/CA regarding the difficulty of Colour, with N/CA regarding the relative ease of Size (3D) and with all other Ss regarding the difficulty of the Configuration (analysis) task.

Errors having seemed an unreliable measure of A's performance, for much the same reasons as in the case of the control Ss, but to a greater extent, the closest comparison possible seemed to be to consider A's relative certainty in the use of matching strategy as suggestive of difficulty. On this basis, the Configuration (analysis) task has appeared to have been difficult for control Ss and A, while the Object task has appeared to have been somewhat more difficult for A than for all control Ss and particularly for S/OLD.

In summary, there did appear to be some similarities between A and control Ss, (in particular with the youngest S, N/MA), in the fact that all the Ss made use of simple positional strategies at some time and that simple positional strategies tended to occur later in any given series. A differed from control Ss, however, in that the latter made far more consistent use of matching strategy which was less likely to be disrupted by particular arrangements or number of alternatives. All Ss appeared to find the Configuration (analysis) task difficult, but, in contrast to other Ss, A appeared to have considerable difficulty also with the Object task.

(b) Patterns of visual inspection.

In contrast with A, as indicated in Table 14, three control Ss showed scanning the full range of alternatives and, to a slightly lesser extent, inter-alternative comparison most of the time, while fixation on only one alternative or the standard was absent. More similar to A was the youngest control S, (N/MA), who showed scanning fairly consistently, but only a slight amount of inter-alternative comparison, and a fair amount of fixation on only one alternative or the standard. In all control Ss and similarly to A, inter-alternative comparison was more likely to decline in the latter half of a series (though a series for control Ss always involved more items than was the case for A). In N/MA, scanning was also likely to decline and fixation to be more apparent in the latter half of a series, a pattern similar to that shown by A. For all Ss and similarly to A, inter-alternative comparison occurred always in conjunction with scanning, but scanning might occur without inter-alternative comparison.

Number and arrangement of alternatives was not a factor of importance as regards patterns of visual inspection in control Ss, who, in most cases, were presented with five alternatives on all tasks. Nor were particular tasks across Ss apparently characterized by particular patterns of visual inspection, which seemed to vary more between individuals, although both subnormal Ss displayed rather similar patterns of scanning and inter-alternative comparison. None of the control Ss appeared to show a relationship between patterns of visual inspection and particular tasks as appeared in the case of A.

(c) Identification strategies and patterns of visual inspection.

Matching versus simple positional strategies (the few sequences of random choices being incorporated with positional), in relation to fixation of the standard or one alternative versus scanning the range of alternatives (doubtful scanning being treated as fixation) for each control S in the first and second halves of tasks has been summarized in Table 15.

From the table, it has appeared that, for all control Ss, a matching strategy was more likely to be associated with scanning the full range of alternatives than were simple positional strategies.

Table 15: The relative frequency of associations between identification strategies and patterns of visual inspection over all tasks for each control S of A.

	Subjects							
	N/CA		S/CA		N/MA		S/OLD	
Identification strategies	P	M	P	M	P	M	P	M
Patterns of visual inspection								
minimal scanning	0	2	0	2	6	3	0	0
scanning all alts.	1	13	2	12	1	6	1	15

In contrast with A, however, simple positional strategies were not more likely than matching strategy to occur in association with minimal scanning, which was in any case not frequently observed in most control Ss. One S, N/MA, did, however, display a relation rather different from the other Ss, which, although by no means unequivocal, did appear to exhibit elements common to both A and control Ss. Thus N/MA showed a relationship between matching and scanning similar to, but less marked than that shown by other control Ss. He also, however, showed a relationship between position strategies and minimal scanning which, although not statistically significant, was in the direction of the similar relationship shown by A.

Case study No. 2 : W (female; CA 7-10)

W, the S of this case study, died during the course of the study, after being involved in a car accident. The case study is, therefore, incomplete, only five of the eight perceptual tasks having been administered. Nevertheless, sufficient evidence was available regarding rapport, discrimination set and perceptual factors to permit comparison with other Ss.

(1) Rapport.

"Autistic" S : W.

Pre-task sessions:

Pre-task sessions were conducted initially at the institution where W was resident. Usually an office was available for these sessions, but it was occasionally necessary to see W in a ward. From the first meeting, the E was left alone with W, but interruptions did occur, when one of the ward staff needed to fetch something from the office, or when staff or other patients came to investigate W's not infrequent distress. Such interruptions were obviously undesirable, particularly since, as described below, attention by the staff seemed to maintain tantrum behaviour. Despite requests by the E, however, such interruptions continued to occur, constituting a further difficulty in the establishment of rapport.

From the first session, W did not object to being left alone with the E, although, towards the end of sessions, she frequently attempted to leave the room. Recognition of the E was shown after only a few sessions, W taking the E's hand at the door and leading her to the office. A few words were used spontaneously to make requests - for example, "seeties" (sweeties), "wee-wee", "or-er" (water) - the words being pronounced in a high-pitched, forced voice. Echolalia was prominent, the last word or two of an utterance by the E being repeated. W responded to her name being spoken and showed good eye-contact.

W was rather hyperactive and distractible and did not persist for long at any activity. Interest in the box of toys brought by the E was shown, but activity consisted of little more than random handling of the toys. Some appropriate activity was, however, observed in relation to two of the toys : W stroked the hair of a doll and then stroked her own hair and the E's hair; she "played" the notes of a small toy piano, meanwhile humming softly to herself.

Repetitive activities were observed, namely manneristic finger play, accompanied by peripheral gazing; a loud cooing noise, accompanied by rubbing under her arm; and jumping up and down, while screaming. Distress was shown frequently, usually later in a session, varying from increased hyperactivity and destructiveness towards toys, through screaming and crying, to throwing herself on the floor, kicking and struggling, headbanging, pulling out her hair and scratching her face. Distress appeared to be precipitated by and related to a number of factors, as discussed below. Attempts by the E to comfort W were effective to varying degrees, again dependent on a number of factors.

The main features of attempts to establish rapport with W in pre-task sessions were, firstly, the fact that concrete rewards could be used effectively as inducements to participation in various activities. Sweets were most effective, but activities such as singing and body play also appeared to have rewarding properties. The effectiveness of such rewards was, however, limited by fairly rapid satiation and by rapid fall-off in the face of a deterioration in W's mood. Nevertheless, largely because of W's responsiveness to such rewards, participation in certain directed activities, such as drawing, looking at pictures and imitating gestures, was present early in the series of sessions.

Secondly, there was, however, considerable fluctuation in rapport during each session and between sessions. Such fluctuation appeared to be related not only to factors such as mood and frustration tolerance, but also to factors external to the E-S relationship, notably events in the ward, which, because of the large number of patients, could not be as adequately controlled by the staff as could events where an S was resident at home.

Thirdly, major distress, as described above, occurred frequently, especially after the initial novelty of the sessions had worn off. Such episodes appeared to be related, firstly, to poor frustration tolerance, occurring when demands - for example, remaining in the room towards the end of a session - were made. Secondly, distress appeared to be related to physical discomfort or pain - for example, ear-ache or pain when urinating, inferred from gestures and a medical history indicating recurrent episodes of such symptoms. Thirdly, distressed behaviour appeared to be attention-seeking and was maintained by contingent adult attention. For example, W's screams usually led to an influx of agitated staff and patients, much fussing about her, the administration of a sedative syrup and, sometimes, receipt of some favourite food, such as a large sweet or cooldrink. When, occasionally, W's screams failed to arouse the ward staff, she was usually calmed within a short while by being held firmly, thus preventing self-destructive behaviour, and spoken to quietly by the E. Such episodes of distress were major obstacles to establishing rapport, particularly since they emphasized the precariousness of rapport, which, in turn, hampered future attempts to extend rapport.

Fourthly, on W's entry to the school, there was a temporary decline in rapport, evident in apparent failure to recognize the E, resistance to complying with demands and some episodes of distress. Within a few days, however, the level of rapport attained prior to entry to the school was re-established.

After a number of sessions, fluctuation in rapport continued to be characteristic and it appeared unlikely that further efforts in this direction would yield greater rapport. W could, however, be engaged in activity for periods of up to 30 minutes, looked at drawings and specific parts of them at the direction of the E and imitated gestures made by the E. Thus, after 26 sessions, it was decided to attempt training of task behaviour.

Task sessions:

During task sessions, rapport appeared similar to that existing in pre-task sessions. There was considerable fluctuation within and between sessions, associated not only with current mood and extent of frustration tolerance, but also with physical state and events at the institution. At times, such fluctuation was so marked - W displaying unusually disturbed, aggressive and extremely self-destructive behaviour - that it was impossible to continue with testing.

Within sessions, there was usually a positive response to demands early in a session, but increasing distractibility and hyperactivity towards the end of a session, culminating not infrequently in destructive, distressed and tantrum behaviour. Such behaviour appeared to occur for reasons similar to those outlined above - that is, poor frustration tolerance, discomfort or pain and as a means of gaining attention. In addition, repeated failure and repetition of items appeared to provoke distressed or tantrum behaviour.

Response to rewards continued to be positive, especially early in a session. It was, however, necessary to change the kind of sweets used frequently, in order to combat satiation and retain their rewarding value. Such rewards, were, however, insufficient to counteract hyperactivity, distractibility and poor frustration tolerance towards the end of a session.

In summary, it appeared that the degree of rapport established in pre-task sessions was maintained at a similar level in task sessions. A number of factors, both as subjectively experienced in the E-S relationship (notably, a feeling that rapport was precarious) and those external to the relationship, did, however, appear to operate to prevent the formation of as close rapport as there appeared to be in the case of A.

Control Ss : W .

N/CA: This S was somewhat anxious and rather cautious, tending to defer to the E during the first session spent administering the intelligence test, in which she participated and co-operated well. In subsequent task sessions, she continued to seek the approval of the E and was co-operative and interested in the tasks.

S/CA: This S was initially shy, but relaxed during the administration of the intelligence test, although continuing to speak in whispers, especially when uncertain. In subsequent task sessions, she appeared highly task-involved and seemed to enjoy the experience of being chosen from her class for participation in the study.

N/MA: This S was a confident young girl, who soon overcame her initial shyness and appeared to enjoy participation in the study, frequently asking when it would be her turn again.

S/OLD: This S retained a quiet, non-committal attitude throughout testing. She did not appear anxious, but seemed fairly well motivated and persistent on the perceptual tasks.

In summary, in comparison with W, none of the control Ss presented problems as regards rapport. Nor were there notable differences between control Ss in this regard.

(2) Discrimination set.

"Autistic" S : W.

The first task presented to W required discrimination of two-dimensional shapes (Shape (2D)). The task was initially presented according to the original training procedure, but failure on W's part to display appropriate behaviour led to the introduction of certain modifications in the training procedure.

General features of task orientation, gaze orientation and appropriate instrumental response were elicited without much difficulty within the first session and, in most subsequent sessions, continued to be elicited early in the session without difficulty. These aspects of discrimination set were evident as between less and more complex items, as well as between sessions, but declined towards the end of sessions, as distractibility - restlessness, tantrum behaviour or abstracted gazing - increased.

Systematic identification strategies rather than random choices were similarly evident early in training. Fairly consistent matching occurred early in sessions, giving way later, as distractibility increased, to more primitive strategies. Matching also appeared to be affected by the number and arrangement of alternatives, as well as by item complexity. The fewer the alternatives, the nearer the centre they were arranged and the less complex the item, the more likely that matching would occur, a relationship which appeared to hold irrespective of whether the item was presented early or later in a session.

Masking of alternatives was introduced in an attempt to extend discrimination set, in particular, with regard to identification strategy. On sub-items of two or more alternatives, the item was first presented with non-matching alternatives masked, successively more alternatives being unmasked in subsequent presentations. This procedure appeared beneficial in focussing attention on the match, particularly when it appeared in one of the outer positions. As a result, performance improved, matching being used fairly consistently on items showing two or three alternatives, but with less certainty with five alternatives, or when the alternative adjacent to the match was not masked. Apart from its effect on the identification strategy used, this technique appeared to improve persistence.

Transfer of discrimination set to subsequently presented tasks was, on the whole, good and features of attention appeared to be benefited by the introduction of novel materials. It was, however, necessary to continue using masking as an aid to the development of matching strategy. On some tasks, masking on training items appeared to result in the consistent use of matching, even amongst five alternatives, the full range of alternatives then being presented in assessment items as well. In other cases, consistent identification strategy was employed only when some alternatives were masked and, on assessment items of such tasks, a similar number of alternatives were presented. It was not possible to specify what factors determined the number of alternatives which could be discriminated, but it was clear that not only perceptual factors were involved. In particular, disturbance associated with poor physical state and external circumstances (see Rapport, p.336), which, at times, precluded any attempt at testing, might at other times, though less severe, still have affected performance adversely.

Control _Ss_ : _W_.

_N/CA_: Following the _E_'s demonstration, there appeared to be little difficulty on the part of this _S_ in choosing the matching alternative. Discrimination set in relation to five alternatives was thus established within one session. In all subsequent tasks, transfer of discrimination set occurred without difficulty. Distractibility was minimal and persistence was shown. The introduction of novel materials in all cases appeared to enhance attention.

_S/CA_: Following the _E_'s demonstration, this _S_ appeared to experience little difficulty in choosing the matching alternative. Discrimination set in relation to five alternatives was thus easily established. Transfer to other tasks occurred without much difficulty, although hesitancy was evident on the Configuration (analysis) and Object tasks and, on the Colour task, there was initially some difficulty on items requiring discrimination amongst shades of one colour, as compared with items composed of different colours. Distractibility was minimal and persistence was shown. The introduction of novel materials appeared to enhance attention.

N/MA: Initially, following demonstration by the E, this S's choices were hesitant and position bound, but after repetition of earlier training items, discrimination set was established. On subsequent tasks, little difficulty was encountered. Distractibility was minimal and persistence was shown. The introduction of novel materials in all cases appeared to enhance attention.

S/OLD: Following the E's demonstration, this S experienced no difficulty in choosing the match from amongst five alternatives. Discrimination set was thus easily established. Transfer to subsequent tasks occurred without difficulty, although hesitancy was shown initially on the Configuation (synthesis), Configuration (analysis) and Object tasks. Distractibility was not noted, persistence was shown and features of attention appeared to be benefited by the introduction of novel materials.

In summary, in comparison with W, control Ss displayed relatively little difficulty in acquiring and transferring discrimination set. All control Ss were able to make use of a matching strategy in relation to five alternatives within one session and, in most cases, showed slight difficulty in subsequent tasks only where the relationship between standard and match was slightly altered, as in the Configuration (synthesis), Configuration (analysis) and Object tasks. In contrast with W, control Ss were not notably distractible and showed persistence, but features of attention were enhanced in both W and control Ss by the presentation of novel materials.

(3) Perceptual factors.

"Autistic" S : W.

The number of alternatives presented in different tasks varied according to what had appeared optimal in training for a particular task and has, therefore, been reported for each task. For each task, or session, choices have been analysed in terms of strategies for the total series of items presented, as well as for the first and second halves of the series, in order to assess any change in strategy over time. Separate calculations for first and second halves of a session did not, however, seem warranted for a series of five or less items. Where fewer than five alternatives were presented, no reference has been made in analysis of strategies to central bias.

Shape (2D):

Items of this task were administered in two sessions, eight items in the first (A) and the full series of twenty in the second session (B). In the first session five-alternatives per item were presented. In the second session, a variable number of alternatives per item were presented, masking being used with some success to offset the influence of simple positional strategies, which appeared to increase as distractibility increased.

(a) Identification strategies.

Analysis of the pattern of choices in the two sessions has been summarized in Figure 9 and Table 16.

During session A, over the whole series of items, the highest proportions of choices were consistent with central bias and position

Figure 9: W's choices on assessment items of Shape (2D) task.

Session	Item no.	Stimulus set	Positions 1	2	3	4	5
A	1	Ba	4	1	5	8	9
	2	Bc	2	6	4	7	8
	3	Cc	9	7	6	3	2
	4	Ca	9	5	1	3	7
	5	Da	1	2	3	4	9
	6	Dc	7	3	1	2	9
	7	Ea	4	9	8	7	6
	8	Ec	2	8	7	9	4
B	1	Ba	4	1	5	8	9
	2	Bc	.	.	.	7	8
	3	Cc	9	7	6	3	2
	4	Ca	9	5	.	.	.
	5	Da	1	2	3	4	9
	6	Dc	7	3	1	2	9
	7	Ea	4	9	.	.	.
	8	Ec	.	.	7	9	4
	9	Fc	1	7	3	.	.
	10	Fa	1	2	9	6	3
	11	Gc	3	6	4	5	8
	12	Ga	3	5	2	7	9
	13	Ha	1	4	2	3	5
	14	Hc	1	4	7	6	9
	15	Bc	1	8	3	9	5
	16	Cc	8	4	2	6	5
	17	Dc	6	8	3	5	2
	18	Ec	.	.	2	1	5
	19	Fc	.	.	.	8	6
	20	Gc	.	.	.	6	1

preference, simple positional strategies which seemed to provide a more likely account of the pattern of choice than did the strategy consistent with the next highest proportion, oddity responding. During the first half of the series, the highest proportion of choices was again consistent with central bias. But, the extent of alternation, together with a moderate proportion of choices consistent with matching, did suggest that some matching, constrained by the central bias, might have occurred. Later in the session, simple positional strategies - central bias, lateral preference, position preference and position perseveration - appeared to account most adequately for the pattern of choices, despite a rather high proportion of choices consistent with oddity responding.

In session B, where masking was employed, over the whole series, moderate proportions of choices were compatible with simple positional and matching strategies, there being no apparent difference of significance amongst them. In the first half of the series, the highest proportion of choices was consistent with central bias, somewhat smaller proportions with central preference and matching and a moderate proportion with position perseveration. Since, however, matching

Table 16: Proportion of M's choices compatible with various strategies on assessment items of Shape (2D) task.

Strategy	Proportion of choices compatible with given strategy					
	Session A			Session B		
	1st half	2nd half	Total	1st half	2nd half	total
Simple positional						
perseveration	.00(3)	.50(4)	.28(7)	.50(4)	.50(8)	.50(12)
preference	.33(3)	1.00(4)	.71(7)	n.a.[1]	.90(10)	n.a.[1]
lateral	no bias	.75(4)	.50(8)	.40(10)	.60(10)	.50(20)
central pref.	.50(4)	.25(4)	.38(8)	.60(10)	.40(10)	.50(20)
central bias	1.00(4)	1.00(4)	1.00(4)	.80(10)	.50(10)	.65(20)
Alternation	.67(3)	.00(4)	.28(7)	n.a.[1]	.10(10)	n.a.[1]
Discrimination						
matching	.50(4)	.25(4)	.38(8)	.60(10)	.50(10)	.55(20)
oddity	.50(4)	.75(4)	.62(8)	.40(10)	.50(10)	.45(20)

1. Masking forced alternation; hence, the extent of either position alternation or preference as strategies of choice could not be gauged.

choices incompatible with positional strategies were made and certain positional choices were also compatible with matching, it seemed likely that some matching was intended, perhaps constrained to some extent by positional strategies. In the second half of the series, simple positional strategies, notably position preference, lateral preference and position perseveration appeared to predominate, alternation occurring only when forced by masking.

In summary, it did appear that matching strategies were used, although constrained somewhat by simple positional strategies. But there was a deterioration with time, more primitive positional strategies being used later in a series, as distractibility increased. Nevertheless, some matching of and hence discrimination amongst two-dimensional shapes seemed possible.

(b) Patterns of visual inspection.

In both sessions, scanning the range of alternatives was noted early in the session, but later, scanning decreased and fixation of the standard or one alternative appeared to occur. Inter-alternative comparison was not clearly evident.

Colour task:

Items of this task were administered in three sessions, five items in the first (A), eight in the second (B) and the full range of twenty in the third (C). In all three sessions, the full range of five alternatives were presented in all items.

(a) Identification strategies.

Analysis of the pattern of choices in the three sessions has been summarized in Figure 10 and Table 17.

During the first session, choices were consistent with central preference (central bias in this case being entirely synonymous with central preference). The presence of a matching choice incompatible with central preference did, however, raise the question whether a matching strategy was followed. During the early part of the series at least, a non-matching choice was, nevertheless of an alternative closely similar to the match.

In session B, selected items, which apparently showed the greatest inter-alternative difference, were presented, in order to maximize transfer from training. The highest proportions of choices were consistent with lateral preference and matching. The extent of alternation, however, supported the view

Figure 10: W's choices on assessment items of Colour task.

Session	Item no.	Stimulus set	Positions 1	2	3	4	5
A	1	Bm	1	2	3	4	5
	2	Cg	1	2	3	4	5
	3	Eg	1	2	3	4	5
	4	Fg	1	2	3	4	5
	5	Gm	3	4	5	6	7
B	3	Eg	1	2	3	4	5
	4	Fg	1	2	3	4	5
	5	Gm	3	4	5	6	7
	6	Am	3	4	5	6	7
	9	Fg	5	1	2	3	4
	10	Gm	4	5	6	7	3
	12	Gg	3	4	5	6	7
	17	Bg	6	5	4	3	2
C	1	Eg	1	2	3	4	5
	2	Fg	1	2	3	4	5
	3	Gm	3	4	5	6	7
	4	Am	3	4	5	6	7
	5	Fg	5	1	2	3	4
	6	Gm	4	5	6	7	3
	7	Gg	3	4	5	6	7
	8	Bg	6	5	4	3	2
	9	Bm	1	2	3	4	5
	10	Cg	1	2	3	4	5
	11	Bg	1	2	3	4	5
	12	Dm	6	5	4	3	2
	13	Bm	1	2	3	4	5
	14	Dg	1	2	3	4	5
	15	Gg	1	2	3	4	5
	16	Cg	3	4	5	6	7
	17	Am	9	8	7	6	5
	18	Dg	2	3	4	5	6
	19	Em	6	5	4	3	2
	20	Gg	10	9	8	7	6

that at least some matching was intended, resulting in a departure from a strict strategy of lateral preference. In the first half of the series, high proportions of choices were compatible with position preference, lateral preference and central bias, there being considerable overlap among the patterns consistent with these strategies. Only a moderate proportion of choices was, however, consistent with matching, which seemed, therefore, subordinate to simple positional strategies. Later in the session, however, the proportion of choices consistent with matching rose, proportions of choices consistent with lateral preference and position alternation being equally high. The fact that non-matching choices were nevertheless of alternatives most closely similar to the match, did, however, appear to suggest that a matching strategy was followed, perhaps to some extent constrained by lateral preference.

In session C, over the whole series of items, the highest proportion of choices was compatible with central bias, moderate proportions being consistent with lateral preference, position alternation and oddity responding. A rather low proportion of choices was consistent with matching; yet eight out of eleven non-matching choices were of alternatives most similar to the match. It appeared possible, therefore, that some attempt at matching was made, but constrained by central bias. During the first half of the session, a high proportion of choices was consistent with position alternation, while central bias and lateral preference also seemed possible strategies. Only a moderate proportion

Table 17: Proportion of W's choices compatible with various strategies on assessment items of Colour task.

Strategy	Proportion of choices compatible with various strategies						
	Session A	Session B			Session C		
		1st half	2nd half	total	1st half	2nd half	total
Simple positional							
perseveration	.50(4)	.00(3)	.25(4)	.14(7)	.00(9)	.10(10)	.06(19)
preference	.50(4)	1.00(3)	.25(4)	.57(7)	.11(9)	.80(10)	.47(19)
lateral	no bias	.75(4)	.75(4)	.75(8)	.60(10)	.50(10)	.55(20)
central pref.	.80(5)	.25(4)	.00(4)	.13(8)	.00(10)	.40(10)	.20(20)
central bias	.80(5)	.75(4)	.25(4)	.50(8)	.60(10)	.80(10)	.70(20)
Alternation	.50(4)	.00(3)	.75(4)	.43(7)	.89(9)	.20(10)	.53(19)
Discrimination							
matching	.40(5)	.50(4)	.75(4)	.62(8)	.50(10)	.40(10)	.45(20)
oddity	.60(5)	.50(4)	.25(4)	.38(8)	.50(10)	.60(10)	.55(20)

of choices did seem accountable in terms of matching strategy, constrained here largely by position alternation. Later in the series, the proportions of choices compatible with central bias and position preference became more prominent, at the expense of alternation and matching.

Over the three sessions, it thus appeared likely that some attempt at matching was made, but constrained by positional strategies, which, to some extent, hampered discrimination, apparently by restricting the positional range within which choice was made. Some discrimination of colour, nevertheless, did appear possible.

(b) Patterns of visual inspection.

Much fluctuation in inspection was evident throughout the sessions. Generally, however, scanning the range of alternatives was noted, although inter-alternative comparison seemed less definite and at times only minimal scanning was evident, especially later in any session.

Configuration (synthesis) task:

Items of this task were administered in four sessions, eleven in the first (A), ten in the second (B), eleven in the third (C) - a repetition of the items of session A - and nine in the fourth (D). Three alternatives were presented in all items of all sessions.

(a) Identification strategies.

Analysis of the pattern of choices as reflected in Figure 11 has been summarized in Table 18.

During session A, over the whole series, the highest proportions of choices were consistent with simple positional strategies. During the first half of the series, however, proportions of choices compatible with matching and simple positional strategies were similar and it appeared from inspection also that some matching probahly occurred, although constrained, particularly later in the first half, by lateral and position preference. In the second half of the series, however, simple positional strategies were clearly dominant and, from inspection, more likely than oddity responding.

In session B, over the whole series, the highest proportions of choices were consistent with central preference and other simple positional strategies, a moderate proportion also being consistent with matching. Inspection of the pattern of choices suggested that a matching strategy was followed to some extent (in that matching choices incompatible with simple positional strategies occurred), but constrained by simple positional strategies. In the first half of the session, a similar combination of strategies seemed probable, central bias

Figure 11: W's choices on assessment items of Configuration (synthesis) task.

Session	Item no.	Positions 1	2	3	4	5
A	1	a	b	•	c	•
	2	a	•	•	b	c
	3	a	•	•	b	c
	4	a	•	b	•	c
	5	a	b	•	•	c
	6	a	•	•	b	c
	7	a	b	•	•	c
	8	a	•	•	b	c
	9	a	b	•	•	c
	10	•	a	•	b	c
	11	a	b	•	c	•
B	4[1]	a	•	b	c	•
	5	a	b	•	•	c
	6	a	•	•	b	c
	7	a	b	•	•	c
	8	•	a	•	b	c
	9	a	b	•	c	,
	10	a	•	•	b	c
	11	a	•	•	b	c
	12	•	a	•	b	c
	13	a	•	•	b	c
C	1	a	b	•	c	•
	2	a	•	•	b	c
	3	a	•	•	b	c
	4	a	•	b	c	•
	5	a	b	•	•	c
	6	a	•	•	b	c
	7	a	b	•	•	c
	8	•	a	•	b	c
	9	a	b	•	c	•
	10	a	•	•	b	c
	11	a	•	b	•	c

(Fig. 11, cont.)

1. First three items refused.

Figure 11 (continued): W's choices on assessment items of Configuration (synthesis) task

Session	Item no.	Positions 1	2	3	4	5
D	12	a	b	•	•	c
	13	•	a	•	b	c
	14	a	•	•	b	c
	15	a	•	•	b	c
	16	a	b	•	•	c
	17	a	b	•	c	•
	18	•	a	•	b	c
	19	a	•	b	•	c
	20	a	•	•	b	c

being most prominent amongst the constraints on matching. During the second half of the series, despite relatively higher proportions of choices consistent with matching, inspection of the pattern of choices nevertheless appeared to allow the possibility of some matching.

In session C, over the whole series of items, the highest proportions of choices were compatible with matching and lateral and position preference. In the first half of the series, a similar combination of strategies appeared to have been followed, while later in the series, high proportions of choices compatible with central preference and position perseveration were also evident. It thus seemed that, throughout the series, an attempt was made to follow a matching strategy, but

Table 18: Proportion of W's choices compatible with various strategies on items of Configuration (synthesis) task.

Strategy	Proportion of choices compatible with given strategy											
	Session A			Session B			Session C			Session D		
	1st half	2nd half	total	1st half	2nd half	total	1st half	2nd half	total	1st half	2nd half	total
Simple positional												
perseveration	-[1]	-	.67(6)	-	-	.33(6)	-	.75(4)	.33(6)	-	-	1.00(5)
preference	.60(5)	.60(5)	.60(10)	.50(4)	.60(5)	.55(9)	.60(5)	.60(5)	.60(10)	.50(4)	1.00(4)	.75(8)
lateral	.67(6)	.80(5)	.73(11)	.60(5)	.60(5)	.60(10)	.50(6)	.80(5)	.64(11)	.60(5)	1.00(4)	.78(9)
central pref.	.50(6)	.80(5)	.64(11)	.80(5)	.60(5)	.70(10)	.33(6)	.80(5)	.55(11)	1.00(5)	.20(4)	.78(9)
centr. bias	n.a.[2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Alternation	.40(5)	.40(5)	.40(10)	.50(4)	.40(5)	.44(9)	.40(5)	.40(5)	.40(10)	.50(4)	.00(4)	.25(8)
Discrimination												
matching	.67(6)	.20(5)	.45(11)	.60(5)	.40(5)	.50(10)	.50(6)	.80(5)	.64(11)	.20(5)	.25(4)	.22(9)
oddity	.33(6)	.80(5)	.55(11)	.40(5)	.60(5)	.50(10)	.50(6)	.20(5)	.36(11)	.80(5)	.75(4)	.78(9)

1. Number of items too small to warrant separate calculations.
2. Fewer than five alternatives per item were presented.

(repeating items administered in session B) and eight in the fourth (D). Three alternatives per item were presented in all sessions, the remainder being masked.

(a) Identification strategies.

Analysis of the pattern of choices, as reflected in Figure 12, has been summarized in Table 19.

In session A, high proportions of choices were consistent with lateral and central preference, with position alternation and with matching. Inspection of the pattern of choices supported the view that a matching strategy was followed, perhaps constrained by simple positional strategies (alternating choices being compatible with matching). The one error made involved choice of the alternative most similar to the match, thus also supporting the assumption of matching.

During session B, the highest proportions of choices were consistent with position perseveration and central preference and it seemed from inspection also that these strategies were most capable of accounting for the pattern of choices.

In session C, over the whole series of items, the highest proportions of choices were consistent with simple positional

Figure 12: W's choices on assessment items of Size (3D) task.

Session	Item[1] no.	Stimulus set	Positions 1	2	3	4	5
A	1	Bs	.	6	.	8	9
	2	c	1	5	.	.	3
	4	s	2	3	.	.	6
	5	Cc	.	5	.	7	8
	6	s	1	2	.	.	5
B	7	Cs	.	10	.	7	8
	8	c	12	13	.	10	.
	9	s	5	.	.	3	4
C	7	Cs	.	10	.	7	8
	8	c	12	13	.	10	.
	9	s	5	.	.	3	4
	11	s	10	11	.	.	9
	12	c	4	3	.	1	.
	13	Ds	.	14	.	10	11
	14	c	11	.	.	8	7
	15	s	2	3	.	5	.
	17	c	.	1	.	3	4
	18	s	21	.	.	22	24
	20	c	20	16	.	17	.
D	11	s	10	11	.	13	.
	12	c	4	.	.	1	5
	13	Ds	.	14	.	10	11
	14	c	.	10	.	8	7
	15	s	2	3	.	5	.
	17	c	5	1	.	.	4
	18	s	21	.	.	22	24
	20	s	20	16	.	17	.

1. Items with match in centre position omitted.

strategies, notably central and lateral preference. A similar pattern was evident in the first half of the series, while, in the second half of the series, position perseveration in position 4 was clearly evident and accounted for choices consistent with other strategies. Choices consistent with oddity responding seemed accountable in terms of simple positional strategies.

In session D, over the whole series of items, proportions of choices consistent with lateral and position preference were highest, a pattern even more evident in the first half of the series, while later, the highest proportion of choices was consistent with lateral preference. The alternatives chosen when errors were made also did not support the assumption of a matching strategy.

Over the four sessions, it thus appeared that positional strategies were dominant, matching being a possible strategy only in the first session. It, therefore, seemed possible that W experienced difficulty in following a matching strategy in relation to three-dimensional sizes.

(b) Patterns of visual inspection.

With the exception of session A where scanning and inter-alternative comparison were evident, visual inspection was

Table 19: Proportion of W's choices compatible with various strategies on Size (3D) task.

Strategies	Session A	Session B	Session C 1st half	Session C 2nd half	Session C total	Session D 1st half	Session D 2nd half	Session D total
	Proportion of choices compatible with various strategies							
Simple positional								
perseveration	.00(2)	1.00(1)	.50(4)	1.00(5)	.78(9)	- [1]	-	.28(7)
preference	.25(4)	.50(2)	.40(5)	1.00(5)	.70(10)	1.00(3)	.50(4)	.71(7)
lateral	.60(5)	.67(3)	.67(6)	1.00(5)	.82(11)	1.00(4)	.75(4)	.73(8)
centr. pref.	.80(5)	1.00(3)	1.00(6)	1.00(5)	1.00 (11)	.50(4)	.50(4)	.50(8)
centr. bias	n.a. [2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Alternation	.75(4)	.50(2)	.60(5)	.00(5)	.30(10)	.00(3)	.50(4)	.28(7)
Discrimination								
matching	.80(5)	.33(3)	.33(6)	.20(5)	.27(11)	.25(4)	.50(4)	.37(8)
oddity	.20(5)	.67(3)	.67(6)	.80(5)	.73(11)	.75(4)	.50(4)	.63(8)

1. Number of items too few to warrant separate calculations.
2. Fewer than five alternatives per item were presented.

characterized by minimal scanning, fixation on one alternative or the standard and much abstracted gazing.

Configuration (analysis) task:

Only four items of two alternatives each were presented in one session. It nevertheless seemed worthwhile to analyse the performance, as providing further information regarding strategies and patterns of visual inspection.

(a) Identification strategies.

Analysis of the pattern of choices as reflected in Figure 13 has been summarized in Table 20.

Figure 13: W's choices on assessment items of Configuration (analysis) task.

Item no.[1]	Positions 1	2	3	4	5
1	.	2	.	4	.
2	1	.	.	.	5
4	1	.	.	.	5
5	.	2	.	4	.

1. Item 3 omitted because match was in centre position.

The highest proportions of choices were consistent with position perseveration, lateral and position preference and matching. It seemed likely, from inspection of the pattern of choices, that a matching strategy was used initially, but gradually gave way to lateral preference (incorporating position preference). A conservative interpretation, however, favoured simple positional strategies.

Table 20: Proportion of W's choices compatible with various strategies on Configuration (analysis) task.

Strategy	Proportion of choices compatible with given strategy
Simple positional	
perseveration	1.00(1)
preference	.67(3)
lateral	.75(4)
central pref.	n.a.[1]
central bias	n.a.[1]
Alternation	.33(3)
Discrimination	
matching	.75(4)
oddity	.25(4)

1. Only two alternatives per item presented.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident.

Control Ss : W.

Strategies were assessed as for W, although where 15 or more correct matches were made, with items of five alternatives, no formal analysis was made and a matching strategy merely assumed. As five alternatives were presented in all cases, central bias was considered in addition to other simple strategies.

N/CA:

Shape (2D) task:

(a) Identification strategies:

As only two errors were made, a matching strategy was assumed.

(b) Patterns of visual inspection:

Clear scanning and inter-alternative comparison were evident throughout the task.

Colour task:

(a) Identification strategies:

Seven errors were made, six involving choice of the alternative most similar to the match. There was no evidence of consistent use of any positional strategy. A matching strategy, therefore, appeared to have been employed.

(b) Patterns of visual inspection.

Scanning the range of alternatives and inter-alternative comparison were clearly evident throughout the task.

Configuration (synthesis) task:

(a) Identification strategies.

Nine errors were made. Analysis of the pattern of choices suggested that a matching strategy was followed, but constrained, in the first half of the series, by position preference and, in the second half, by position preference and central bias.

(b) Patterns of visual inspection.

Clear scanning and inter-alternative comparison were noted throughout the session.

Size (3D) task:

(a) Identification strategies.

Eight errors were made, seven involving choice of the alternative most similar to the match. There appeared to be a slight positional constraint on matching - central bias in the first half of the series and position preference and central bias later in the series.

(b) Patterns of visual inspection.

Scanning was evident, but inter-alternative comparison seemed rather cursory.

Configuration (analysis) task:

(a) Identification strategies.

Twelve errors were made. Analysis of the pattern of choices suggested that, during the first half of the series, a matching strategy was followed, but constrained by lateral preference and central bias. Later, however, the latter two positional strategies, together with position preference, appeared dominant.

(b) Patterns of visual inspection.

Scanning and careful inter-alternative comparison were evident in the early part of the task, but minimal scanning was evident later in the series.

<u>S/CA</u>:

Shape (2D) task:

(a) Identification strategies.

Five errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were noted throughout the task.

Colour task:

(a) Identification strategies.

Nine errors were made, six involving choice of the alternative most similar to the match. It appeared from analysis of the pattern of choices that a matching strategy was followed, but constrained, during the first half of the series by central bias and, later, by position preference.

(b) Patterns of visual inspection.

Scanning was clearly evident throughout the series, but inter-alternative comparison was cursory.

Configuration (synthesis) task:

(a) Identification strategies.

Eleven errors were made. During the

first half of the series, matching appeared to be constrained by position preference, while, later in the series, lateral preference was an additional constraint on matching.

(b) Patterns of visual inspection.

Although scanning was evident throughout the series of items, inter-alternative comparison was cursory.

Size (3D) task:

(a) Identification strategies.

Six errors were made, five involving choice of the alternative most similar to the match. During the first half of the series, matching was clearly dominant, but, later, position preference and central bias appeared to predominate, although some attempt at matching was, nevertheless, still made.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were evident throughout the task.

Configuration (analysis) task::

(a) Identification strategies.

Eleven errors were made. Throughout the task, it appeared that matching was attempted, but constrained, in the first half, by central bias, and, later, by central bias and position preference.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were noted throughout the series.

<u>N/MA</u>:

Shape (2D) task::

(a) Identification strategies.

As only three errors were made, a matching strategy was assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident throughout the task.

Colour task:

(a) Identification strategies.

Seven errors were made, four of them involving choice of the alternative most similar to the match. During the first half of the series, central bias and lateral preference appeared to act as constraints on matching, but, in the second half, matching strategy appeared clearly dominant.

(b) Patterns of visual inspection.

Early in the series, both scanning and inter-alternative comparison were evident, but the latter appeared to decline later in the series.

Configuration (synthesis) task:

(a) Identification strategies.

Eight errors were made. It seemed, however, from analysis of the pattern of choices that a matching strategy was followed, although constrained to some extent by lateral preference in the first half of the series and position preference in the second half of the series.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident throughout the series.

Size (3D) task::

(a) Identification strategies.

Nine errors were made, eight of them involving choice of the alternative most similar to the match. In the first half of the series, there appeared to be no positional constraints on matching, but, later, central bias, position preference and lateral preference appeared to act as constraints on matching.

(b) Patterns of visual inspection.

Although scanning the range of alternatives was evident throughout the task, inter-alternative comparison was cursory.

Configuration (analysis) task::

(a) Identification strategies.

Ten errors were made. Early in the series, mathcing appeared to be the predominant strategy, but, later, central preference and position perseveration appeared predominant.

(b) Patterns of visual inspection.

Initially, scanning and inter-alternative comparison were noted, but, later, scanning was minimal.

S/OLD:

Shape (2D) task:

(a) Identification strategies.

One error was made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Clear scanning and inter-alternative comparison were evident throughout the task.

Colour task:

(a) Identification strategies.

As only two errors were made, both involving choice of the alternative most similar to the match, a matching strategy was assumed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were noted throughout the task.

Configuration (synthesis) task:

(a) Identification strategies.

Four errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident throughout the series.

Size (3D) task:

(a) Identification strategies.

Three errors were made, all involving choice of the alternative most similar to the match. A matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were clearly evident throughout the task.

Configuration (analysis) task:

(a) Identification strategies.

As only five errors were made, a matching strategy was assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were noted throughout the series.

Summary of evidence regarding perceptual factors:

"Autistic" S : W.

(a) Identification strategies.

As indicated in Table 21, the most frequently used strategies were simple positional strategies, of which lateral preference, followed by central and position preference, were most prominent. Where five alternatives were presented, central bias was also prominent, while position perseveration appeared to have been employed on a fair number of occasions.

Position alternation as a strategy seemed a possibility during only one session of the Colour task; elsewhere, the occurrence of alternation seemed more consistent with a matching strategy. It thus seemed that a strategy of position alternation could be excluded as a determinant of W's pattern of choices.

As regards discrimination strategies, a

Table 21: Summary of identification strategies and patterns of visual inspection employed by W.

Task	Shape (2D)		Colour			Config. (synth.)				Size (3D)				An -al.
Session	A	B	A	B	C	A	B	C	D	A	B	C	D	A
No. of alts.	5	5,2,3	5	5	5	3	3	3	3	3	3	3	3	2
Strategies														
Simple pos.														
persev.	X	OX						O			XX	X		
prefer.	X	X		X	X	O	X	O	X				X	
later.	X	X		XO		OX	X	OO	X	OO		X	XX	XX
centr. pref.		O	XX				OX	O	X	OO	XX	X		
centr. bias	XX	O		X	X									
Alternation					O									
Discrim.														
matching	O	X	OO	OX	XO	X	XO	XX		XX				
oddity														
Random														
Patterns of vis. inspec.														
only one or std.	X	X			O	XX	XX		XX		XX	XX	XX	
scans range	X	X	XX	XX	XX			XX		XX				XX
inter-alt.			OO	O	O			XX		XX				XX

key: X - probable strategy/pattern; O - possible (additional) strategy/pattern; note, for each task, first and second halves of each session have been reported, indicated respectively by symbols on left and right of column.

high proportion of choices consistent with oddity responding always occurred in association with high proportions consistent with simple positional strategies. Since the latter were more frequently and consistently observed, choices compatible with oddity responding seemed more plausibly related to simple positional strategies.

A matching strategy appeared to have been employed on at least some items of at least four of the five tasks presented to W and it seemed likely that a matching strategy would have been present during further administrations of the fifth task. The presence or absence of matching strategy was certainly related to factors, such as the degree of rapport and task orientation. Task factors, such as number and arrangement of alternatives, and item difficulty also seemed important, interacting with the factors mentioned above. Conclusions regarding the likelihood of matching strategies in relation to various tasks were thus not readily made and it seemed safe only to say that matching strategy could be employed but with varying effectiveness, depending on a variety of factors, both perceptual and non-perceptual.

Investigation of possible changes in the strategy employed over time during a given session suggested only a slightly increased probability that matching would be employed early in a session, simple positional strategies occurring later in a session. Where regression in the kind of strategy used did occur, a related increase in distractibility and decrease in task orientation and rapport was usually observed.

It thus appeared that W could probably discriminate amongst alternatives relevant to the perceptual tasks presented to her. Such perceptual skill was, however, easily adversely affected by a number of factors, some related to the tasks and others concerning the degree of distractibility, task orientation and rapport present at any moment.

(b) Patterns of visual inspection.

Great variability was shown in patterns of visual inspection from moment to moment in most tasks. Certain patterns, as summarized in Table 21, could, however, be ascertained.

Scanning the range of alternatives and fixation of one alternative or the standard (minimal scanning) occurred about equally often. Inter-alternative comparison, which occurred always in conjunction with scanning the range of alternatives, was much less frequently observed.

In the first task presented, Shape (2D), scanning the range of alternatives was present early in the task and was replaced later by minimal scanning. In other tasks, however, patterns of visual inspection remained fairly consistent within any session and appeared related to the prevailing extent of distractibility, task orientation and rapport. The latter factors, it might be recalled, did change over time within any session, usually in a direction unlikely to enhance performance. But it was usually the case that either a session was characterized from the start by poor task orientation, rapport and distractibility, which merely increased over time, (in which case minimal scanning was evident throughout); or, following initial good task orientation and rapport, there was a sudden, marked decline in these factors, preventing further testing (in which case scanning observed during the initial period, when items were administered, would be recorded for the whole session).

There did not appear to be any clear association between patterns of visual inspection and number and arrangement of alternatives. As regards tasks, the Colour task was exceptional, in that scanning the range of alternatives was present throughout all sessions, in contrast to other tasks where patterns of visual inspection changed from session to session. The pattern of inspection seemed, however, to be related more to task orientation, rapport and lack of distractibility which, particularly in the third session, were exceptionally good, than to the task itself.

Patterns of visual inspection thus appeared to be related to a large extent to the extent of rapport, task orientation and distractibility prevailing in any session.

(c) Identification strategies and patterns of visual inspection.

The relative frequency of associations between strategies and patterns of visual inspection recorded for the first and second halves of each session over all the sessions has been summarized in Table 22. Matching versus simple positional strategies were considered in relation to scanning the range of alternatives versus minimal scanning. (Inter-alternative comparison was disregarded, as its absence might have reflected inadequate observation.)

Table 22: The relative frequency of associations between identification strategies and patterns of visual inspection over all sessions and all tasks for W.

Patterns of visual inspection	Identification strategies simple positional	matching
minimal scanning	12	2
scanning all alts.	7	7

From the table it has appeared that simple positional strategies were more likely to occur in association with minimal scanning than was a matching strategy. The reverse did not, however, apply as regards scanning all the alternatives.

Comparison between W and control Ss.

(a) Identification strategies.

In contrast with W's performance, which seemed predominantly determined by simple positional strategies, as indicated in Table 23, the performance of all control Ss seemed predominantly determined by matching strategy. Simplle positional strategies were not, however, absent from the performance of control Ss, being present usually in the form of constraints on attempts to apply a matching strategy and only occasionally as the predominant influence. The oldest control S, (S/OLD) was an exception, in that positional strategies were apparently entirely absent as determinants of her performance.

The positional strategies employed by the other control Ss varied. Similar proportions of central bias and position preference, with occasional use of lateral preference, were used by N/CA and S/CA, while small proportions of all simple positional strategies were used by N/MA.

Table 23: Summary of identification strategies and patterns of visual inspection employed by control Ss of I.

Subject	N/CA					S/CA					N/MA					S/OLD				
Task	Sh. (2D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Col.	Syn.	Size (3D)	An-al.	Sh. (2D)	Col.	Syn.	Size (3D)	An-al.
No. of alts.		5 alts. on all tasks				5 alts. on all tasks					5 alts. on all tasks					5 alts. on all tasks				
Errors	2	7	9	8	12	5	9	11	6	11	3	7	8	9	10	1	2	4	3	5
Strategies																				
Simple pos.																				
persev.															X					
prefer.			OO	O	X		O	OO	X	O			O	O						
later.					OX			O				O	O	O						
centr. pref.															X					
centr. bias			O	OO	OX		O		X	OO		O		O						
Alternation																				
Discrim. matching oddity	XX	XX	XX	XX	X	XX	XX	XX	XO	XX	XX	XX	XX	XX	X	XX	XX	XX	XX	XX
Random																				
Patterns of vis. inspec.																				
only one or std.					X										X					
scans range	XX	XX	XX	XX	X	XX	XX	XX	XX	XX	XX	XX	XX	XX	X	XX	XX	XX	XX	XX
inter-alt.	XX	XX	XX	OO	X	XX	OO	OO	XX	XX	XX	XX	XX	OO	X	XX	OO	OO	XX	XX

key: X - probable strategy/pattern; O - possible (additional) strategy/pattern; note, for each task, first and second halves of session have been reported, indicated respectively by symbols on left and right of column.

Position alternation as a strategy did not seem to have been employed consistently by control Ss. In these respects, control Ss seemed similar to W.

As mentioned above, matching strategies were clearly used by all control Ss, although to varying extents in each S constrained by positional strategies and subject to error. Ranking of tasks in terms of errors for each S revealed similarity in the order of difficulty, although there were quite wide differences amongst Ss in absolute terms. Shape (2D) was the easiest task for all Ss, and Configuration (analysis) the most difficult. Intermediate in difficulty were Colour, Size (3D) and Configuration (synthesis), ranked, for most Ss, in that order, from easiest to most difficult.

Errors having seemed an unreliable measure of W's performance, (because of the frequent changes in strategy), the closest comparison possible seemed to be in terms of W's relative certainty in the use of matching strategy. Even this measure, however, was not suitable, because, as mentioned in summary of W's performance, non-perceptual factors, such as task orientation and rapport, greatly affected performance. The fact that matching strategy was present most clearly on the Colour task and was much less evident on the Size (3D) task, for example, seemed related more to the exceptionally good task-orientation and rapport present on the Colour as compared with the Size (3D) task, than to relative difficulty of the tasks or discriminative ability of W. It was not, therefore, possible to compare relative difficulty of tasks for W and control Ss.

In summary, there was some similarity between W and control Ss, in the fact that all Ss made use of simple positional strategies at some time. W differed from control Ss in that the latter made far more consistent use of matching strategy. The most striking difference between W and control Ss was, however, the ease with which W's performance was disrupted by distractibiltiy, poor task orientation and lack of rapport.

(b) Patterns of visual inspection.

In contrast with W, visual inspection in control Ss,(as indicated in Table 23), was characterized predominantly by scanning the full range of alternatives and, to a slightly lesser extent, by inter-alternative comparison. Fixation of the standard or one alternative was rare,occurring in the latter part of one session in two Ss only. For all Ss and similarly to W, inter-alternative comparison occurred always in conjunction with scanning, although scanning sometimes occurred without clear inter-alternative comparison. Like W, patterns of visual inspection of control Ss remained fairly consistent within any session, but, whereas a decline in scanning in the case of control Ss seemed associated with task difficulty, for W, non-perceptual factors were involved.

Since all control Ss were presented with five alternatives in all tasks, number and arrangement of alternatives could not affect patterns of visual inspection. As regards the effect of various tasks, only on the Configuration (analysis) task did two Ss display similar patterns of visual inspection.

In summary, as in the case of identification strategies, however, the chief difference between W and control Ss was the extent to which patterns of visual inspection were affected by non-perceptual factors in the former.

(c) Identification strategies and patterns of visual inspection.

Matching versus simple positional strategies in relation to fixation of the standard or one alternative versus scanning the range of alternatives for each control S in the first and second halves of tasks has been summarized in Table 24.

Table 24: The relative frequency of associations between identification strategies and patterns of visual inspection over all tasks for each control S of W.

	Subjects							
	N/CA		S/CA		N/MA		S/OLD	
Identification strategies	P	M	P	M	P	M	P	M
Patterns of visual inspection								
minimal scanning	1	0	0	0	1	0	0	0
scanning all alts.	0	9	1	9	0	9	0	10

From the table, it has appeared that, for all control Ss, a matching strategy was more likely to be associated with scanning the full range of alternatives, than were simple positional strategies. In contrast with W, however, simple positional strategies were not more likely than matching strategy to occur in association with minimal scanning, which was in any case not frequently observed in control Ss.

Case study No. 3 : R (male; CA 7 - 3).

(1) Rapport.

"Autistic" S : R.

Pre-task sessions:

The first three pre-task sessions were conducted in an office at a children's hospital, which R was attending for remedial teaching. Following termination of the remedial lessons, the remaining six pre-task sessions were conducted at R's home.

As indicated by the relatively small number of sessions mentioned above - nine, in all - rapport was relatively easily established with this S. From the first session, R did not object to being left alone with the E, although towards the end of sessions, he often indicated his desire to leave or to have the E leave, by spontaneously packing away toys and books. Recognition of the E was shown after only a few sessions; for example, when the E arrived for the first session at his home, R jumped up and down excitedly, saying, "Hospital, go hospital", indicating that he associated the E with the hospital, where he had previously seen her. A fair number of words and phrases were used spontaneously, although pronounced indistinctly. R responded to his name being spoken and used his name appropriately himself. Eye-contact was good.

Persistence, particularly on more structured activities, was shown, although distractibility and restlessness increased towards the end of sessions. Interest in the box of toys brought by the E was shown; fascination with part-objects was observed, for example, the buzzing sound of car wheels and the ringing of an alarm clock; but more appropriate activity was also observed, for example, grouping together objects with a common function, such as furniture, and pouring water from a tea-pot. Drawing - immature, but recognizable as, for example, boats and houses - and looking at pictures and parts of pictures, as well as naming pictures, was elicited early and usually without difficulty, except for a short period, when drawing was resisted.

Repetitive, stereotyped activities, such as finger-play, were not noted. Distress was shown only as increasing reluctance to stay with the E towards the end of sessions; major episodes of distress as with A and W were not observed.

The main features of attempts to establish rapport with R in pre-task sessions were thus, firstly, the fact that concrete rewards, notably sweets, could be used effectively as inducements to participation in various activities. Less direct rewards, arising from enjoyment of certain activities by the S and from the praise and interest of the E - a form of reward to which this S was responsive - also assisted in maintaining participation and co-operation in directed activities.

Secondly, a fairly even level of rapport was maintained within and between sessions. Reluctance to continue was evident towards the end of sessions, but the absence of major distress reduced the extent of fluctuation in rapport considerably.

In summary, the criteria stated in the revised design for the attainment of a suitable level of rapport, were relatively easily satisfied with this S. In fact, training could probably have been initiated earlier, but it seemed advisable to establish a firm base before presenting task materials.

Task sessions:

The introduction of task materials produced in this S evidence of great excitement and, in the first few sessions, it was difficult to control his almost hyperactive behaviour. He jumped up and down and found it extremely difficult to wait between presentations.

Within a short while, however, he became calmer and showed both a desire and an ability to co-operate in the more directed activity of the tasks. His ability to master the tasks appeared to add to his enjoyment of sessions and to increase his frustration tolerance, shown by participation for longer periods. Moreover, he showed increasingly motivation of an intrinsic rather than an extrinsic nature; that is, he appeared increasingly to be motivated by a desire to do well on the tasks, rather than merely to gain certain concrete rewards for continued participation. The extent of his interest in and enjoyment of the tasks was indicated by R's requests, long after testing was completed, for further opportunities to participate in the tasks.

Control Ss : R.

N/CA: This S did not appear unduly anxious during administration of the intelligence test, although he tended to be rather cautious. In subsequent task sessions, he co-operated well and showed interest and task-involvement.

S/CA: This S was a quiet, serious-faced boy, who approached both the intelligence test and subsequent tasks in a cautious manner. He co-operated well and appeared interested in the perceptual tasks.

N/MA: Although outwardly boisterous, this S showed anxiety, especially during the initial part of the session spent administering the intelligence test. On subsequent tasks, he was more relaxed, but, although he co-operated with the E, he did not appear particularly interested in the perceptual tasks and lacked task-involvement.

S/OLD: This S was quiet and reserved, but co-operative during the intelligence test and the subsequently presented perceptual tasks. He seemed fairly well motivated and persistent on the perceptual tasks.

In summary, rapport with control Ss did not appear markedly better than that established with R. There were, however, differences in rapport, notably in that control Ss appeared to take the tasks far more in their stride than did R, who was initially considerably excited by presentation of task materials.

(2) Discrimination set.

"Autistic" S : R.

The first task presented to R required discrimination of two-dimensional shapes (Shape (2D). Initial presentation of the task was in terms of the original training procedure, in which choice was indicated by pressing a key associated with a particular alternative. After two sessions, however, it was clear that the keys, rather than the display, were attracting R's attention and key-pressing was discarded in favour of pointing - subsequently used as the matching response for all <u>S</u>s (see pp. 132ff.) - which immediately resulted in improved attention to the display. General features of attention, gaze orientation and instrumental response were subsequently elicited regularly and without difficulty.

Systematic identification strategies, including matching, were evident early in training, at least when no more than three alternatives were presented, although the full array of five alternatives tended to provoke rather random choices. After a total of six training sessions, however, consistent matching amongst five alternatives was evident. Transfer to subsequent tasks was accomplished without great difficulty, usually within one or two sessions. A fair amount of repetition of training items was, however, necessary in order to establish discrimination set in relation to five alternatives, in the case of tasks where the standard-match relationship was somewhat altered (Configuration (synthesis), Configuration (analysis) and Object tasks).

As mentioned in discussion regarding rapport with this <u>S</u>, distractibility and hyperactivity were evident in the first few task sessions, but rapidly gave way to an unexpected degree of task-involvement and persistence. Distractibility was still, however, evident near the end of sessions, although for a much shorter period relative to the total session, than was the case with other "autistic" Ss. Features of attention were enhanced by the introduction of novel materials.

Control Ss : R.

N/CA: Following the E's demonstration this S appeared to encounter little difficulty in choosing the match from amongst five alternatives. Transfer of discrimination set to subsequent tasks was achieved without difficulty, although some hesitancy was shown on the Configuration (analysis) task. Distractibility was not noted, persistence was shown and features of attention were enhanced by the introduction of novel materials.

S/CA: Following the E's demonstration, this S experienced little difficulty, except on the first five-alternative item, in choosing the matching alternative. On subsequent tasks, transfer of discrimination set was evident, with only slight hesitancy on tasks in which the standard-match relationship was somewhat altered (Configuration (Synthesis), Configuration (analysis) and Object tasks). Distractibility was minimal, persistence was shown and novel tasks enhanced attention.

N/MA: Following the E's demonstration, this S carefully imitated the required gestures, but in following sub-items, choices were random.

After considerable repetition and re-demonstration by the E, discrimination set in relation to five alternatives was established. Transfer to subsequent tasks was achieved without difficulty, although hesitancy was evident on the Configuration (synthesis), Configuration (analysis) and Object tasks. Some distractibility was evident, although not sufficient to disrupt performance, while persistence was only fair. The introduction of novel tasks did, however, appear to enhance attention.

S/OLD: Following the E's demonstration, this S achieved discrimination set in relation to five alternatives with little difficulty. Transfer to subsequent tasks was accomplished without difficulty, only slight hesitancy being shown on the Configuration (analysis) task. Distractibility was not evident, persistence was shown and the introduction of novel materials appeared to enhance attention.

In summary, the contrast between R and his control Ss in acquiring and transferring discrimination set in relation to five alternatives was not marked, although more repetitions of training items were required for R. Similar difficulties were encountered by most Ss on tasks in which the standard-match relationship was slightly altered. R was somewhat more distractible than control Ss, with the exception of N/MA who was also easily distracted; but as regards persistence, R was similar to most control Ss, and seemed, at times, to display even greater task orientation than did control Ss. All Ss were similarly affected by the introduction of novel tasks.

(3) Perceptual factors.

"Autistic" S : R.

Five alternatives were presented in all tasks; hence analysis of strategies included reference to central bias as well as central preference.

Shape (2D) task:

(a) Identification strategies.

Seven errors were made. Analysis of the pattern of choices as reflected in Figure 14 has been summarized in Table 25.

The strategy most evident in relation to total number of choices was central bias, with somewhat smaller proportions of choices compatible with matching and position preference. Inspection of the pattern of choices indicated that choices compatible with position preference were possibly more adequately accounted for in terms of central bias and position perseveration. It therefore appeared - in view also of the good task orientation shown - that matching did occur, constrained by central bias and, to some extent also, by position perseveration and position preference.

Figure 14: R's choices on assessment items of Shape (2D) task

Item No.	Stimulus set	Positions 1	2	3	4	5
1	Ba	4	1	5	8	9
2	Bc	2	6	4	7	8
3	Cc	9	7	6	3	2
4	Ca	9	5	1	3	7
5	Da	1	2	3	4	9
6	Dc	7	3	1	2	9
7	Ea	4	9	8	7	6
8	Ec	2	8	7	9	4
9	Fc	1	7	3	9	5
10	Fa	1	2	9	6	3
11	Gc	3	6	4	5	8
12	Ga	3	5	2	7	9
13	Ha	1	4	2	3	5
14	Hc	1	4	7	6	9
15	Bc	1	8	3	9	5
16	Cc	8	4	2	6	5
17	Dc	6	8	3	5	2
18	Ec	6	3	2	1	5
19	Fc	2	5	4	8	6
20	Gc	2	8	4	6	1

The influence of simple positional strategies seemed to increase over the series, a higher proportion of matching choices being evident early in the series, though central bias was, nevertheless, still prominent. Discrimination of two-dimensional shapes was, therefore, possible.

Table 25: Proportion of R's choices compatible with various strategies on assessment items of Shape (2D) task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.33(9)[1]	.40(10)[1]	.37(19)[1]
preference	.56(9)	.70(10)	.63(19)
lateral	———	no bias	———
central pref.	.10(10)	.50(10)	.35(20)
central bias	.90(10)	.90(10)	.90(20)
Alternation	.44(9)	.30(10)	.37(19)
Discrimination			
matching	.70(10)	.60(10)	.65(20)
oddity	.30(10)	.40(10)	.35(20)

1. Total number of items in respect of which the preceding proportion was calculated.

(b) Patterns of visual inspection.

Scanning occurred, but appeared somewhat erratic, being confined largely to the three central positions.

Inter-alternative comparison was evident within the range of alternatives scanned.

Configuration (synthesis) task:

(a) Identification strategies.

Eight errors were made. Analysis of the pattern of choices as reflected in Figure 15 has been summarized in Table 26.

Figure 15: R's choices on assessment items of Configuration (synthesis) task

Item no.	Positions 1	2	3	4	5
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18[1]	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e

1. This item had two possible matches (cf.Appendix B).

Over the whole series of items, the highest proportions of choices were compatible with central bias and matching. It therefore appeared that matching was used, perhaps constrained to some extent by central bias, although since the latter proportion was not much different from the proportion which could be expected on the basis of chance (.60), central bias was not particularly prominent. In the first half of the series, lateral preference, together with central bias might have constrained matching to some extent, while later, central bias alone might have influenced matching strategy. It did, however, seem likely that matching of configurations requiring synthesis was possible.

Table 26: Proportion of R's choices compatible with various strategies on assessment items of Configuration (synthesis) task

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.11(9)	.10(10)	.11(19)
preference	.33(9)	.40(10)	.47(19)
lateral	.50(10)	no bias	.40(20)
central pref.	.40(10)	.40(10)	.40(20)
central bias	.60(10)	.70(10)	.65(20)
Alternation	.44(9)	.50(10)	.47(19)
Discrimination			
matching	.60(10)	.60(10)	.60(20)
oddity	.40(10)	.40(10)	.40(20)

(b) Patterns of visual inspection.

Scanning the full range of alternatives and inter-alternative comparison were evident throughout the series.

Size (3D) task::

(a) Identification strategies.

Seven errors were made. Analysis of the pattern of choices indicated in Figure 16 has been summarized in Table 27.

Figure 16: R's choices on assessment items of Size (3D) task

Item no.	Stimulus set	Positions 1	2	3	4	5
1	Bs	5	6	7	8	9
2	c	1	5	2	4	3
3	c	4	5	6	7	3
4	s	2	3	4	5	6
5	Cc	9	5	6	7	8
6	s	1	2	3	4	5
7	s	9	10	6	7	8
8	c	12	13	11	10	9
9	s	5	6	2	3	4
10	c	7	8	9	10	6
11	s	10	11	12	13	9
12	c	4	3	2	1	5
13	Ds	13	14	12	10	11
14	c	11	10	9	8	7
15	s	2	3	4	5	6
16	c	23	19	20	21	22
17	c	5	1	2	3	4
18	s	21	25	23	22	24
19	c	15	13	12	11	14
20	s	20	16	18	17	19

Over the whole series of items, the highest proportions of choices were consistent with matching and central bias, the latter slightly above what would be expected on the basis of chance. During the first half of the series, however, matching appeared predominant, the influence of simple positional strategies, particularly central bias and position preference, becoming more marked only later. The moderate proportions of choices compatible with position alternation throughout the series were accountable in terms of matching. It thus

Table 27: Proportion of R's choices compatible with various strategies on assessment items of Size (3D) task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.11(9)	.30(10)	.21(19)
preference	.44(9)	.50(10)	.47(19)
lateral	no bias		
central pref.	.50(10)	.20(10)	.35(20)
central bias	.60(10)	.80(10)	.70(20)
Alternation	.55(9)	.50(10)	.53(19)
Discrimination			
matching	.70(10)	.60(10)	.65(20)
oddity	.30(10)	.40(10)	.35(20)

appeared likely that a matching strategy was employed although constrained to some extent, particularly later in the series, by simple positional strategies. The assumption of matching was further supported by the fact that six of the seven errors involved choice of the alternative most similar to the match. It seemed, therefore, that R could employ a matching strategy appropriately in relation to three-dimensional sizes.

(b) Patterns of visual inspection.

Scanning appeared good throughout the series, but inter-alternative comparison seemed somewhat cursory, especially later in the series.

Colour task:

(a) Identification strategies.

Eight errors were made. Analysis of the pattern of choices as reflected in Figure 17 has been summarized in Table 28.

Over the whole series of items, the highest proportion of choices was compatible with a matching strategy, moderate proportions also being consistent with position alternation and lateral preference. During the first half of the series, however, a number of strategies appeared possible - matching, central bias, lateral and position preference, all suggested by moderate to high proportions of choices. Later, only position alternation seemed a possible alternative strategy to matching. Comparison of relative proportions of choices, therefore, yielded a rather confusing picture of the strategies employed.

Figure 17: R's choices on assessment items of Colour task.

Item no.	Stimulus set	Positions 1	2	3	4	5
1	Bm	1	2	3	4	5
2	Cg	1	2	3	4	5
3	Eg	1	2	3	4	5
4	Fg	1	2	3	4	5
5	Gm	3	4	5	6	7
6	Am	3	4	5	6	7
7	Bg	1	2	3	4	5
8	Dm	6	5	4	3	2
9	Fg	5	1	2	3	4
10	Gm	4	5	6	7	3
11	Bm	1	2	3	4	5
12	Gg	3	4	5	6	7
13	Dg	1	2	3	4	5
14	Gg	1	2	3	4	5
15	Cg	3	4	5	6	7
16	Am	9	8	7	6	5
17	Bg	6	5	4	3	2
18	Dg	2	3	4	5	6
19	Em	6	5	4	3	2
20	Gg	10	9	8	7	6

Inspection of the pattern of choices did, however, appear to exclude central bias because of the presence of a fair number of choices in extreme positions. Furthermore, the fact that five out of eight errors, nevertheless, involved choice of a closely similar alternative supported the assumption of a matching strategy. It was, therefore, concluded that a matching strategy was employed, although constrained to some extent by lateral and position preference, the high proportion of alternation later in the series being compatible also with matching. It seemed thus that R was capable of some degree of colour discrimination.

Table 28: Proportion of R's choices compatible with various strategies on assessment items of colour task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.44(9)	.20(10)	.31(19)
preference	.56(9)	.40(10)	.47(19)
lateral	.60(10)	.40(10)	.50(20)
central pref.	.20(10)	.10(10)	.15(20)
central bias	.70(10)	.20(10)	.45(20)
Alternation	.44(9)	.60(10)	.53(19)
Discrimination			
matching	.60(10)	.60(10)	.60(20)
oddity	.40(10)	.40(10)	.40(10)

(b) Patterns of visual inspection.

Scanning appeared adequate, but inter-alternative comparison was rather cursory.

Object task:

(a) Identification strategies.

Twelve errors were made. Analysis of the pattern of choices as indicated in Figure 18 has been summarized in Table 29.

Figure 18: B's choices on assessment items of Object task

Item no.	Positions 1	2	3	4	5
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7[1]	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19[1]	a	b	c	d	e
20	a	b	c	d	e

1. These items had two possible matches (cf. Appendix B)

Choices over the whole series seemed accountable largely in terms of lateral and position preference, and perhaps, to some extent, central bias. During the first half of the series, however, the proportion of choices consistent with position perseveration was also notable, while a moderate proportion of choices compatible with matching suggested that some attempt at matching was made, an assumption supported by good task orientation and deliberate choices on the part of R.

Table 29: Proportion of R's choices compatible with various strategies on assessment items of Object task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.67(9)	.30(10)	.47(19)
preference	.78(9)	.70(10)	.74(19)
lateral	.60(10)	.90(10)	.75(20)
central pref.	.20(10)	.00(10)	.10(20)
central bias	.50(10)	.80(10)	.65(20)
Alternation	.22(9)	.30(10)	.26(19)
Discrimination			
matching	.50(10)	.30(10)	.40(20)
oddity	.50(10)	.70(10)	.60(20)

Later, in the series, however, lateral preference, position preference and central bias seemed predominant, a relatively high proportion of choices compatible with oddity responding apparently accountable in terms of the positional strategies. It thus seemed that matching functionally related objects was difficult for this S, leading him to rely largely on positional strategies in making choices.

(b) Patterns of visual inspection.

Scanning the full range of alternatives was evident only occasionally and inter-alternative comparison slight.

Shape (3D) task:

(a) Identification strategies.

Eight errors were made. Analysis of the pattern of choices as reflected in Figure 19 has been summarized in Table 30.

Over the whole series of items, the highest proportions of choices were consistent with central bias and matching, with moderate proportions consistent with lateral and position preference. In the first half of the series, the highest proportion of choices was consistent with central bias, but a fair proportion was also consistent with matching. Later, also, the proportion of choices consistent with central bias fell to a chance level, while the proportion of choices compatible with matching remained at the same level. It thus appeared that a matching strategy was employed, but constrained by central bias and lateral preference (choices consistent with position preference being largely accountable in terms of lateral preference). Thus some discrimination of three-dimensional shapes was possible.

Figure 19: R's choices on assessment items of Shape (3D) task.

Item no.	Stimulus set	Positions 1	2	3	4	5
1	Ba	1	3	2	7	6
2	Bc	7	9	8	4	5
3	Cc	8	9	3	7	5
4	Ca	2	4	6	8	1
5	Dc	5	1	2	3	9
6	Da	4	5	6	3	8
7	Ea	8	9	7	6	5
8	Ec	9	6	4	2	3
9	Fa	4	7	6	8	5
10	Fc	6	9	2	3	1
11	Gc	5	4	3	2	1
12	Ga	9	7	8	6	3
13	Ha	6	2	7	8	9
14	Hc	9	3	4	5	1
15	Bc	8	2	6	5	1
16	Cc	4	3	2	5	6
17	Dc	7	9	1	3	5
18	Ec	8	5	3	1	7
19	Fc	9	5	2	7	4
20	Gc	9	6	5	7	8

Table 30: Proportion of R's choices compatible with various strategies on assessment items of Shape (3D) task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.22(9)	.20(10)	.21(19)
preference	.56(9)	.50(10)	.53(19)
lateral	.50(10)	.60(10)	.55(20)
central pref.	.30(10)	.20(10)	.25(20)
central bias	.90(10)	.60(10)	.75(20)
Alternation	.44(9)	.50(10)	.47(19)
Discrimination			
matching	.60(10)	.60(10)	.60(20)
oddity	.40(10)	.40(10)	.40(20)

(b) Patterns of visual inspection.

Scanning was somewhat cursory, especially early in the series, and inter-alternative comparison rather brief, but nevertheless still present.

Configuration (analysis) task.

(a) Identification strategies.

Nine errors were made. Analysis of the pattern of choices as reflected in Figure 20 has been summarized in Table 31.

Figure 20: R's choices on assessment items of Configuration (analysis) task

Item no.	Positions 1	2	3	4	5
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e

The highest proportion of choices in relation to the total number of items was consistent with central bias, but this proportion masked a marked change over the series. In the first half, a matching strategy was clearly used, as indicated by a high proportion of choices consistent with matching, good task orientation and deliberate choices. Later, however, choices appeared accountable largely in terms of central bias and position preference. At least some perception of configurations, involving analysis of complex patterns, was, however, shown by this S.

Table 31: Proportion of R's choices compatible with various strategies on assessment items of Configuration (analysis) task.

Strategy	Proportion of choices compatible with given strategy 1st half	2nd half	Total
Simple positional			
perseveration	.00(9)	.10(10)	.06(19)
preference	.33(9)	.60(10)	.47(19)
lateral		no bias	
central pref.	.20(10)	.40(10)	.30(20)
central bias	.60(10)	1.00(10)	.80(20)
Alternation	.67(9)	.40(10)	.53(19)
Discrimination			
matching	.80(10)	.30(10)	.55(20)
oddity	.20(10)	.70(10)	.45(20)

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were clearly evident early in the series, though declining later.

Size (2D) task:

(a) Identification strategies.

Nine errors were made. Analaysis of the pattern of choices indicated in Figure 21 has been summarized in Table 32.

Figure 21: R's choices on assessment items of Size (2D) task.

Item no.	Stimulus set	Positions 1	2	3	4	5
1	Bs	9	5	6	8	7
2	c	1	5	2	4	3
3	c	5	9	6	8	7
4	s	3	7	4	6	5
5	Cc	9	12	10	13	11
6	s	3	2	1	4	5
7	c	7	10	6	8	9
8	c	4	5	3	6	7
9	s	10	9	12	8	11
10	s	3	7	4	5	6
11	c	1	5	2	3	4
12	s	12	9	13	11	10
13	Dc	4	1	3	2	5
14	c	13	14	11	15	12
15	s	9	6	10	7	8
16	c	18	19	17	20	16
17	s	24	21	23	22	25
18	s	2	1	3	5	4
19	c	6	7	8	9	10
20	s	20	16	19	17	18

Over the whole series of items, the highest proportions of choices were compatible with central bias, position preference, matching and lateral preference. In the first half a similar distribution was evident, with simple positional strategies slightly more marked.

Table 32: Proportion of R's choices compatible with various strategies on assessment items of Size (2D) task.

Strategy	Proportion of choices compatible with given strategy		
	1st half	2nd half	Total
Simple positional			
perseveration	.44(9)	.20(10)	.31(19)
preference	.78(9)	.50(10)	.64(19)
lateral	.70(10)	.30(10)	.50(20)
central pref.	.30(10)	.30(10)	.30(20)
central bias	.70(10)	.80(10)	.75(20)
Alternation	.22(9)	.50(10)	.36(19)
Discrimination			
matching	.60(10)	.50(10)	.55(20)
oddity	.40(10)	.45(10)	.45(20)

In the second half, however, proportions consistent with all simple positional strategies, except central bias, fell, as did the proportion compatible with matching. Nevertheless, taking into account that six of the nine errors involved choice of an alternative most similar to the match, it seemed that a matching strategy was used, although constrained to varying extents in the first and second halves by simple positional strategies.

(b) Patterns of visual inspection.

Scanning was evident, but inter-alternative comparison appeared somewhat cursory.

Control Ss : R.

Strategies were assessed as for R, although, where 15 or more correct matches were made, with items of five alternatives, no formal analysis was made and a matching strategy merely assumed. As five alternatives were presented in all tasks to all Ss, central bias was considered in addition to other simple positional strategies.

N/CA:

Shape (2D) task:

(a) Identification strategies.

As only three errors were made, a matching strategy was assumed.

(b) Patterns of visual inspection.

Clear scanning and careful inter-alternative comparison were evident throughout the task.

Size (3D) task:

(a) Identification strategies.

Six errors were made, but, as all except one error involved choice of the alternative most similar to the match and no positional bias was evident, it appeared possible to assume that a matching strategy was employed.

(b) Patterns of visual inspection.

Careful scanning was evident, together with inter-alternative comparison, the latter, however, declining later in the series.

Colour task:

(a) Identification strategies.

Eight errors were made, six of them involving choice of the alternative most similar to the match. It appeared, therefore, that a matching strategy was employed, although constrained to some extent, during the first half of the series by central bias.

(b) Patterns of visual inspection.

Rather cursory scanning which, at times, appeared not to take in the full range of alternatives, and somewhat brief inter-alternative comparison were observed.

Object task:

(a) Identification strategies.

As only five errors were made, it seemed clear that a matching strategy was employed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident throughout the task.

Shape (3D) task:

(a) Identification strategies.

Only four errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Clear scanning and inter-alternative comparison were evident.

Configuration (analysis) task:

(a) Identification strategies.

Eleven errors were made. During the first half of the series, a matching strategy was used, but later it appeared that attempts to match were constrained by central bias and position perseveration.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were observed throughout the task.

Size (2D) task:

(a) Identification strategies.

Seven errors were made, all involving choice of the alternative most similar to the match. As there was no evidence of consistent use of positional strategies, it, therefore, appeared that a matching strategy was used.

(b) Patterns of visual inspection.

Scanning the range of alternatives was observed, but inter-alternative comparison was rather cursory.

S/CA:

Shape (2D) task:

(a) Identification strategies.

As only four errors were made, it was assumed that a matching strategy was used.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative

comparison were observed throughout the task.

Configuration (synthesis) task:

(a) Identification strategies.

Thirteen errors were made. It appeared that some attempt at matching was made, but tending to be based on common elements rather than patterns. Simple positional strategies - position preference, central bias, central preference and position perseveration - particularly later in the series, did, however, appear to be the predominant influence.

(b) Patterns of visual inspection.

Rather cursory scanning and only brief inter-alternative comparison were evident.

Size (3D) task:

(a) Identification strategies.

Six errors were made, five of which involved choice of the alternative most similar to the match. There appeared to be a slight tendency towards central bias, but, in general, a matching strategy appeared to have been employed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison was observed throughout the series.

Colour task:

(a) Identification strategies.

Nine errors were made, six of them involving choice of the alternative most similar to the match. As there did not appear to be consistent use of any positional strategies, a matching strategy was assumed.

(b) Patterns of visual inspection.

At times, careful scanning and inter-alternative comparison were observed, but, at other times, both forms of inspection were somewhat cursory. Visual inspection was, therefore, somewhat erratic.

Object task:

(a) Identification strategies.

Eleven errors were made. It appeared that some attempt was made to follow a matching strategy during the first half of the series, but largely constrained by central bias. In the second half, however, a combination of position and lateral preference, together with position perseveration, seemed to predominate.

(b) Patterns of visual inspection.

Early in the series, careful scanning and inter-alternative comparison were observed, but later both forms of inspection were somewhat cursory.

Shape (3D) task:

(a) Identification strategies.

Five errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were noted.

Configuration (analysis) task:

(a) Identification strategies.

Thirteen errors were made and one item refused when, after careful study, the S could not make a choice. During the first half of the series, it appeared that a definite attempt at matching was made, (as indicated by good task orientation and cautious choices), but constrained to some extent by position preference. Later, in the series, choices appeared to be made more impulsively and governed largely by a combination of central bias, lateral preference and position perseveration.

(b) Patterns of visual inspection.

Although, initially, careful scanning and inter-alternative comparison were observed, later there appeared to be less careful inspection.

Size (2D) task:

(a) Identification strategies.

Eleven errors were made, nine of which involved choice of the alternative most similar to the match. No consistent positional strategies were evident and a matching strategy was, therefore, probably employed.

(b) Pattern of visual inspection.

Scanning the full range of alternatives was evident throughout the series, but only brief inter-alternative comparison.

N/MA:

Shape (2D) task:

(a) Identification strategies.

Five errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Scanning the range of alternatives and inter-alternative comparison were observed.

Configuration (synthesis) task:

(a) Identification strategies.

Twelve errors were made. It appeared that some attempt was made to follow a matching strategy, as indicated by the S's outlining of standard figures in imitation of the E's demonstration in training. But, during the first half of the series, such matching was constrained by position preference, while, in the second half, strategies of central bias, position and lateral preference were influential.

(b) Patterns of visual inspection.

Rather cursory scanning and only brief inter-alternative comparison were noted.

Size (3D) task:

(a) Identification strategies.

Six errors were made, all involving choice of the alternative most similar to the standard. A matching strategy appeared to have been employed, constrained to some extent by central bias.

(b) Patterns of visual inspection.

Rather cursory scanning and only brief inter-alternative comparison were noted.

Colour task:

(a) Identification strategies.

Fifteen errors were made, ten of them involving choice of the alternative most similar to the match. A large proportion of choices were, however, consistent with central preference (including perseveration in the central position), which thus appeared the pre-dominant strategy.

(b) Patterns of visual inspection.

There was minimal scanning and virtually no inter-alternative comparison.

Object task:

(a) Identification strategies.

Ten errors were made. Some attempt at matching appeared to have been made. During the first half of the series, however, central bias and position preference were influential, while, later, central bias and central preference were predominant.

(b) Patterns of visual inspection.

Rather cursory scanning and only brief inter-alternative scanning were observed.

Shape (3D) task:

(a) Identification strategies.

Seven errors were made. It appeared that some attempt at matching was made, constrained, in the first half of the series, by position preference.

(b) Patterns of visual inspection.

Scanning the full range of alternatives was evident, but inter-alternative comparison was rather brief.

Configuration (analysis) task:

(a) Identification strategies.

Thirteen errors were made. In the first half of the series, central bias, position preference and central preference appeared predominant, while, later, position preference and lateral preference seemed most compatible with the pattern of choice.

(b) Patterns of visual inspection.

Minimal scanning was observed.

Size (2D) task:

(a) Identification strategies.

Eleven errors were made, eight involving choice of the alternative most similar to the match. During the first half of the series, at least, it appeared that matching was attempted, although constrained to some extent by central bias. Later, central bias, position and lateral preference all seemed possible determinants of choice.

(b) Patterns of visual inspection.

Rather cursory scanning and brief inter-alternative comparison were evident initially, decreasing further later in the series.

S/OLD:

Shape (2D) task:

(a) Identification strategies.

Only one error was made; a matching strategy was thus assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident.

Configuration (synthesis) task:

(a) Identification strategies.

Only two errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were noted.

Size (3D) task:

(a) Identification strategies.

Five errors were made, all involving

choice of the alternative most similar to the match. A matching strategy therefore appeared to have been employed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were clearly evident.

Colour task:

(a) Identification strategies.

Eight errors were made, six of which involved choice of the alternative most similar to the match. No consistent positional strategy was evident and a matching strategy seemed, therefore, to have been used.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were observed.

Object task:

(a) Identification strategies.

Only two errors were made; a matching strategy was, therefore, assumed.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative comparison were evident.

Shape (3D) task:

(a) Identification strategies.

Only one error was made; a matching strategy was thus assumed.

(b) Patterns of visual inspection.

Scanning and inter-alternative comparison were clearly evident.

Configuration (analysis) task:

(a) Identification strategies.

Ten errors were made. During the first half of the series, a matching strategy was followed, but, later, despite obvious attempts at matching (for example, extreme caution in making a choice), choices seemed to be constrained to some extent by central preference.

(b) Patterns of visual inspection.

Careful scanning and inter-alternative

comparison were noted.

Size (2D) task:

(a) Identification strategies.

Nine errors were made, all involving choice of the alternative most similar to the match. No consistent positional strategies were evident and a matching strategy thus appeared to have been employed.

(b) Patterns of visual inspection.

Although scanning appeared to occur, inter-alternative comparison was rather brief.

Summary of evidence regarding perceptual factors:

"Autistic" S : R.

(a) Identification strategies.

As indicated in Table 33, the most frequently used strategy was discriminative matching in relation to five alternatives. Positional strategies were, however, not absent from R's performance, being present usually as constraints on matching, but occasionally as the predominant influence.

Amongst simple positional strategies, central bias occurred most frequently, position and lateral preference also being present moderately often. Position perseveration was noted occasionally.

Table 33: Summary of identification strategies and patterns of visual inspection employed by R.

Task	Sh. (2D)	Syn.	Size (3D)	Col.	Obj.	Sh. (3D)	An-al.	Size (2D)
No. of alts.		5 alts. in all tasks						
Errors	7	8	7	8	12	8	9	9
Strategies								
Simple pos.								
persev.	O				O			
prefer.	O		O	O	OX		X	O
later.		O		O	OX	O		O
centr.pref.								
centr.bias	OO	OO	O		X	O	X	OO
Alternation								
Discrim.								
matching	XX	XX	XX	XX	XO	XX	X	XX
oddity								
Random								
Patterns of vis. inspec.								
only one or std.					XX			
scans range	OO	XX	XX	XX				

Amongst simple positional strategies, central bias occurred most frequently, position and lateral preference also being present moderately often. Position perseveration was noted occasionally.

Position alternation did not appear to have been used, the occurrence of alternation in patterns of choice being always more consistent with a matching strategy. Similarly, oddity responding did not seem feasible in relation to the pattern of choices on any of the tasks, since a high proportion of choices consistent with oddity responding always occurred in association with high proportions of the more common, simple positional strategies and on more difficult tasks, where a reversion to simpler positional strategies might be expected. Nor did random responding seem likely on any of the tasks.

Matching strategy was employed on all tasks, but not consistently throughout the series of items on the Object and, especially, Configuration (analysis) tasks. In the latter half of these tasks, simple positional strategies appeared to predominate, related more, however, to the increasing difficulty of the tasks, than to increasing distractibility on the part of the S. On the remaining tasks, however, as mentioned above, simple positional strategies acted as constraints on matching, apparently by partially determining the area of the display where the matching choice would be made, particularly when increasing task difficulty made the match less obvious. Use of matching and simple positional strategies in this manner resulted in about eight errors per task, with the exception of the Object task, where twelve errors were made.

It thus appeared that R could discriminate amongst alternatives of a fairly wide range of perceptual tasks. Such discriminative ability interacted with intra-task difficulty and inter-task complexity in determining the extent of reliance on or reversion to simpler positional strategies and the relative number of errors per task.

(b) Patterns of visual inspection.

As indicated in Table 33, scanning the range of alternatives was present to some extent on most tasks, but was somewhat cursory on the Shape (2D) and Shape (3D) tasks, as well as in the latter half of the Configuration (analysis) task. Inter-alternative comparison was observed on most tasks, but in most cases was rather brief. Minimal scanning appeared to occur on only one task - Object - and even here, it was possible that scanning the range of alternatives and inter-alternative comparison occurred to some extent.

Patterns of visual inspection did not appear to be consistently related to the complexity of tasks as were identification strategies. Nor was a change in pattern of inspection over time characteristic.

(c) Identification strategies and patterns of visual inspection.

The relative frequency of associations between strategies and patterns of visual inspection recorded for the first and second halves of each session over all tasks has been summarized in Table 34. Matching versus simple positional strategies were considered in relation to scanning the range of alternatives versus minimal scanning (doubtful scanning of the range being treated as minimal). (Inter-alternative comparison was disregarded, as its absence might have reflected inadequate observation.)

Table 34: The relative frequency of associations between identification strategies and patterns of visual inspection over all tasks for R.

Patterns of visual inspection	Identification strategies simple positional	matching
minimal scanning	2	5
scanning all alts.	0	9

From the above table, it appeared that a matching strategy was more likely to occur in association with scanning the range of alternatives than were positional strategies. The reverse did not, however, apply as regards minimal scanning.

Comparison between R and control Ss.

(a) Identification strategies.

As indicated in Table 35, like R, the strategy most frequently used by most control Ss was discriminative matching in relation to five alternatives. One S, N/MA, appeared, however, to rely on discriminative matching as the predominant determinant of choice relatively less frequently than R or the other control Ss.

As regards positional strategies, in the case of R and N/CA, such strategies were usually present as constraints on matching and relatively rarely as the predominant influence on choice. For N/MA, however, simple positional strategies were frequently the most important determinant of choice, while S/CA fell between N/MA and R and N/CA in the frequency with which simple positional strategies determined choice. S/OLD made relatively little use of positional strategies.

The kinds of simple positional strategies used by Ss varied. Like R, control Ss showed a susceptibility to strategies related to the central position or positions, although N/CA relied on such strategies to a slight extent only. Position

...ntification strategies and patterns of visual inspection employed by control Ss of R.

Subject	N/CA								S/CA							
Task	Sh. (2D)	Syn.	Size (3D)	Col.	Obj.	Sh. (3D)	An-al.	Size (2D)	Sh. (2D)	Syn.	Size (3D)	Col.	Obj.	Sh. (3D)	An-al	Size (2D)
No. of alts.		5 alts. on all tasks								5 alts. on all tasks						
Errors	3	7	6	8	5	4	11	7	4	13	6	9	11	5	13	11
Strategies																
Simple pos.																
persev.							X			X			X		X	
prefer.		0					X			X			X		0	
later.													X		X	
centr. pref.										X						
centr. bias		0			0		X			XX	00		0		X	
Alternation																
Discrim. matching oddity	XX	XX	XX	XX	XX	XX	X0	XX	XX	00	XX	XX	X	XX	X	XX
Random																
Patterns of vis. inspec.																
only one or std.																
scans range	XX	00	XX	00	XX	XX	XX	XX	XX	00	XX	00	X0	XX	X0	XX
inter-alt.	XX	00	X0	00	XX	XX	XX	XX	XX	00	XX	00	X0	XX	X0	00

Subject	N/MA								S/OLD							
Task	Sh. (2D)	Syn.	Size (3D)	Col.	Obj.	Sh. (3D)	An-al.	Size (2D)	Sh. (2D)	Syn.	Size (3D)	Col.	Obj.	Sh. (3D)	An-al.	Size (2D)
No. of alts.		5 alts. on all tasks								5 alts. on all tasks						
Errors	5	12	6	15	10	7	13	11	1	2	5	8	2	1	10	9
Strategies																
Simple pos.																
persev.				00												
prefer.		XX			X	O	XX	X								
later.		X					X	X								
centr. pref.				XX	X		X								0	
centr. bias		X	00		XX		X	0X								
Alternation																
Discrim. matching oddity	XX	00	XX		00	XX		X	XX	XX	XX	XX	XX	XX	XX	XX
Random																
Patterns of vis. inspec.																
only one or std.				XX			XX	X								
scans range	XX	00	00		00	XX		O	XX	XX	XX	XX	XX	XX	XX	XX
inter-alt.	XX	00	00		00	00		O	XX	XX	XX	XX	XX	XX	XX	00

Key: X - probable strategy/pattern; 0 - possible (additional) strategy/pattern; note, for each task, first and second halves of session have been reported, indicated respectively by symbols on left and right of column.

and lateral preference were used by *S/CA* and *N/MA*, in this respect similar to *R*, although somewhat more reliant on such strategies. Position perseveration was also present to a slight extent in the performances of *N/CA*, *S/CA* and *N/MA*, again not unlike *R*. The occurrence of positional strategies did not appear systematically related to time, in the sense of usually occurring early or later in a series of items.

Position alternation did not appear to be employed as a strategy by either *R* or control *Ss*. Nor were oddity responding or random choices characteristic of any *Ss*.

To the extent that, despite differences in strategies employed, performances could be used as a basis of comparison, a somewhat similar ranking of tasks in terms of errors was evident across *Ss*. Thus, for *R* and control *Ss*, Shape (2D) and Shape (3D) were the easiest tasks, while Configuration (analysis) was one of the most difficult. In the moderate range of difficulty, less agreement was shown, but most *Ss* found Size (3D) more easy than difficult and Configuration (synthesis) and Size (2D) more difficult than easy. The colour task was found moderately easy by *R* and *S/CA*, but rather difficult by *S/OLD*, *N/CA* and *N/MA*. The Object task was moderately difficult for control *Ss*, but proved the most difficult task for *R*. The latter task was, nevertheless, not more difficult in terms of absolute number of errors for *R* than for *S/CA* and *N/MA*.

In summary, there did appear to be considerable similarities between R and control Ss, both in the kinds of strategies used and in the ranking of the tasks in terms of difficulty. Most like R in the latter regard were S/CA and N/MA, while in terms of strategies used, R was most like S/CA. All Ss appeared to encounter relatively great difficulty on the Configuration (analysis) task, but in contrast to control Ss, R appeared to find the Object task relatvely more difficult than other tasks.

(b) Patterns of visual inspection.

As indicated in Table 35, with the exception of N/MA, none of the control Ss showed minimal scanning - that is, fixation of the standard or one alternative. R showed minimal scanning on only one task (Object), where it was nevertheless possible that scanning the range of alternatives and inter-alternative comparison did occur to some extent.

In R, inter-alternative comparison was less clearly evident than was the case with control Ss, except N/MA. As regards scanning the range of alternatives R and S/CA showed a similar pattern of somewhat less clear scanning than N/CA and S/OLD, but somewhat more evident scanning than N/MA.

Scanning did not apparently decline over time in any of the Ss. Nor were particular tasks apparently characterized in different Ss by similar patterns of visual inspection.

(c) Identification strategies and patterns of visual inspection.

Matching versus simple positional strategies in relation to minimal scanning versus scanning the range of alternatives (doubtful scanning being treated as minimal) for each control S in the first and second halves of the tasks has been summarized in Table 36. From the table it may be seen that a matching strategy was more likely to be associated with scanning the full range of alternatives than were simple positional strategies, a relationship similar to that in the case of R. In the case of N/MA, however, this relationship was rather tenuous, a relationship between minimal scanning and positional strategies being slightly more evident.

Table 36: The relative frequency of associations between identification strategies and patterns of visual inspection over all tasks for each control S of R.

Identification strategies	Subjects N/CA P	N/CA M	S/CA P	S/CA M	N/MA P	N/MA M	S/OLD P	S/OLD M
Patterns of visual inspection								
minimal scanning	0	4	4	2	9	3	0	0
scanning all alts.	1	11	0	10	0	4	0	16

C. Comparative summary of findings.

(1) Rapport.

Rapport was defined earlier (p.178) as a harmonious relationship between the E and the S, such that the S is amenable to carrying out certain demands of the E. It was considered necessary to attempt an assessment of rapport in order to provide an indication of the likelihood of disturbance in rapport having affected performance on perceptual tasks.

Amongst the variables relevant to rapport which seemed to differentiate amongst Ss was, firstly, the extent of difference amongst Ss in characteristics associated with rapport when contact with the E was first made. None of the Ss - "autistic" or control - objected to being left with the E and all soon showed recognition of the E. As regards language, all "autistic" Ss were relatively more handicapped than control Ss, but there were also considerable differences amongst "autistic" Ss. Thus, A showed little or no comprehension of speech, did not respond to his name, used no comprehensible words and only babbled; W showed some comprehension of speech, did respond to her name, used a few words spontaneously to make requests, but echolalia was prominent; and R showed fair comprehension of speech, did respond to his name, used a fair number of words and phrases spontaneously, (although pronounced indistinctly), and echolalia was not characteristic. Although none of the control Ss was linguistically handicapped, differences in the use of language were evident in some cases. Both A(S/CA) and W(S/CA), for example, were extremely inhibited, during the first session, in particular, talking only in whispers, although both Ss were more relaxed in later sessions.

Poor eye-contact was observed in only one "autistic" S of the present sample, namely, A. Neither W, nor R, nor any of the control Ss regularly and persistently avoided eye-contact. Repetitive, stereotyped activities were noted in W and A, but not in R, nor in any of the control Ss. Major distress was also shown by W and A, but not by R or control Ss. Distractibility and lack of persistence were particularly characteristic of W and A; were present to some extent in R, particularly towards the end of a session and when activity was relatively unstructured; but were not noted in control Ss, with the exception of two younger normal controls, namely, R(N/MA) and A(N/MA). Finally, as regards reaction to the activities initially offered by the E, two "autistic" Ss, A and W, showed only fleeting interest in toys, which were handled in a rather random fashion. W did, however, also engage in some appropriate activity with toys, as, to a greater extent, did R. All three "autistic" Ss also showed fascination with part-objects. In contrast, most control Ss reacted with interest and task involvement to the activity first presented to them, the intelligence test, although some Ss were initially somewhat anxious, while R(N/MA) was rather boisterous and A(N/MA) resistant to complying with demands.

When attempts to establish rapport were initiated, therefore, there were considerable inter-S differences. It appeared possible to range Ss on a continuum with regard to amenability to rapport. Least amenable were the "autistic" Ss, A and W, and most amenable were the majority of control Ss. Intermediate were one "autistic" S, R, and two young normal control Ss, namely R(N/MA) and A(N/MA). The ordering amongst the latter three Ss depended on the degree of structure in the activity required of the S. Thus, when R was presented with more structured activities, he displayed greater task involvement and persistence than did the two control Ss, R(N/MA) and A(N/MA), who became distractible and lacked persistence under such conditions.

A second variable, which appeared likely to affect performance on perceptual tasks was the variable reaction to rewards amongst Ss. All "autistic" Ss were responsive to concrete rewards, such as sweets and body play, especially early in a session, but only

R in addition came to be motivated by an intrinsic desire to succeed on a task. The latter incentive was effective in extending frustration tolerance and persistence beyond the relatively brief period allowed by the rapid satiation rate of concrete rewards. Hence, it was possible to proceed with training in the case of R more efficiently and with fewer interruptions than was the case with A and W. Similarly, the existence of incentives other than concrete rewards in the case of most control Ss appeared to facilitate training. Most like the "autistic" Ss were two young normal control Ss - A(N/MA) and R(N/MA) - who were, nevertheless, sufficiently responsive to both concrete and secondary rewards to permit fairly rapid training, involving considerably less repetition than was the case with A and W.

Thirdly, the extent of fluctuation in rapport varied between Ss. Considerable fluctuation both within and between sessions was characteristic of A and W, apparently related to factors such as mood prior to a session with the E, the extent of frustration tolerance, physical state, events occurring outside the experimental situation and, in task sessions, the extent of repetition of items and consequent boredom. In the case of R, fluctuation in rapport was not notable within or between sessions, except, in pre-task sessions, as a slight reluctance, towards the end of a session, to continue to interact with the E. A similar pattern was noted in the case of R(N/MA) and A(N/MA), who, however, in contrast with R, showed fluctuation in rapport also during task sessions. The majority of control Ss, however, maintained an even level of rapport within and between sessions.

Finally, the occurrence of major distress continued throughout the study to differentiate A and W from R and from control Ss. In A and W, distress was frequently related to poor frustration tolerance, but also appeared to be provoked by factors outside the experimental situation, such as those mentioned above with regard to fluctuation in rapport. Apart from the immediate disruption of activity, the occurrence of major distress in A and, more particularly, W, by emphasizing the precariousness of rapport, contributed further negative effects to future attempts to maintain or extend rapport.

In conclusion, considerable inter-S differences in rapport were indeed noted. Most marked were differences between, on the one hand, "autistic" Ss and, on the other, all control Ss, as indicated most clearly by the extended number of sessions necessary with the former prior to the introduction of training materials. Striking differences amongst "autistic" Ss were, however, also evident, most notably between R, on the one hand, and on the other, A and W, making it difficult to talk in general terms regarding rapport with the "autistic" Ss. Differences amongst control Ss in rapport were also evident, but were generally less marked. It seemed clear that such differences in rapport as did exist contributed to the findings regarding the acquisition of discrimination set and perceptual factors. The precise nature of the effects is less clear. It has, however, appeared probable that, in the case of A and W, characteristics of rapport contributed a large proportion of the difficulties encountered in training discrimination set, if only because of the frequent interruptions of training; in performance on perceptual tasks, the effect of poor rapport was probably less, since any marked decline of rapport resulted in termination of assessment until rapport appeared re-established. For the majority of control Ss, however, characteristics of rapport did not appear to exert a major influence on the acquisition of discrimination set or perceptual factors. R and two young normal control Ss appeared to fall between A and W, on the one hand, and the remaining control Ss, on the other, (and nearer the latter than the former), as regards the effect of rapport on the acquisition of discrimination set and perceptual factors.

(2) Discrimination set.

The extent to which discrimination set was acquired by any S crucially affected performance on assessment items, in terms of which perceptual factors were assessed. Comparison amongst Ss regarding discrimination set was therefore essential to an understanding of perceptual factors.

The clearest indication of differences amongst Ss was the introduction of modifications in the original training procedure to overcome persistent difficulties in acquiring discrimination set. Such modifications were necessary in the case of W and A, who, after a number of sessions in which the original procedure was followed, required the introduction of masking to counteract the use of positional strategies. In contrast, neither R, nor any of the control Ss required such modifications.

As regards general features of task orientation, gaze orientation and instrumental responses, Ss differed not so much with respect to the elicitation of these features, as with regard to their continued emission throughout a session. Thus, in the case of W and A, during any session, there was much fluctuation with regard to the abovementioned features and, usually, a decline in their occurrence towards the end of a session. In the case of R, a slight decline in general features of task orientation and gaze orientation sometimes occurred towards the end of a session. Most control Ss, too, showed little, if any, change in the features in question over a session, although, in the case of R(N/MA), to some extent, and A(N/MA), to a greater extent, the features of discrimination set in question did decline over any session.

Systematic identification strategies rather than random choices were present early in training in all Ss, but Ss differed greatly in the ease and consistency with which matching rather than positional strategies were used. In the case of A and W, matching strategy was never consistently followed: matching occurred, if at all, early in a session, giving way later to simple positional strategies; matching was affected by the number and arrangement of alternatives. Less difficulty was encountered with R who, although initially confused by increases in the number of alternatives presented, was, after six training sessions, able to match amongst five alternatives at all levels of complexity on training items. As regards control Ss, all made consistent use of matching strategy within one session, although the young normal control Ss - A(N/MA), W(N/MA) and R(N/MA) - experienced slight difficulty and required more repetition of training items than did other control Ss.

Differences in transfer of discrimination set between tasks were quantitative rather than qualitative. All Ss experienced some difficulty in transferring to tasks in which the relationship between standard and match was altered - Configuration (synthesis), Configuration (analysis) and Object - but "autistic" Ss, particularly A and W, required considerable repetition of training items before discrimination set on the tasks in question appeared to be established. Similarly, on other tasks, whereas control Ss encountered little difficulty in transferring discrimination set, A and W and, to a considerably lesser extent, R required more training before it was possible to present assessment items.

In all Ss, the presentation of novel materials enhanced attention, but in the case of A and W, and, to some extent also in A(N/MA), the effect was less prolonged than in the case of R and other control Ss. Distractibility and lack of persistence, (affecting discrimination set through interrupting training) were marked in A and W, but were not notable in R, nor in the majority of control Ss, R(N/MA) and, to a greater extent, A(N/MA), being exceptions in this regard.

In summary, marked differences in the course and manner of acquisition of discrimination set were evident amongst Ss. Greatest difficulty was encountered in the case of A and W, consistency in the use of matching strategy not being firmly established. Most control Ss, on the other hand, acquired discrimination set without difficulty, while R and, to some extent, also A(N/MA) and R(N/MA) experienced relatively slight difficulty only.

(3) Perceptual factors.

(a) Identification strategies.

Analysis of patterns of choice was undertaken in order to investigate the existence of qualitative differences amongst Ss in certain aspects of perception. The most striking difference between Ss was in the relative frequency with which matching as opposed to simple positional strategies were employed.

Two "autistic" Ss, A and W, most frequently used simple positional strategies, the particular strategy favoured depending largely on what the arrangement of alternatives permitted. Lateral and position preference were used most frequently, the somewhat more primitive central strategies (central preference and central bias) and position perseveration also occurring, when permitted by the number and arrangement of alternatives. Matching strategy was, however, also used by both A and W on at least some items of most tasks. The presence or absence of matching strategy in these Ss appeared to be related in a complex fashion to task factors, such as number and arrangement of alternatives, item complexity and task complexity, as well as to non-task factors, such as the extent of rapport and task-orientation shown by the S (the latter factors being particularly important in the case of W). There was a tendency for matching to occur early in a session, giving way later to simple positional strategies as rapport and task orientation declined and distractibility increased.

In the case of R and all control Ss, the most frequently used strategy was matching in relation to five alternatives. Simple positional strategies were not, however, absent from the performance of most of these Ss, being present usually as constraints on matching and seldom as the predominant influence. In the case of W(S/OLD) and R(S/OLD) however, there was virtually no evidence of the use of positional strategies, while, in the case of A(N/MA) and R(N/MA), simple positional strategies were sometimes the predominant determinant of choice. The kinds of positional strategies used by R and control Ss varied, but central bias (permitted by the presentation of five alternatives) occurred fairly frequently, as did position preference.

Strategies of position alternation and oddity responding did not appear to have been used by any Ss with any consistency, perhaps because the presentation of more than two alternatives in most cases and the arrangement of alternatives where only two alternatives were presented, discouraged the use of such strategies. Random choices were noted rarely, being evident in the performance of A(N/MA) twice towards the end of sessions, apparently associated with increasing distractibility, and, in the case of A(S/OLD), once, associated with increasing item complexity.

The use of strategies other than matching made it difficult to compare Ss directly in terms of performance on different tasks. As an alternative, relative difficulty of tasks across Ss was considered in terms of errors (where a matching strategy was followed) or in terms of the relative certainty with which matching strategy was followed; general trends were of interest rather than absolute order of difficulty. It was unfortunately not possible to include W in this comparison, mainly because, as discussed earlier (p. 385) non-perceptual factors influenced performance to such an extent in her case that to assume her performance to be a measure of the limits of her perceptual skill was unwarranted. Similar reservations might be entertained in the case of A and, to a lesser extent, R and certain of the young normal control Ss, but non-perceptual factors seemed in their case less crucial determinants of performance.

It appeared that, for the majority of control Ss, Shape (2D) and Shape (3D) were amongst the least difficult of tasks, while the Configuration (analysis) task was almost invariably the most difficult. In the intermediate range of difficulty, less agreement across Ss was evident. In the case of the "autistic" Ss, A and R, a similar order was evident, the most striking difference from control Ss being that the Object task was relatively more difficult than the Configuration (analysis) task.

In summary, it appeared that differences in identification strategies were most marked between A and W, on the one hand, and R and control Ss, on the other hand. The distinction was, however, blurred by the similarity between R and A as compared with control Ss in experiencing difficulty on the Object task; the difference between A and W as regards the ease with which performance was disrupted by declining rapport and task orientation; and the similarity between the control Ss, A(N/MA) and R(N/MA), on the one hand and W and A as compared with R and other control Ss, on the other, with regard to the use of positional strategies as the predominant determinant of choice.

(b) Patterns of visual inspection.

Examination of patterns of visual inspection in "autistic" and control Ss was introduced, following initial observations in the present study which, together with previous findings, suggested that patterns of visual inspection in "autistic" children might hamper efficient perception. Despite the somewhat primitive method of observation used, certain suggestive differences amongst S s were observed.

In the case of A and W, great variability in patterns of visual inspection was evident from moment to moment, but general tendencies were nevertheless observable. In comparison with R and control Ss, scanning the range of alternatives and inter-alternative comparison were noted less frequently in A and W, apparently related to the greater distractibility shown by the latter Ss. In the case of A, however, there was a tendency for scanning the range of alternatives to occur early in a series, giving way later to minimal scanning, whereas, in W, patterns of visual inspection showed greater consistency over time. R and most control Ss showed rather similar patterns of visual inspection, except that inter-alternative comparison in R tended to be somewhat cursory, as it was also in R(S/CA) and to a greater extent R(N/MA) and A(N/MA).

In all Ss, inter-alternative comparison occurred always in conjunction with scanning the full range of alternatives, but scanning occurred at times without inter-alternative comparison. There did not appear to be a relationship between patterns of visual inspection and number and arrangement of alternatives or with particular tasks.

(c) Identification strategies and patterns of visual inspection.

Matching versus simple positional strategies in relation to minimal scanning versus scanning the range of alternatives across Ss was investigated. Three patterns of relationship were evident. Firstly, in the case of A and W, minimal scanning tended to be associated with positional strategies rather than matching. Secondly, in the case of R and most control Ss, scanning the range of alternatives tended to be associated with the use of matching strategy. Thirdly, in the case of A(N/MA) and R(N/MA), a relationship exhibiting elements common to both the above-mentioned relations, was suggested. Thus, there appeared to be a relationship between matching and scanning, similar to, but less marked than that shown by R and other control Ss. There also seemed to be a relationship between position strategies and minimal scanning, which was in the direction of the similar relationship shown by A and W.

Chapter XII

Discussion and Summary.

A. Discussion.

(1) Critique of the study.

In view of the somewhat unorthodox approach adopted in this study, it seemed necessary, before proceeding with discussion of findings, to attempt a critique of its effectiveness in dealing with certain methodological problems.

Firstly, how satsifactory was the general framework of variables in providing a comprehensive account of qualitative differences amongst Ss? As mentioned earlier (p. 177), the variables studied - rapport, discrimination set and perceptual factors - were not independent. The extent of overlap did not, however, appear disadvantageous, since it appeared to highlight interactions amongst various processes and their relative importance in different Ss. Indeed, it seemed clear that study of non-perceptual factors provided information crucial to an understanding of more purely perceptual processes in certain of the Ss. As regards perceptual factors, it seemed that the qualitative information provided by analysis of identification strategies and patterns of visual inspection provided a clearer picture of performance, than would have been the case had simple error scores been used.

Amongst the disadvantages of the variables studied was the necessity for relying on E - observation (particularly in the absence of a reliability check on such observation), rather than less fallible means of obtaining information. Particularly since the E was a contributing factor in at least one of the variables studied, namely rapport, it was possible that some degree of bias entered into either the conditions under which Ss were observed, or the events recorded.

Another disadvantage was the inevitable selection and interpretation in translating the complex interactions involved at every stage of the procedure into a verbal description relevant to the variables in question. Even in the case of perceptual factors, description of identification strategies, although derived from patterns of actual choices, was nevertheless dependent on interpretation of relative plausibility of various possible strategies.

The disadvantages mentioned, however, although reflecting on the reliability of the findings, did not seem to negate the value of the framework of variables adopted, in pointing up important qualitative differences amongst Ss. Further study would, however, be necessary to verify the particular findings obtained.

A second problem to be considered was the effectiveness of the single case approach in dealing with difficulties arising from S heterogeneity and deficiencies in the training procedure. It did seem that a number of the advantages of the single case approach, outlined earlier (p. 176), were relevant in the present study, notably greater precision in specifying relevant parameters in each of the Ss (particularly, the "autistic" Ss), a clearer indication of relationships amongst variables in individual Ss and greater assurance regarding the validity of combining data from different Ss.

Thirdly, it was necessary to consider the effectiveness of the stimulus materials used and their manner of presentation in providing information regarding perception in the "autistic" and control Ss of this study. It was unfortunately the case that, despite the introduction of modifications in the training procedure and presentation of assessment items, it was difficult to make absolute statements regarding perceptual skill in particular areas as was originally intended. This difficulty arose partly because of S differences in the use of various identification strategies, which prevented direct comparison in terms of errors per task. But, in addition, the somewhat rigid format of the original materials, although open to some modification, was perhaps not entirely suitable for testing the limits of perceptual skill in Ss as disturbed as some were in the present study. It was, however, possible in some cases, to make comparisons in relative terms, using either errors or certainty in the use of matching strategy as a basis for comparison of perceptual skill in various areas.

Finally, the reliability of the findings might be called in question. The extent of variability within each "autistic" S might raise doubts as to the replicability of the findings obtained, but against this query, it needs to be recalled that each "autistic" S was intensively studied, some of them over a period of almost a year, permitting considerable cross-checking of findings. The variety of stimulus materials also permitted study of perceptual factors in different contexts, allowing greater assurance regarding the reliability of findings.

One of the Ss, however, although studied over a period of about a year was not presented with all the tasks, because of her death following an accident; the inclusion of incomplete findings in her case might be queried. It nevertheless appeared worthwhile to include the evidence available, in the first place because of indications of important idiosyncratic differences from other "autistic" Ss; and secondly, because the degree of consistency within the available findings suggested that striking differences under further testing would have been unlikely.

Also relevant to reliability was the extent of inter-S difference in the variables studied within the "autistic" sample. Such differences, it might be argued, might reflect on the selection of Ss and on the differences between Ss existing at the outset of the study, as outlined in some detail earlier (p.441-3). With regard to the first objection, it should be recalled that selection of Ss was based, as in other studies, on careful psychiatric diagnosis, using generally accepted criteria, every attempt having been made to exclude dubious cases - hence, the small number of cases. The existence of a considerable degree of heterogeneity in the final sample thus appeared to reflect more upon the unity of the syndrome, than upon selection procedures. Secondly, as regards inter-S differences in non-perceptual variables at the outset of the study, differences in age, extent of linguistic handicap and intellectual level might have been partially accountable. There was, however, certainly no clear relationship between differences in age and the differences in perceptual factors; nor did it seem likely that significant intellectual differences in line with perceptual differences existed amongst Ss.

The extent of difference amongst "autistic" Ss in the variables studied nevertheless rendered generalization within the sample difficult, let alone to a supposed "autistic" population. This apparent disadvantage did, however, in some respects appear advantageous in the questions raised regarding other samples referred to in the literature. That is, the apparently greater homogeneity of such samples might require that generalization be limited to closely similar populations, rather than being extended to ECA in general, as has tended to be the case. With respect to findings regarding "autistic" Ss of the present study, it was clear that any generalization must take careful account of the characteristics of individual Ss, generalization to an undefined population of "autistic" children being unwarranted.

As regards control Ss, it might be argued that selection of other control Ss might have resulted in different findings. Consistency of findings across control Ss within each category of control Ss did, however, appear to provide some assurance of reliability in this regard.

Another important proviso with regard to reliability referred to findings regarding perceptual factors. As mentioned above (p. 457), such findings were not unambiguous. Despite the apparently greater precision provided by the figures representing proportions of choices, analysis of identification strategies was not a mechanical procedure, but one which relied to a large extent on the E's interpretation and judgement. The presentation of detailed tables and charts, together with an outline of the analysis for each S and each task was necessary to permit evaluation by the reader of the reliability of such analyses. As regards patterns of visual inspection, as discussed earlier (p. 204), a more accurate means of recording eye-movements would have been desirable. The reliability of the means available, namely, observation by the E, was undoubtedly lower, particularly as regards inter-alternative comparison. Consistency of patterns of inspection with Ss did, however, appear to offer a partial check on reliability.

The above, by no means exhaustive critique has indicated a number of areas of doubt regarding findings of the study, particularly with regard to generalizability and reliability. Nevertheless, the findings have appeared important, firstly, in terms of questions raised regarding the value of studying in isolation variables which in fact appear to interact in complex ways. Secondly, the findings have indicated important qualitative differences amongst Ss of a group frequently discussed in a manner implying the assumption of homogeneity.

(2) The nature of perceptual disturbance indicated by the study.

The clearest finding of the study was that there were differences with respect to the variables investigated not only between "autistic" and control Ss, but also amongst "autistic" Ss. While it appeared that non-perceptual factors had contributed to such differences, it nevertheless seemed that, in some "autistic" Ss, there was evidence of perceptual disturbance. Even in the latter Ss, however, there nevertheless appeared to be some differences in the nature of interactions among variables resulting in disturbed perception. Perhaps of greater interest, however, was the fact that one "autistic" S differed relatively little from most control Ss and was, in some respects, more similar to control Ss of his own age than were younger normal control Ss.

Leaving aside, for the moment, the contribution of non-perceptual factors, at what level of perception was disturbance evident? The perceptual factors investigated appeared to represent different levels of organization in the perceptual process. As mentioned elsewhere (p.202), patterns of visual inspection have appeared relevant to the selective aspect of perception, involving differences in the degree to which stimuli are sampled from the environment. Identification strategies, on the other hand, have appeared to involve predictions related to some pattern of stimulation - whether primitive positional cues or more complex forms of stimulation - subject to feedback concerning the appropriateness of the prediction and hence open to modification of future predictions. A relationship between the two variables might be posited. Thus, patterns of visual inspection, in the sense of extensive or restricted sampling from the environment, have appeared to be an influential determinant of identification strategy, through the possibility of their excluding aspects of stimulation relevant to the final prediction. Other, central aspects of perceptual processing have, however, seemed likely to modify the form of the final identification strategy, such that, even where sampling has been extensive, the identification strategy followed might not be optimal.

In the present study, most control _Ss_, as well as the "autistic" _S_ most like them, _R_, generally exhibited fairly extensive sampling of stimulation, in the sense of scanning the full range of alternatives and inter-alternative comparison. These _Ss_ also tended to employ a matching strategy most of the time, although simple positional strategies were occasionally present, usually as constraints on matching. In these _Ss_, therefore, it appeared that an aspect of perceptual selection, namely, patterns of visual inspection, was generally adequate in providing a basis for prediction, but that, at times, central factors operated to encourage a less than optimal strategy as regards processing all available information.

The relationship in the _Ss_ described above seemed, moreover, to be CA-linked, since increasingly adequate patterns of visual inspection and identification strategies appeared to be employed with increasing age. Older sub-normal _Ss_ used matching almost exclusively, while, in young normal controls, positional strategies were sometimes predominant rather than merely constraining influences. Young normal controls also tended to show less adequate patterns of visual inspection than did Ss chronologically older than themselves. There were, however, exceptions: one of the young normal control Ss, W(N/MA), tended to show more mature perceptual features than did others in her category, while one of the older subnormal Ss, A(S/OLD), tended to show less mature perceptual features than other Ss in his category. These exceptions appeared explicable in terms of non-perceptual factors, namely, in the case of W(N/MA) greater rapport and task orientation than was the case with other Ss in her category, and in the case of A(S/OLD), less rapport and task orientation than was the case with other Ss in his category.

In comparison with the Ss described above, the two "autistic" Ss, A and W, tended to display restricted patterns of visual inspection, together with less than optimal identification strategies most of the time. In these Ss, therefore, it seemed that patterns of visual inspection were generally inadequate in providing an optimal basis for subsequent perceptual prediction, by tending to exclude from the perceptual process aspects of stimulation relevant to identification. Such restriction of selection did, however, not invariably occur and, where more extensive scanning occurred, the form of identification strategy appeared to be determined by the complexity of stimulation requiring processing. Thus, the greater the number and complexity of alternatives, the more complex the arrangement of alternatives and of the form of stimulation presented, the less likely that a matching strategy would be employed. Non-perceptual factors - the degree of rapport, task-orientation and distractibility - also appeared to affect the extent to which stimulation was optimally processed.

It was in terms of the latter factors that there appeared to be a link between the two "autistic" Ss in question and the other Ss, since complexity of stimulation and certain non-perceptual factors seemed to affect two young normal control Ss in a similar manner, although not to as great an extent. Moreover, as regards the realtionship between patterns of visual inspection and identification strategies, the young normal Ss shared characteristics with both the two "autistic" Ss and other Ss. In addition to the above, rather specific overlap between certain "autistic" Ss and some control Ss, certain perceptual features were common to all Ss. Firstly, in all Ss, there was evidence of order or system in identification strategies and patterns of visual inspection, random behaviour not being characteristic. Secondly, a rather similar ranking of perceptual tasks in terms of relative difficulty was noted (an exception in the case of "autistic" Ss being the Object task).

The existence of elements common to all the Ss made it appear unlikely that the perceptual disturbance in the two "autistic" Ss, A and W, could be considered deviant rather than developmental - that is, qualitatively rather than quantitatively different. Rather it appeared that a perceptual lag in the two "autistic" Ss was complicated by the interacting effects of relatively poor rapport and task orientation, relatively great difficulty in the acquisition of discrimination set and distractibility, the latter factors also, however, bearing a strongly developmental aspect.

The finding of developmental immaturity in certain aspects of visual inspection confirmed in general terms similar findings by O'Connor and Hermelin (1967) regarding the failure of "autistic" children to switch gaze between stimuli. The major difference between the present findings and those of O'Connor and Hermelin (ibid) was the close similarity of the two "autistic" Ss of the present study, A and W, to younger normal controls than to subnormal controls of the same CA. The difference might be explicable in terms of the slight difference in aspects of visual inspection studied in the two studies or might be attributable to S differences.

A further difference was the apparently greater contribution of non-perceptual factors to the findings of the present study.

As regards identification strategies, findings of the present study complemented earlier findings (cf. p.59) which suggested that variability in certain aspects of sensory behaviour of "autistic" children was explicable in terms of the complexity of stimulation, referring not only to an artificially circumscribed stimulus, but also to the context in which it occurred. Thus, it appeared that relatively simple stimulation (cf. p. 466), presented under conditions which maximized its impact - for example, when novel or when distractibility was minimal - could be adequately processed, leading to appropriate identification. In contrast, more complex stimulation, particularly when presented under conditions unlikely to enhance its distinctiveness, led to inappropriate and more primitive identification. The particular contribution of the present study in regard to clarifying conditions favouring various identification strategies was in emphasizing the role of quantity of stimulation (operationalized as number of alternatives), spatial arrangement of stimulation and of non-perceptual factors in increasing complexity of stimulation.

The closer similarity of one of the "autistic" _Ss_ of the present study, _R_, to control _Ss_ of the same CA than to younger normal control _Ss_ or to other "autistic" Ss, has a parallel in the work of Hermelin and O'Connor (1970), who, however, attributed differences within their "autistic" sample to differences in intellectual level. In the present study, while it appeared that intellectual differences might have contributed to some extent to the differences within the "autistic" sample, differences in the extent of rapport, acquisition of discrimination set, task orientation and distractibility were also very important.

With respect to the influence of non-perceptual factors on identification strategies, the findings of the present study were in accord with the suggestion of Reese (1963), that distractibility is associated with the use of positional strategies. Deficiencies in verbal mediation (Fellows, 1968; Reese, 1963) might also have been implicated, younger control Ss and "autistic" Ss with relatively poorly developed language using more primitive strategies than did older control Ss and one "autistic" S with relatively more developed language. (cf. Table 2, p.208). Mediation difficulties might also account for the one respect in which R resembled other "autistic" Ss more closely than control Ss, namely, in experiencing relatively great difficulty in relation to the Object task. Thus, it appeared possible that although his language was sufficiently developed to permit mediation of general aspects of task behaviour in a manner similar to control Ss, R was handicapped by his smaller vocabulary, as regards aiding identification of specific objects. The other two "autistic" Ss, who were considerably more linguistically handicapped than R, were, however, probably unable to derive assistance from verbal mediation even in respect to more general aspects of the task. Differences in rapport also, however, appeared to be important interacting determinants of differences in strategies used.

As regards patterns of visual inspection, consistency in patterns of eye-movements in "autistic" and control Ss was observed, similar to that in other samples (McKinnon and Singer, 1969). However, contrary to other findings (McKinnon and Singer, ibid), a relationship did appear to exist between patterns of visual inspection and an independent measure of perception, namely identification strategies. The different findings possibly arose because, as suggested earlier (p. 203), patterns of visual inspection in children are more evident than in the case of adults, whose eye-movements are perhaps more economically deployed and may be implicit.

Finally, it should be noted that the discussion above has indicated that although perceptual disturbance in certain "autistic" Ss was severe, their perception was nevertheless capable of relation to more normal processes.

Such a relation appeared to require noting, in view of a tendency in the literature to discuss "autistic" children as if they constituted a group entirely distinct from both normal and other handicapped children.

(3) Implications for extra-experimental perceptual behaviour.

It might be asked how the findings regarding perceptual disturbance in certain "autistic" Ss, as discussed above, relate to perceptual behaviour outside the somewhat artificial experimental situation and in relation to less artificially circumscribed stimulation. Certain inferences could indeed be made, the behaviour of the "autistic" Ss outside the experimental situation providing illustrative examples.

With regard to patterns of visual inspection, it appeared likely that the minimal scanning characteristic of the two perceptually handicapped "autistic" Ss would frequently result in the exclusion of characteristics of stimulation relevant to identification, the S focussing entirely on aspects of stimulation requiring only a primitive, relatively undifferentiated identifying response. Thus, for example, at a park, A appeared to gaze blankly ahead of him without apparently adjusting his gaze to particular aspects of stimulation.

Instead, he appeared to focus his gaze on the relatively clearly demarcated paths and boundary fences, walking or running rapidly along them, occasionally tapping on the fence with his hand. In W, under similar circumstances, there appeared to be much fluctuation in patterns of visual inspection, attention to and inspection of a variety of environmental characteristics alternating with undirected gazing and close attention to minutiae of the environment or to her own hand-flapping movements. In both A and W, such patterns of visual inspection appeared to result in the exclusion of aspects of stimulation relevant to perceptual identification of objects in the environment.

In other circumstances, however, selection was less restricted. Particularly in familiar surroundings, somewhat more extended visual inspection was evident for periods of time, although deterioration in mood frequently disrupted scanning and led to reappearance of undirected gazing or focussing on a single, relatively circumscribed aspect of stimulation, such as hand-flapping in the case of W, or stone-dropping in the case of A.

Where more extensive scanning did occur, identification tended to occur on a relatively primitive basis. Thus, a single, relatively simple aspect of stimulation, or an affective-personal connotation of the stimulation appeared to serve as a basis for identification. For example, A would appear oblivious to the impact of many aspects of environmental stimulation, but would consistently respond to string, cords, strands of a bead-curtain or a piece of flex as a "thing to be twirled". W appeared at times to ignore environmental changes completely, but would consistently approach hair or silky material as a "thing to be stroked and touched". The affective-personal basis of identification was evident, in the case of A, in his recognition of the author's parked car, indicated by his moving towards this car in preference to different coloured models of the same car, which were closer to him; and, in a supermarket, in contrast to his unfocussed gaze and repetitive tapping in relation to most objects on the shelves, his sudden, purposeful reaching for a bottle of a particular brand of cooldrink which he favoured.

It appeared, however, that less primitive identification strategies could be developed, as was apparent in changes induced by extensive repetition of aspects of stimulation in teaching. Thus, aspects of stimulation other than that related to affective-personal connotations, or involving a number of aspects of stimulation came to be used as a basis of identification. For example, blocks were arranged in order of size and not merely dropped through the fingers. More sophisticated identification strategies were, however, easily disrupted by deteriorating mood and by distractibility, as was evident also in the experimental situation.

(4) Implications for perceptual and cognitive hypotheses of ECA.

Reference has been made elsewhere (Chapter V) to hypotheses that the basic dysfunction in ECA is a disturbance in the ability to integrate and to provide organization and meaning to patterns of stimulation, some hypotheses stressing auditory imperception in particular. In such hypotheses, perceptual dysfunction has been regarded as primary, emotional and social disturbance being considered derivative.

The findings of the present study confirmed the existence of disturbance in certain aspects of visual perception in some "autistic" children. Selective, as well as central organizational aspects of the process were, however, implicated, but not all "autistic" *Ss* exhibited such disturbance. Moreover, interacting effects of non-perceptual factors seemed to be important in determining the extent of disturbance.

It did not, therefore, seem that any simple hypothesis positing disturbance in a single area of functioning could adequately account for the findings of this study. Only by considering the effect of changing conditions within the perceiver, as well as in the environment - for example, in terms of complexity - could allowance be made for fluctuations in the level of perceptual functioning. Such non-perceptual factors might, it is true, merely alter or exacerbate an existing disturbance in perception, but their importance as co-determinants of the final form of the disturbance could not be overlooked.

Finally, the relative lack of disturbance in the aspects of perception studied in one of the "autistic" Ss required consideration. It appeared that any hypothesis of a basic perceptual disturbance in ECA would need to be qualified by reference to qualitative differences in non-perceptual factors, such as language and distractibility, amongst "autistic" children. A similar position has been adopted by Hermelin and O'Connor (1970), who have, however, attributed differences amongst "autistic" children largely to cognitive factors. In the present study, the importance of cognitive factors in determining to some degree the extent of perceptual disturbance was acknowledged, but, in addition, it appeared that affective factors, operationalized as rapport, were also extremely important.

(5) Implications for approaches to understanding ECA.

The findings of the present study appeared to reflect on certain features of current approaches to understanding ECA. Firstly, the existence of striking differences in perceptual and non-perceptual characteristics amongst the "autistic" Ss of the study appeared to reinforce earlier criticisms (p. 10) regarding the value of regarding ECA as currently defined as a diagnostic and actiologic entity. A more useful approach in view of the current lack of consensus regarding diagnostic criteria would appear to demand careful specification of the characteristics of individual Ss and the study of relatively small homogeneous samples, in preference to larger groups of Ss in which opportunities for uncontrolled inter-S variations are greater.

Secondly, the importance of an interactional approach as regards cognitive and affective variables was highlighted. As discussed elsewhere (p. 19), mutually exclusive explanations of the syndrome have tended to be made, in terms of either cognitive or affective-social factors, ignoring the fact that there may be more than one determinant of a given abnormality. The findings of the present study appeared to emphasize the necessity of adopting a framework permitting the discovery of such interactions or, where psychological functions are studied in isolation from one another, the acknowledgement of the probable limitations of such an approach.

Finally, the existence in the present study of some relation as regards perceptual processes between "autistic" Ss whose perception was disturbed and control Ss emphasized the necessity of studying ECA within a framework permitting the discovery of similarities, rather than approaching the syndrome on the assumption of discontinuity with normal processes. A minimum requirement would appear to be the provision of control groups representing various developmental reference points, but reference to theoretical conceptions of normal processes would also appear necessary. Anthony's (1958) concern that the "autistic" child should not be regarded as a "psychological monstrosity" is perhaps less necessary after twelve years of increasingly sophisticated research into ECA. But, in the welter of findings clarifying differences between "autistic" and other children, there remains a danger that similarities and areas of overlap may be overlooked.

(6) Implications for teaching "autistic" children.

It has seemed fairly generally accepted in recent years that "autistic" children can benefit from specific remedial education, not unlike that employed with other handicapped children. Apart from teaching ordinary social behaviour, such as dressing and eating, the necessity of compensating for specific disabilities through a multi-sensory approach has been advocated (Elgar, 1966).

With regard to such education, the findings of the present study emphasized certain, by no means novel points. Firstly, establishing close rapport with the child, whatever other inducements are also employed, appeared extremely important. Secondly, distractibility should as far as possible be minimized. Thirdly, presentation of materials should take account of the effect of quantity and complexity of stimulation on ease of perception. A gradual increase in number and complexity of stimuli, in a manner highlighting important aspects of stimulation, seemed to be indicated. Finally, a great deal of repetition in teaching new skills appeared to be necessary, bearing in mind the need to balance repetition against the adverse effects of boredom.

B. Summary.

An attempt was made to investigate certain aspects of perception in "autistic" children, using experimental materials in a matching task, administered under standard conditions. Marked differences between _S_s in the "autistic" sample necessitated revision of the research design to permit qualitative rather than quantitative assessment. A single case study approach was, therefore, adopted, modifications in the assessment procedure being systematically introduced in order to test hypotheses regarding each _S_'s difficulties. A general framework of variables was devised, incorporating perceptual and non-perceptual variables, in terms of which comparisons were made between "autistic" _S_s and with control _S_s representing various points on a developmental continuum.

Marked differences were evident with regard to perceptual factors - patterns of visual inspection and identification strategies - between two "autistic" _S_s, on the one hand,

and on the other, one other "autistic" S and most control Ss. Similarities were, however, evident between the two "autistic" Ss showing perceptual disturbance and two young normal control Ss, suggesting a developmental rather than deviant interpretation of perceptual disturbance in the former. The extent of distractibility and rapport, differences in the acquisition of discrimination set and mediational deficiencies appeared to be important determinants of the observed differences between Ss.

The implications of the findings for extra-experimental perceptual behaviour in "autistic" children, for perceptual and cognitive hypotheses of ECA, for approaches to understanding ECA and for teaching "autistic" children were discussed.

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Appendix A.

Subjects of PSI and PSII.

Subjects were primary school pupils who were tested at their respective co-educational schools. The Wechsler Intelligence Scale for Children (WISC) was used to select _Ss_ whose intelligence was within average limits, according to Wechsler's criteria and whose full scale IQ fell as close to 100 as possible. Testees showing a marked discrepancy between scores on the two scales of the WISC were excluded. None of the _Ss_ included in the samples was considered disturbed by the class teacher. Sample size, intelligence and age data have been summarized in Table A.1.

Table A.1: Sample size and intelligence and age of Ss of PS I and PS II.

Study group	No. of Ss M	F	Tot.	Age[1] Mean	Range	VIQ[2] Mean	Range	PIQ[2] Mean	Range	FIQ[2] Mean	Range
PS I	5	6	11[3]	6-8	6-4 to 7-1	101	89-118	100	90-114	101	92-109
PS II											
A	5	5	10	6-7	6-2 to 7-0	101	92-106	102	93-107	102	92-107
B	5	4	9	7-5	7-2 to 8-0	100	95-106	103	94-111	102	94-111
C	5	5	10	8-7	7-11 to 9-9	101	91-111	100	96-104	100	96-109
Total	15	14	29[4]	7-6	6-2 to 9-9	101	91-111	102	93-111	101	92-111

1. Age in years and months.
2. Verbal, Performance and Full Scale IQ on the WISC.
3. From a total of 22 children tested on the WISC.
4. From a total of 48 children tested on the WISC.

Appendix B.

Additional information regarding materials used in training and in the various perceptual tasks.

Training materials.

The composition of training items was as follows:

(a) In the first four items, there were seven steps in which discriminative alternatives were arranged thus:

(i) match in centre position (3) in order to highlight the equivalence of standard and match;

(ii) match in position 2 or 4 to initiate set that match rather than position is of interest;

(iii) match and one other alternative, one of which appeared in position 2 or 4, the other at least one position away, to invoke scanning and simple discrimination between alternatives;

(iv) as for (iii);

(v) match and two other alternatives, usually in positions 1,3 and 5, to extend scanning and increase the number of alternatives amongst which the S must discriminate;

(vi) match and four other alternatives (full item), with the match in one of the central positions (2,3 or 4) to further increase scanning and to test the acquisition of a set to discriminate by choosing the match from amongst the maximum number of alternatives;

(vii) as for (vi), but with the match in any of the five positions, to confirm the acquisition of discrimination set.

(b) In the last two items, there were three steps only, in which discriminative alternatives were arranged thus:

(i) match and one other alternative (as in (a)(iii) and (iv) above);

(ii) match and two other alternatives (as in (a)(v) above);

(iii) match and four other alternatives (as in (a)(vi) and (vii) above).

Using these items and the training procedure outlined earlier (p.137), the time taken for training normal Ss in PS II was between 10 and 20 minutes on the first task, the number of presentations being approximately 20-23 (as compared with 34-40 using a less efficient procedure in PS I). Training for subsequent tasks proved far more easy, Ss seldom exceeding 5-10 minutes and 14 presentations, with few repetitions of steps required.

Task 1 : Shape.

Metric shapes are produced as follows (Alluisi, 1960): A square of a given size is subdivided into a number of equal-sized cells such that there are n rows and n columns. Each cell is capable of assuming either of two states, black or white. To produce solid rather than speckled shapes and hence to provide contour to the shapes, a further limitation is imposed, namely that all black cells are grouped together. The resultant shapes form part of a population of metric shapes where a row or column is taken as the unit of construction. Thus, for each row or column, a random selection of the number of cells in each state is made and that number of cells marked off on a constant axis. Other forms of redundancy may be introduced by additional limitations, for example, of area or symmetry.

In the present study, metric shapes were generated as follows: Squared graph paper was used. Each shape was drawn in a 2x2-inch square, composed of four equal-sized segments (1 x 1-inch square), and marked off in units of 1/10 inch.

Complexity or uncertainty was varied by varying the cell-size of shapes in different categories. This variation had the effect of altering the width and extent of distinctiveness of projections and the number of projections of shapes in different categories. The cell-sizes used were:

(a) four horizontal by four vertical units (large cell);

(b) two horizontal by two vertical 1/10 inch units (intermediate cell);

(c) two horizontal by one vertical unit (small cell).

With regard to homogeneity or similarity, experimental findings reported by Alluisi (<u>ibid</u>) have suggested that factors such as extent of logical restriction, degree of symmetry and direction of symmetry - vertical or horizontal - are importantly related to discriminability of metric shapes under brief exposure conditions. Logical restrictions designed to vary homogeneity in different categories of metric shapes in the present study took account of the above findings.

The categories of shapes produced with the aid of a random table of numbers by the two types of restrictions - cell-size and logical restrictions on sampling - have been listed below in the order of expected difficulty:

A. Symmetrical around the vertical axis - large cell: With the lower boundary of the square as base, and working outwards in both directions from the central vertical axis, randomly selected numbers of large cells were marked off symmetrically about this axis.

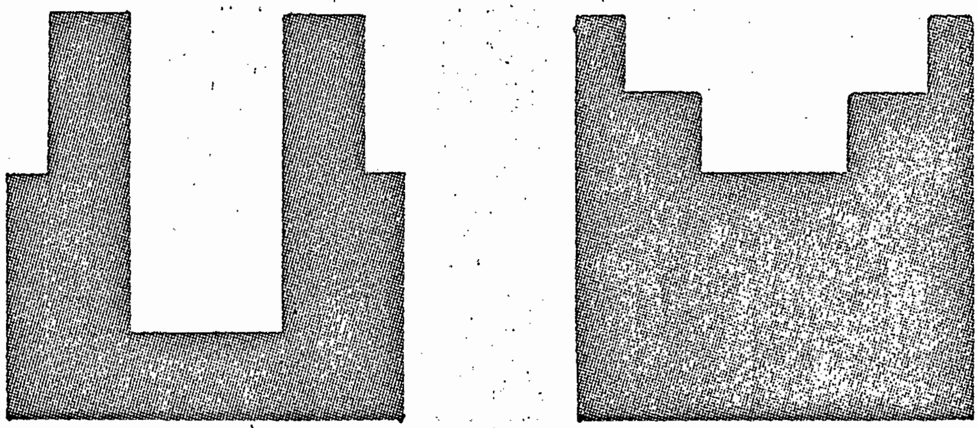
B. Assymmetrical - large cell: With the lower boundary of the square as base and working from the left-hand boundary towards the right, randomly selected numbers of large cells were marked off to form an a symmetrical figure.

C. Symmetrical around the vertical axis - intermediate cell: The same procedure as in A was followed, but using intermediate cells.

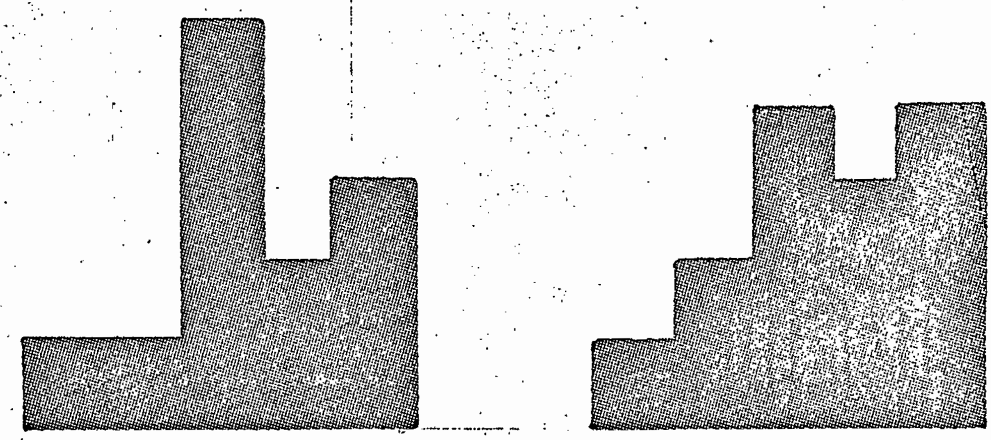
D. Symmetrical around the horizontal axis - intermediate cell: The same procedure as in A was followed, but using the right-hand boundary of the square as base, the horizontal axis as a point of reference and intermediate cells.

Examples of metric shapes used in the Shape task.

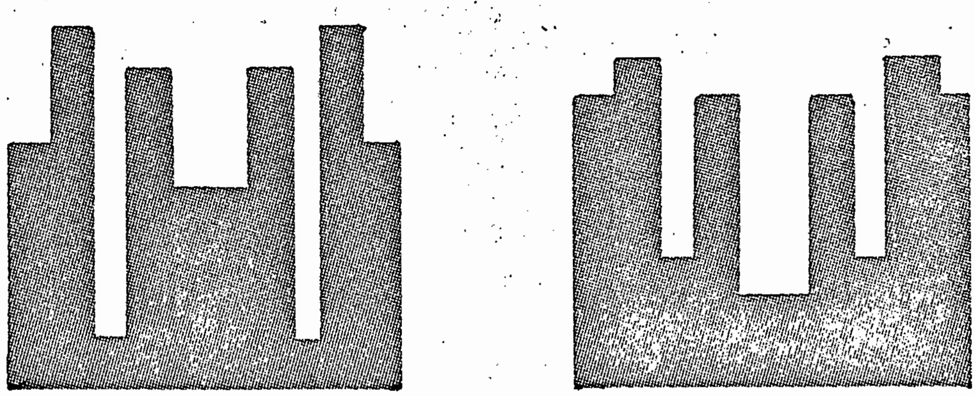
A: Symmetrical around vertical axis (large cell)



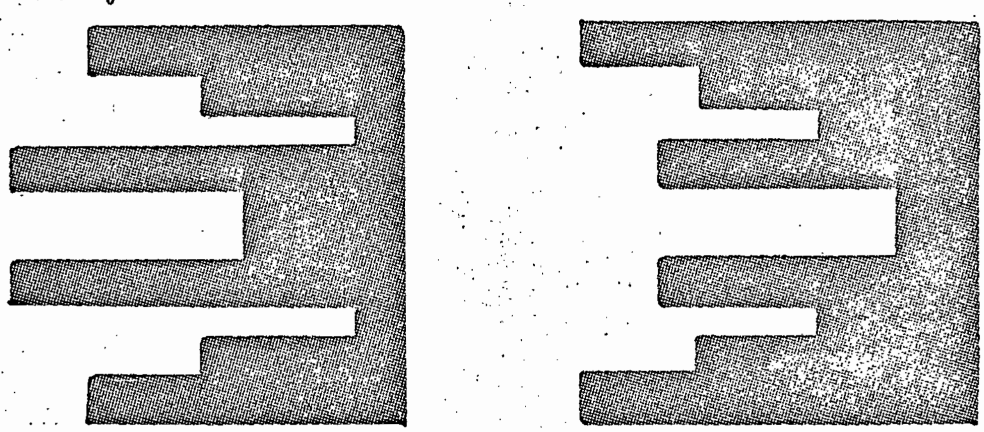
B: Asymmetrical (large cell)



C: Symmetrical around vertical axis (intermediate cell)



D: Symmetrical around horizontal axis (intermediate cell)



E. Assymmetrical-intermediate cell: The same procedure as in B was followed, but using intermediate cells.

F. Bipolar shapes, symmetrical around the vertical axis - small cell: The horizontal central line, bisecting the square, served as a base for marking off intermediate cells with respect to the vertical axis, the resultant shape having projections above and below the central line. Different sets of randomly selected numbers were used for upper and lower halves of the square; thus, projections on either side of the vertical axis in the upper half were symmetrical with respect to each other, but not with respect to those in the lower half.

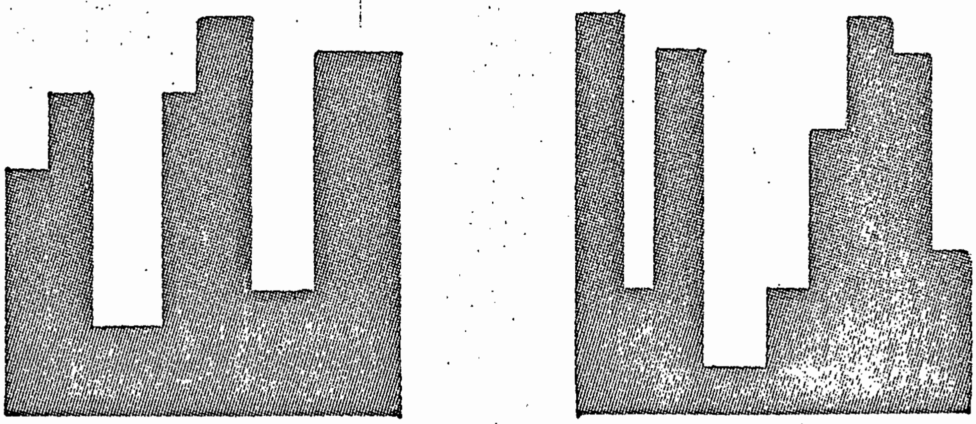
G. Bipolar shapes, symmetrical around both axes - small cell: The essential difference from shapes in category F was that the randomly selected numbers were duplicated in both halves of the square; hence, the projections in each segment of the square were symmetrical with respect to each other.

H. Bipolar, assymetrical shapes - small cell: With the horizontal, central line as base and working from the left-hand boundary in the upper half and the right-hand boundary in the lower half, randomly selected numbers of small cells were marked off. The resultant shape had projections above and below the central line, none of which was symmetrical with respect to any other.

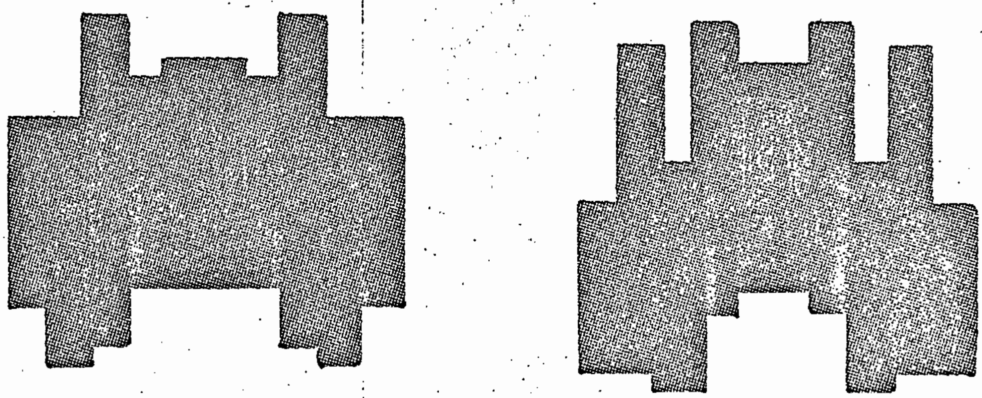
One additional restriction, which applied in particular to categories A to E, was introduced in order to reduce the possibility of size or area providing additional discriminative cues. Thus, it was stipulated that shapes must extend into the segments of the square furthest from the base. If a particular set of randomly

Examples of metric shapes used in the Shape task (continued).

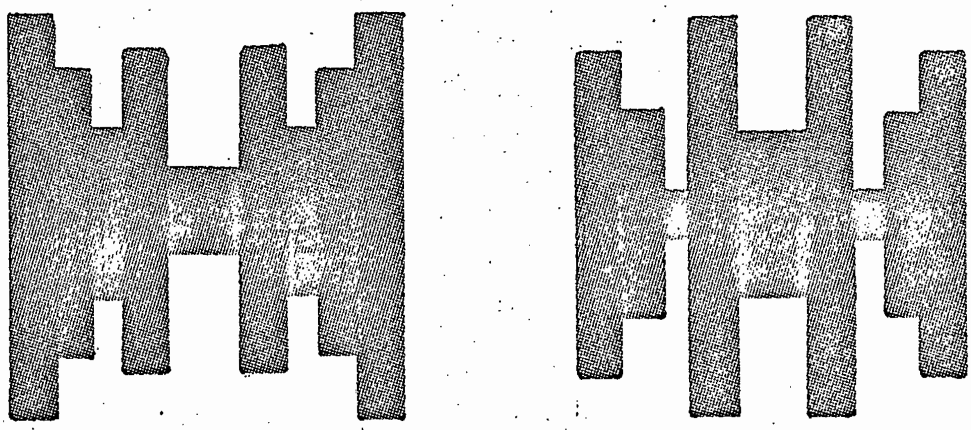
E: Asymmetrical (intermediate cell)



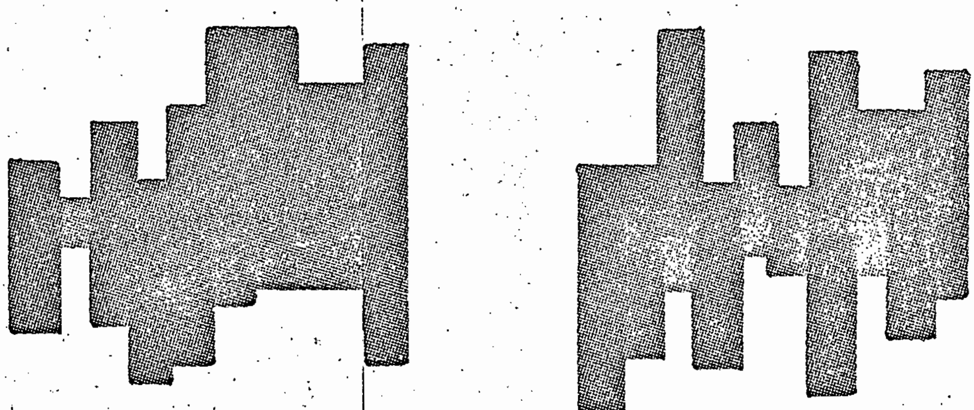
F: Bipolar, symmetrical around vertical axis (small cell)



G: Bipolar, symmetrical around both axes (small cell)



H: Bipolar, asymetrical (small cell)



selected numbers failed to generate at least one projection extending into the furthest segments, the set was discarded and another random selection made.

It has been mentioned that metric shapes are capable of being given a determinate orientation and that orientation was systematically varied in different items (see p. 152). In reproducing the shapes, generated as outlined above, on the display cards, angles of 30, 50, 70, 90, 110, 130 and 150 degrees to the base of the card were used, initially in accordance with three forms of orientation, namely:

(a) all shapes comprising an item were presented perpendicularly to the base of the card;

(b) the standard and match were presented in the same orientation, the orientation of the remaining discriminative alternatives being randomly varied;

(c) the standard and match were differently oriented and discriminative alternatives were randomly varied as in (c).

Following PS II, the second form of orientation (b) was eliminated, as contributing to the low ceiling of difficulty of the task.

The data arising from administration of the preliminary version of the task in PS II have been summarized in Tables B.1 and B.2 Decisions regarding elimination of variables, such as orientation, were based on these data.

Table B.1: Means, medians and ranges of errors for groups A,B,C and total sample of PS II. (Shape).

Group	Mean	Median	Range
A	2.8	2.5	1 - 7
B	2.1	2.0	0 - 6
C	3.0	2.5	0 - 9
Total	2.7	2.1	0 - 9

Table B.2: Analysis of errors of total sample by metric shape category and orientation

Category	Errors by orientation (a)	(b)	(c)	Error total	No. of items	Mean error by category
B	4	3	2	9	4	2.3
C	5	1	9	15	4	3.8
D	1	1	5	7	4	1.8
E	5	0	5	10	3	3.3
F	1	3	7	11	4	2.8
G	10	0	0	10	3	3.3
H	22	5	8	15	3	5.0
Error total	28	13	36			
No. of items	7	7	11			
Mean error by orientation	4.0	1.9	3.3			

The format of the final version of the task has been set out in Table B.3.

Table B.3: Format of shape discrimination task

Category	Content	Cell-size (units)	Orientation (no. of items)		No. of items
			a	c	
Training items					
AA	geometric	n.a.	n.a.		
A	symmetrical (vertical)	4 x 4	4	-	
Assessment items					
B	assymetrical	4 x 4	1	2	
C	symmetrical (vertical)	2 x 2	1	2	
D	symmetrical (horizontal)	2 x 2	1	2	
E	assymmetrical	2 x 2	1	2	
F	bipolar symmetrical (vertical)	1 x 2	1	2	
G	bipolar symmetrical (vertical and horizontal)	1 x 2	1	2	
H	bipolar assymmetrical	1 x 2	1	1	

Task 2 : Size.

The data arising from administration of the preliminary version of the task in PS II have been summarized in the tables below. Decisions regarding the format of the task as used in the present study were based on these data.

Table B.4: Means, medians and ranges of errors for groups A,B,C and total sample of PS II.(Size).

Group	Mean	Median	Range
A	7.9	8.0	5 - 11
B	5.4	5.8	2 - 11
C	6.2	5.8	1 - 11
Total	6.6	6.2	1 - 11

Table B.5: Analysis of errors of total sample by size category and shape.

Category	Size difference(ins.)	No. of items	Mean error per item		
			Category	Circle	Square
A	1/4	4	2.5	3.5	1.5
B	3/16	5	4.2	2.5	5.3
C	1/8	8	8.0	5.5	10.8
D	1/16	8	11.9	13.0	10.8
Total		25	7.6	7.1	8.1

With regard to the finding that the last three items in Category D elicited markedly fewer errors than previous items in the same category, it was noted that these three items were the only ones in category D which repeated discriminative alternative sizes used in previous items. Although the discriminative alternatives were in each case arranged in a different order from that of their first appearance and using the shape not used in the earlier item, and although the standards were different, it seemed possible that experience with the discriminative alternatives contributed to their greater discriminability in later items (see Table B.6 below). Similar pairs of items in

Table B.6: Relative number of errors elicited by pairs of items composed of the same discriminative alternatives

Category	Item No.	Shape	Errors	Item No.	Shape	Errors
A	1	square	2	3	circle	7
C	10	circle	13	17	square	14
D	18	circle	16	23	square	5
	20	square	20	24	circle	2
	21	circle	23	25	square	6

other categories did not, however, show a similar marked decline in errors on the second item, suggesting that, in addition to any practice effect from previous similar items, the unusual error scores on items 23 to 25 might have resulted also from more general practice effects over the whole series.

Following the decision to discard the items of category A, the format of the final version of the task was as follows (Table B.7).

Table B.7: Format of size discrimination task.

Category	Size difference (ins.)	Range of sizes (ins.)	No. of size alts.	No. of items
Training items				
AA	1/2	1/4 - $2\frac{1}{4}$	5	4
A	1/4	1/2 - 2	7	2
Assessment items				
B	3/16	9/16 - $2\frac{1}{16}$	9	4
C	1/8	1/2 - 2	13	8
D	1/16	1/2 - 2	25	8

Task 3 : Colour.

The data arising from administration of the preliminary version of the task in PS II have been summarized in Tables B.8 and B.10 below. Decisions regarding the format of the task as used in the present study were based on these data.

Table B.8: Means, medians and ranges of errors for groups A,B,C and total sample of PS II (Colour).

Group	Mean	Median	Range
A	7.0	6.5	4 - 13
B	7.8	7.7	3 - 13
C	7.0	9.0	5 - 11
Total	7.3	7.6	3 - 13

With regard to Table B.8, a somewhat anomalous finding was the apparent increase with age in difficulty of the task, as indicated by median error scores. It appeared possible, however, that there was an increasing tendency with age to respond less cautiously, an hypothesis compatible with the fact that mean and median number of correct responses with a latency greater than 10 seconds[1] decreased with increasing age (see Table B.9).

Table B.9: Means, medians and ranges of delayed correct responses for groups A,B,C and total sample of PS II (Colour).

Group	Mean	Median	Range
A	3.9	2.0	0 - 19
B	2.2	2.0	0 - 7
C	0.9	0.0	0 - 4
Total	2.3	1.4	0 - 19

As mentioned in earlier discussion, (p.162) it was clear from inspection that the wide range of errors per category would not have been adequately represented by measures of average number of errors. An alternative analysis was made in terms of the number of items per category eliciting errors in each of five subdivisions of total possible number of errors per item (see Table B.10).

1. The latency measure was applied to all tasks in PS II, but, in most cases, it added little to an understanding of group differences. It has, therefore, only been reported where it has assisted in evaluation of particular tasks.

Table B.10: Number of items per category eliciting errors in ranges between 0 and 29 errors.(Colour).

Category	Error range 0-5	6-10	11-15	16-20	20-29	No.of items
A	3	-	1	-	-	4
B	-	3	-	1	-	4
C	1	-	1	-	-	2
D	2	-	-	2	-	4
E	3	1	-	-	-	4
F	-	-	2	-	-	2
G	1	1	1	2	-	5
Total	10	5	5	5	-	25

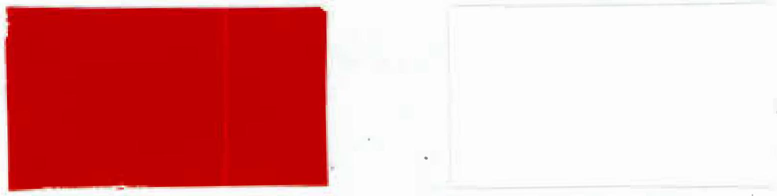
From the above table, it could be seen that nearly one half of the items elicited very few errors (0-5 errors) and that no items were so difficult that more than 20 errors were elicited (that is, that more than 20 Ss made errors). The rather random distribution of errors for each category suggested that difficulty was a function of the particular items, rather than of the category as a whole.

Elimination of items eliciting fewest errors altered the number of items in each category, but did at least retain all the original colour categories, thus ensuring no further reduction of the already limited range of colours. The final version of the task was thus as follows (Table B.11).

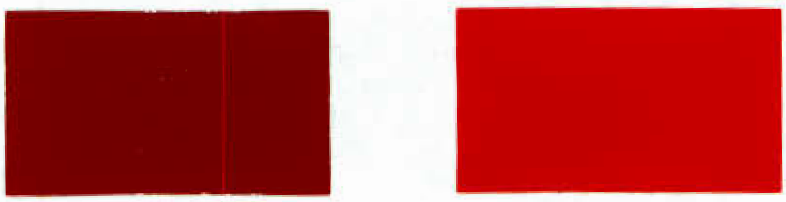
<u>Examples of shade differences in Colour task.</u>

Training items:

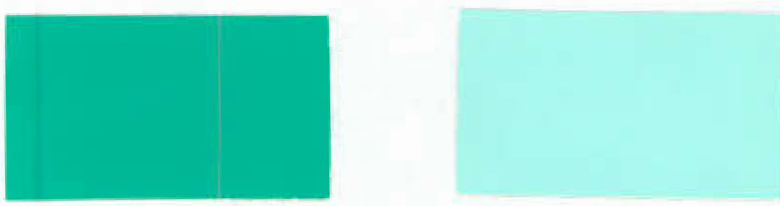
Different colours



Similar colours

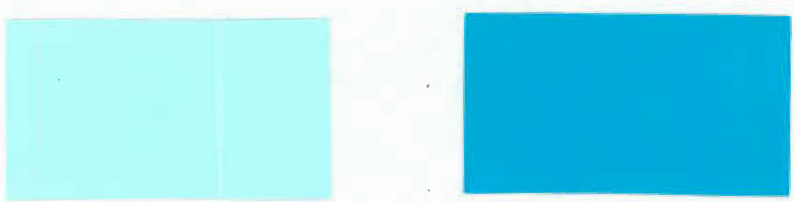


Different shades



Assessment items:

"Easy" item



"Difficult" item

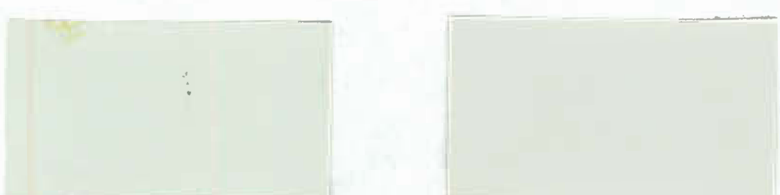


Table B.11: Format of colour discrimination task.

Colour category	No. of shades matt	No. of shades glossy	No. of items matt	No. of items glossy	Total no. of items
Training items					
different colours	n.a.		2	2	4
similar colours	n.a.		1	1	2
different shades	n.a.		1	1	2
Assessment items					
blue	10	8	1	1	2
pink	5	5	2	2	4
turquoise	-	7	-	2	2
cream	6	6	1	2	3
grey	6	6	1	1	2
yellow	-	5	-	2	2
green	7	10	2	3	5

Task 4: Configuration (synthesis).

The data arising from administration of the preliminary version of this task in PS II have been summarized in the tables below.

Item analysis was undertaken to check that *a priori* designation of the match was valid; that is, an attempt was made to establish whether items eliciting choices of figures other than the *a priori* match might be construed as having a different or more than one, "good" figure associated with the standard. Where the majority of choices (75% or more) on a given item were of the figure designated a priori as the correct match, it was assumed that that designation was valid. Seventeen items fulfilled this criterion.

Table B.12: Means, medians and ranges of errors for groups A,B,C and total sample of PS II.

Group	Mean	Median	Range
A	4.8	4.3	2-11
B	4.0	3.8	1- 7
C	4.4	4.0	1- 9
Total	4.4	4.0	1-11

The remaining eight items were then analysed to establish whether Ss consistently chose any of the additional figures composing a given item. The number of choices among five alternatives for each of the eight items has been summarized in Table B.13. The small number of choices per cell did not permit the application of a statistical test, but the significance of the relative number of choices per figure could be estimated by reference to the number of choices per figure which could have occurred by chance (5.4 choices, where total possible number of choices for a given item was 27, two Ss being absent when the test was administered).

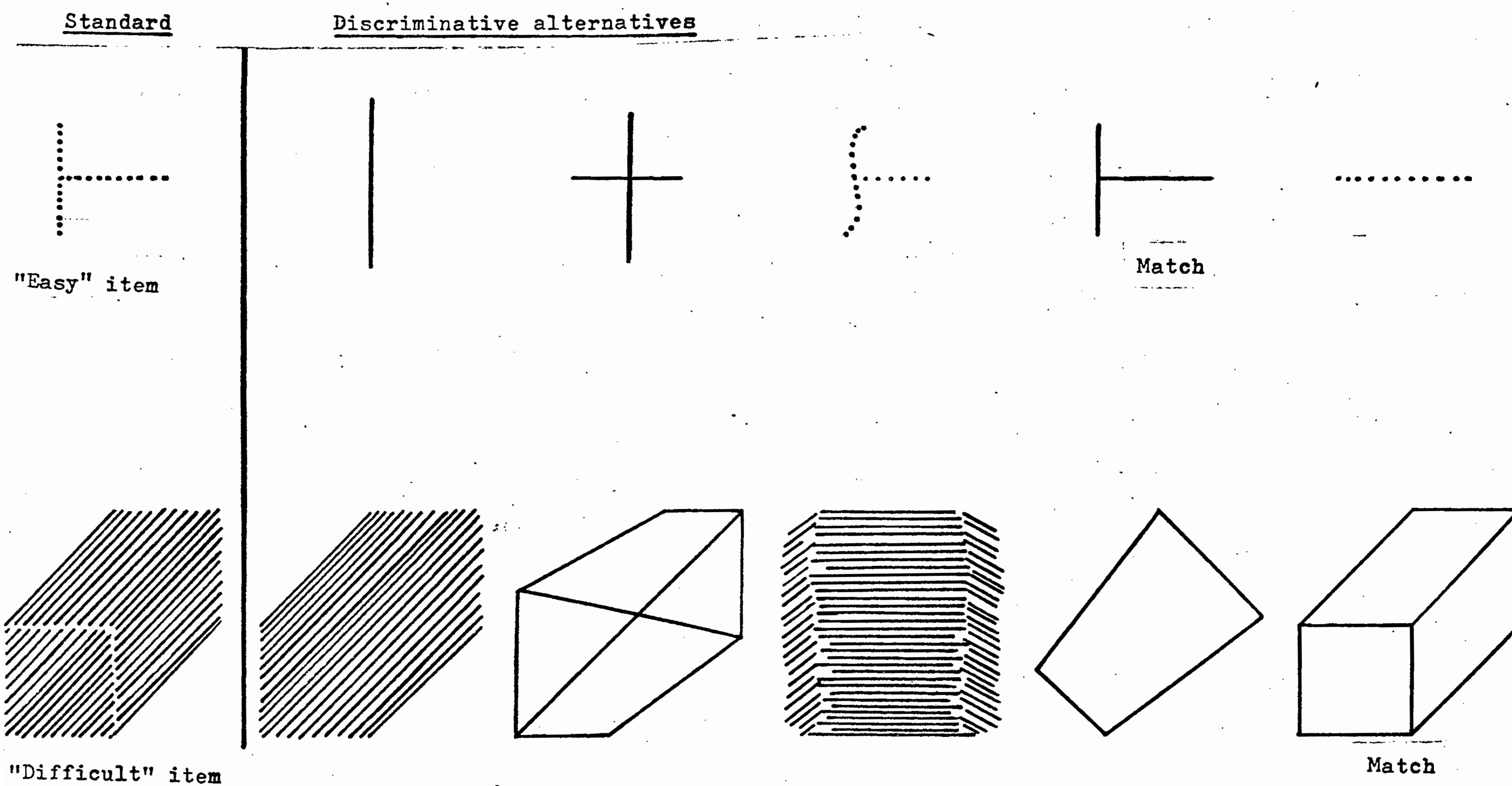
Table B.13: Distribution of choices among five alternatives on eight items of Configuration (synthesis) task

Item number	Discriminative alternatives[1] 1	2	3	4	5
2	0	1	9	0	17
8	1	5	5	0	16
12	2	2	1	17	5
13	16	6	3	1	1
16	3	2	4	5	13
18	0	4	7	0	16
19	0	0	13	14	0
23	1	1	2	12	11

1. Underlined numbers indicate choices of *a priori* designated match

The distribution of choices per figure, in relation to the distribution of choices on a chance basis, suggested that the *a priori* designation of the match was confirmed by *Ss*' choices on items 2, 12 and 13. On these items, the number of choices of figures other than the match differed very little from a chance distribution and was considerably lower than the number of choices of the match figure.

On items 19 and 23, number of choices of the match was about equal to number of choices of one other figure. It was, therefore, assumed that for these two items, the two figures chosen



Examples of items of Configuration (synthesis) task.

approximately equally often were equally probably "good" perceptual syntheses of the standard configuration. (Thus, in scoring of PS II protocols, choice of either of these two figures was considered correct.)

On items 8,16 and 18, number of choices of the previously designated match did not exceed number of choices which could have occurred by chance. However, for each of these items, one other figure was chosen by a large number of Ss. It was, therefore, assumed that, for these items, the a priori designation was perceptually improbable and that the figure chosen most often represented the most probably "good" synthesis of the standard configuration. (Thus, in scoring, choice of the latter figure was treated as correct.)

As indicated in Table B.14, in terms of the revised designations of matches, the majority of items elicited very few errors, while no items elicited 16 or more errors. Hence the task lacked items in the least discriminable range. Five items, which elicited no errors at all, were discarded. Practical difficulties prevented further attempts to design items.

Table B.14: Number of items and mean error in ranges between 0 and 27 errors.

	Error range			
	0 - 5	6 - 10	11 - 15	16 - 27
No. of items	15	6	4	0
Mean error	1.7	7.8	11.8	-

Task 5: Configuration (analysis).

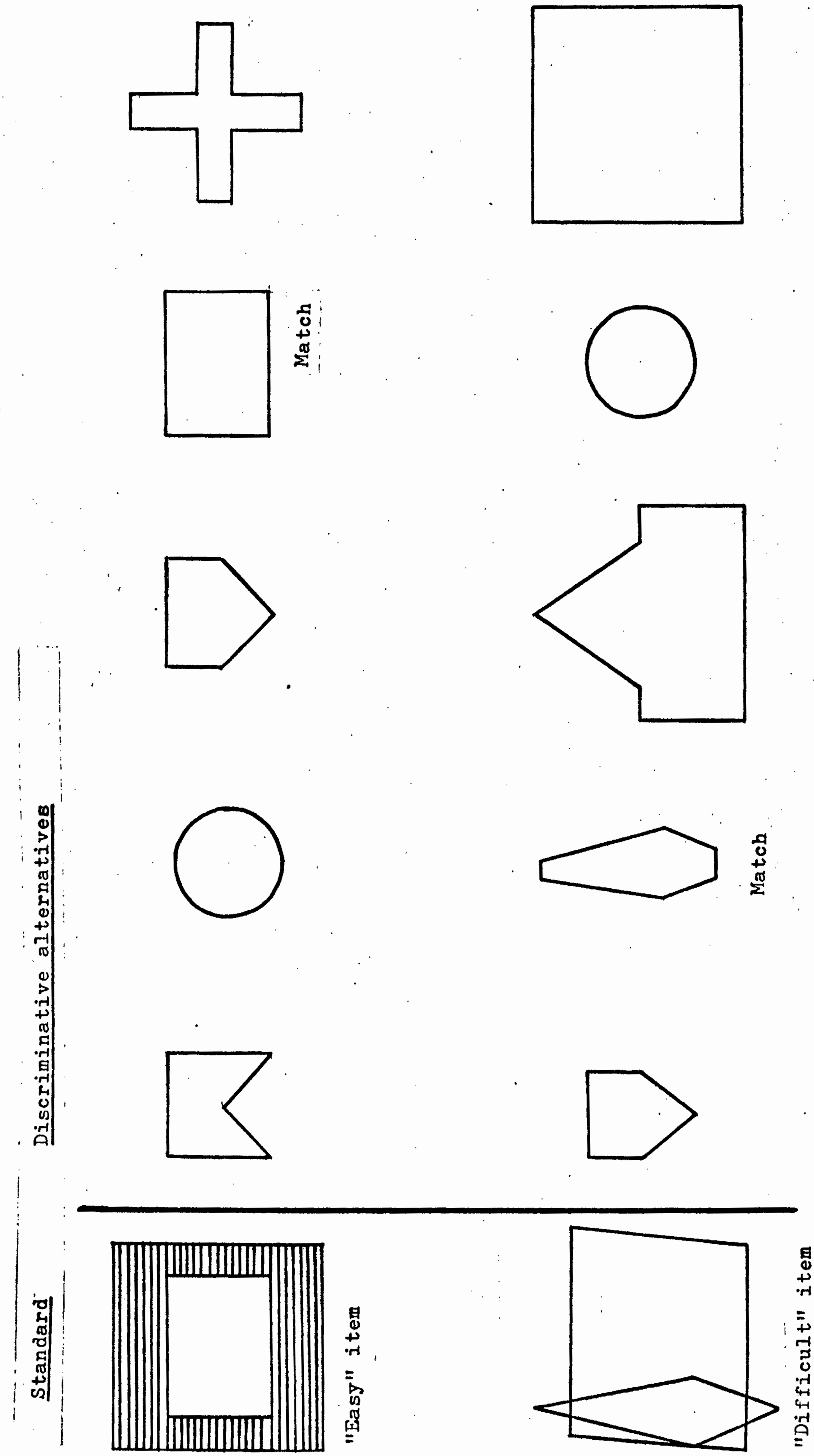
The data arising from administration of the preliminary version of this task in PS II have been summarized in the tables below.

Table B.15: Means, medians and ranges of errors for groups A,B,C and total sample of PS II (Configuration(analysis).

Group	Mean	Median	Range
A	12.7	13.2	7 - 16
B	14.3	14.7	12 - 17
C	13.3	12.5	10 - 18
Total	13.4	13.3	7 - 18

Since it was not possible to categorize items *a priori* in terms of difficulty, an analysis in terms of numbers of items eliciting errors in each of six subdivisions of total possible number of errors per item was made. (see Table B.16). It appeared that, within each range of error, items were not sufficiently differentiated as regards discriminability and, furthermore, that the task lacked items of

Examples of items of Configuration (analysis) task.



intermediate difficulty.

Table B.16: Number of items and mean error in ranges between 0 and 29 errors.

	Error range					
	0-5	6-10	11-15	16-20	21-25	26-29
No. of items	6	3	1	5	8	2
Mean error	0.8	9.2	15.0	18.6	24.4	26.5

To reduce the overall level of difficulty, five items, eliciting most errors, were discarded.

Task 6:. Object character.

The data arising from administration of the preliminary version of this task in PS II have been summarized in the tables below.

Table B.17: Means, medians and ranges of errors for groups A,B,C and total sample of PS II.(Object).

Group	Mean	Median	Range
A	3.5	3.2.	0-8
B	2.3	1.5	0-7
C	2.0	1.5	0-5
Total	2.6	2.2	0-8

Before analysing relative discriminability of items, an attempt was made to establish whether items elicitng choices of objects other than the match object might be construed as having additional objects functionally associated with the standard. Where the majority of choices (75% or more) for a given item were of the object designated *a priori* as the correct match, it was assumed that the designation had been valid. Twenty-one items fulfilled this criterion.

The remaining items were then studied to establish whether *S*s consistently chose any of the additional alternatives composing a given item. The number of choices among five alternatives on each of these items has been summarized in Table B.18. The small number of choices per cell did not permit the application of a statistical test. The significance of relative number of choices per alternative could, however, be estimated by reference to the number of choices per alternative which could have occurred by chance (5.6 choices, where total possible number of choices was 28, one *S* being absent when the test was administered).

The distribution of choices per alternative in relation to a chance distribution confirmed the *a priori* designation for only one of these items, item 23. Here the number of choices of figures other than the match differed very little from a chance distribution and was considerably lower than the number of choices of the *a priori* match.

Table B.18: Distribution of choices among five alternatives

Item number	Standard	Discriminative alternatives[1] 1	2	3	4	5
1	pen	spoon	cottonreel	book	suitcase	pencil
		0	0	16	0	9
8	flowers	fruit	vase	cup	tree	house
		3	13	0	0	9
11	saw	house	flower	knife	tree	logfire
		0	0	13	9	3
22	driver	aeroplane	engine	bicycle	suitcase	car
		2	9	3	0	11
23	screw	table	screwdriver	ruler	saw	hammer
		1	16	0	2	6

1. Underlined numbers indicate choices of object designated *a priori* as match.

On items 8 and 22, number of choices of the match was not very different from that of one other alternative. It was, therefore, assumed that for these two items, both objects were perceived as functionally related to the standard to approximately the same extent. (Thus in scoring protocols, choice of either of these two objects was treated as correct.)

On item 1, choices of alternatives 3 and 5, though differing by a greater number, indicated that _Ss_ perceived both to be functionally related to the standard. This was probably due to the fact that the drawing of the book might have been perceived as a writing, rather than as a printed book as had been intended. (In scoring protocols, either choice was treated as correct.)

On item 11, number of choices of alternatives 3 and 4 did not differ greatly. In the case of alternative 3, choices indicated the use of a more inclusive concept. It was also noted that choice of alternative 5 (log-fire) could have indicated perception of a functional relationship. (Thus, in scoring protocols, choice of any of these three figures was treated as correct.)

The data were then analysed as regards relative discriminability of items. As indicated in Table B.19, the majority of items elicited very few errors, while no items elicited 10 or more errors. Five items, which elicited no errors at all, were discarded.

Table B.19: Number of items and mean error in ranges between 0 - 28 errors.

	Error range		
	0 - 5	6 - 10	11 - 28
No. of items	21	4	0
Mean error	22	6.8	-

Appendix C.

Questionaires used to obtain descriptive information regarding the samples used in the study.

(1) Diagnostic information : completed by consulting psychiatrist.

(2) Rating scale : completed by the teacher and the E for each "autistic" S.

(3) Descriptive information : questionaires completed by teachers of control Ss.

(a) Children in ordinary classes.

(b) Children in special class or those whose scholastic performance was markedly retarded, but were nevertheless still in an ordinary class.

(1) Diagnostic information: completed by consulting psychiatrist.

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A. General Information:

Child's name:.....................Birthdate:...........
Age:.....yrs.....mths.

Parents' name:.....................
Address:........................ Telephone:......(home)
....(office)
....

Parental occupation: a) father......................
b) mother...........(before marriage)
...........(at present)

B. Diagnostic Information:

1(a) Age when atypical behaviour was first noted by parents:...............yrs.........mths.

(b) Nature of atypical behaviour noted by parents:....
....
....
....
....

2. Age when consultation/therapy was started:
.......yrs.......mths.

3. Length of time in therapy:.........yrs.......mths.

4(a) If the child has been given an EEG, was the record considered normal?..............................

(b) If "No" to 4(a), what were the findings?..........
....
....
....
....

5(a) In the absence of any positive neurological findings, are there any grounds for suspecting minimal brain damage?..............

(b) If "Yes", can you briefly indicate the symptoms in question?...................................
....
....
....

6(a) Which of the following diagnostic labels most accurately describes the child's condition?

autistic..........   schizophrenic..........
psychotic.........   seriously disturbed....
borderline (specify) ....
other (specify) ....

(b) Age when diagnosis first made:......yrs....mths.

(c) If any other diagnosis has been applicable during previous stages of the illness, please can you summarize the relevant information?...
....
....
....

7. How would you describe the degree of affectedness at (a) the time of diagnosis; (b) the time of entry to the school. (Tick the appropriate remark.)

a) slight ... moderate... serious ... severe...
b) slight ... moderate... serious ... severe...

8. Do you regard the prognosis as
good ... fair ... poor ... very poor ... (at entry to school).

(2) <u>Rating scale: completed by the teacher and the *E* for each "autistic" *S*.</u>

On the following pages, a number of symptoms regarded as characteristic of autism and related conditions are listed. Please indicate whether the child (a) originally presented with these symptoms, (b) still presents with these symptoms. Except where otherwise indicated, please rate each symptom on a 1-5 scale, where

1 - not present at all
2 - noted very infrequently
3 - present fairly frequently, but not a prominent feature
4 - definitely present, noted frequently
5 - occurs very frequently, severe, an obvious feature.

Space has been left after each category for any additional symptoms which you may wish to note. As well, please add any comments you wish to make with regard to any of the symptoms in the column provided.

Symptom

Relationships with people / self:

(1) aloofness

(2) empty clinging

(3) impersonal 'use' of people as objects

(4) lack of sympathy or empathy for others

(5) parallel play when with other children

(6) difficulty in forming peer relationships

(7) apparent unawareness of own personal identity

Relationship with objects:

(1) obsessive collecting of certain objects

(2) obsessive attachment to certain objects

(3) fascination with objects (in contrast to people)

(4) inappropriate use of objects

(5) attachment to 'transitional' objects (e.g. vacuum cleaner)

(6) repetitive 'play' with objects

(7) failure to experiment with objects

Attitude to change:

(1) difficulty in changing routines

(2) adverse reaction to changes in the environment

(3) food fads

Speech:

(1) speech has never developed

(2) speech developed normally for a period; then lost / regressed

(3) retarded speech development

(4) avoidance of use of speech, although capable of using it

(5) use of whisper / 'special' voice

(6) use of special jargon (e.g., fragments of speech, portmanteau expressions)

(7) echolalia

(Speech cont.)

(8) 'pronominal reversal'

(9) use of "No" developed before "Yes"

(10) repetition of phrases / questions

(11) rote memorization of speech

(12) overly concrete / literal use of language in relation to age

(13) confusion of words with two connotations

(14) difficulty in comprehending language

Mood patterns:

(1) acute anxiety, precipitated by change

(2) apparently illogical fear of harmless objects

(3) lack of appropriate fear response to real dangers

(4) temper tantrums, excessive in relation to the events precipitating them

(5) self-directed aggression (excluding head-banging) - specify.

Motility patterns:

(1) hyperkinetic

(2) hypokinetic

(3) bizarre postures

(4) ritualistic mannerisms (whole body)

(5) ritualistic mannerisms (hands, fingers)

(6) rocking

(7) spinning

(8) head banging

(9) facial grimaces

(10) graceful movements

Perceptual patterns:

(1) abnormal startle response

(2) unusual interest in smell

(3) excessive response to sensory stimuli

(Perceptual patterns cont.)

(4) diminished response to sensory stimuli

(5) visual avoidance (e.g., covering eyes, looking away)

(6) use of peripheral vision

(7) auditory avoidance (e.g., covering ears)

(8) preference for proximal senses

(9) insensitivity to pain

(10) insensitivity to temperature

(11) inability to localize sensation

(12) preference for certain stimuli (e.g., particular colours / shapes / sounds)

(13) inability to recognize familiar objects (e.g., house, parents, dog)

(Additional symptoms)

Intellectual functioning:

(1) Uneven pattern of functioning (see also, below *)

(2) good rote memory

(3) poor concentration

(4) non-distractibility

* Please specify the nature of the pattern of intellectual functioning and indicate on what evidence the assessment is based. If psychometric testing has been carried out, could you specify which tests were used and what results were obtained?

(3) (a) Questionaire completed by teachers of control Ss in ordinary classes.

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Child's name: ____________________ Birthdate: __________

Std: ________ Sex: ________ Age: ___ yrs. ____ mths.

Parents' name: ____________________ Phone _______(home)

Address: ____________________ _______(office)

____

Parental occupation (if known):

a) father ____________________

b) mother ____________________(before marriage)_________(now

The following questions relate to the child's scholastic progress. The information is required for descriptive purposes.

1. Briefly describe the child's scholastic progress (age when started school, whether any standards have been failed and, if so, which standards have been repeated).

2. Would you describe the child's performance in school at present as well above average /slightly above average / slightly below average (Please underline the appropriate comment and add any comments which you wish to make in this connection in the space below.)

3. Does the child display any emotional or behavioural disturbance ? If so, please describe the disturbance and indicate how severe you think it is.

4. How would you rate the child's relationship with
   (a) his/her teacher: very good / good / fair / poor / very poor
   (b) his/her age-mates: very good / good / fair / poor / very poor

Please underline the comment which applies and add any comments in the space below.

5. Do you have any additional comments to make (e.g., motivation, discipline) ?

Thank you for your assistance.

(3)(b) Questionaire completed by teachers of control Ss in special class or whose scholastic performance was markedly retarded.

CONFIDENTIAL REPORT.

Child's name: ________________________ Birthdate: ______________

Std: ______ Sex: ________ Age: _____yrs. _____ mth

Parental occupation (if known):

a) father ____________________

b) mother ________________(before marriage) ______________(now)

Parents' name ______________________ Phone: _____________(offic

Address: ___________________________ _____________(home)

____

The following questions relate to the child's scholastic progress. The information is required for descriptive purposes.

1. Briefly describe the child's scholastic progress (age when started school, whether any standards have been failed and if so, which standards were repeated).

2. If the child is in special class, when was he/she transferred and how many years has he/she spent in special class?

3. Would you describe the child's performance in school at present as borderline normal / subnormal / severely subnormal (Please underline appropriate comment and add any comments which you wish to make in this connection in the space below.)

4. Does the child display any emotional or behavioural disturbance ? If so, please describe the disturbance and indicate how severe you think it is.

5. How would you rate the child's relationship with
(a) his/her teacher: very good / good / fair / poor / v. poor
(b) his/her age-mates: very good / good / fair / poor/ v. poor
(please underline the comment which applies).
Do you have any comments to add with regard to the child's relationships ?

6. Do you have any additional comments to make (e.g., motivation,discipline) ?

Thank you for your assistance.