Orientation Discrimination by Nonambulatory, Profoundly Mentally Retarded Children

by

Susan R. Shaw

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ORIENTATION DISCRIMINATION BY NONAMBULATORY, PROFOUNDLY MENTALLY RETARDED CHILDREN

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SUSAN R. SHAW

A thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

MASTER OF ARTS

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This thesis is dedicated to the memory of my mother

Naomi Shaw

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ABSTRACT

Behavioral similarities between nonambulatory, profoundly mentally retarded children and nonretarded infants suggest that experimental methods used to study infants may also prove to be appropriate for the study of nonambulatory, profoundly mentally retarded children. The paired-comparison procedure typically used to test infant visual recognition memory has been used with nonambulatory, profoundly mentally retarded children to demonstrate their ability to discriminate amongst faces, colors, and high and low contrast abstract patterns. These studies also show that profoundly mentally retarded children look at novel stimuli longer than they look at familiar stimuli.

A recent study investigating the discrimination of stimulus orientation in nonambulatory, profoundly mentally retarded individuals using a habituation-dishabituation procedure revealed that they could perceive changes in figure orientation. In the present study, the paired-comparison task was used to further examine orientation discrimination. The paired-comparison task was expected to be a more sensitive test for detecting discrimination than the habituation-dishabituation procedure.

Subjects were 15 profoundly mentally retarded persons whose chronological ages ranged from 5.00 to 20.42 years. Stimuli consisted of square-wave gratings and line stimuli. Subjects participated in four test sessions, each separated by at least 24 hours. Each test session included four discrimination problems. Each of these problems involved three 10-s familiarization trials with either a vertical, horizontal or oblique orientation of a stimulus and two 10-s test trials with the familiar stimulus and a novel stimulus that differed from the familiar stimulus by either 45 or 90 degrees.

The results showed a significant decrease in looking time over the familiarization phase. Longer fixation times to the novel orientation than to the familiar orientation during the test phase indicated that the subjects discriminated 45 degree and 90 degree rotations of the stimuli. The paired-comparison procedure was shown to be an effective method for revealing the perceptual abilities of profoundly mentally retarded individuals.

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Orientation Discrimination by Nonambulatory, Profoundly Mentally Retarded Children

Nonambulatory, profoundly mentally retarded children are characterized by both physical handicaps and profound mental retardation. The American Association on Mental Deficiency (1983) defines profoundly mentally retarded persons as those with intelligence quotient (IQ) scores that are more than five standard deviations below the mean of the general population. Landesmann-Dwyer and Sackett (1978) describe nonambulatory, profoundly mentally retarded persons as: (a) unable to move through space; (b) totally lacking adaptive behavioral skills; and (c) having extremely small stature for their chronological age, especially in head circumference. Many of these children suffer from severe forms of cerebral palsy that result in scoliosis, muscular atrophy and joint stiffness. In spite of these similarities, they represent a heterogeneous group in terms of central nervous system integrity, physical growth and development, and behavioral repertoires (Landesmann-Dwyer & Sackett, 1978).

Due to the severe motor and sensory deficits of nonambulatory, profoundly mentally retarded children, it is

difficult, if not inappropriate, to test them using standard intelligence tests (Berkson & Landesmann-Dwyer, 1977; Shepherd & Fagan, 1981). Moreover, Berkson and Landesmann-Dwyer (1977) suggest that many of these individuals are classified as profoundly retarded because they are untestable rather than because they have achieved low scores on a test.

It has been suggested that nonambulatory, profoundly mentally retarded children have behavioral capabilities comparable to nonretarded infants (Landesmann-Dwyer & Sackett, 1978; Shepherd & Fagan, 1981). Estimates of the mental ages (MAs) of profoundly mentally retarded individuals lie in the infancy range (Whiteley & Krenn, 1986). Furthermore, both populations lack adaptive self-help skills, resulting in total dependence on others. These similarities suggest that experimental methods used to study nonhandicapped infants may prove appropriate for the study of nonambulatory, profoundly mentally retarded children.

A popular experimental method used to assess infant perceptual and cognitive functioning has been the visual recognition memory test (e.g., Lasky, 1980; Martin, 1975; Olson, 1979). This method has also been useful for assessing atypical infant populations (e.g., McDonough & Cohen, 1982; Miranda & Fantz, 1974; Mundy, Seibert, Hogan, & Fagan, 1983). Infant tests of visual recognition memory require that the child be able to selectively fixate visual

stimuli and control their eye movements (Butcher, 1977). A substantial proportion of nonambulatory, profoundly mentally retarded children have shown these abilities in several studies (Abraham, 1987; Butcher, 1977; Ellis & Boyd, 1982; Kelman & Whiteley, 1986; Krenn, 1986; Shepherd & Fagan, 1980). These studies suggest that perceptual and cognitive functioning in nonambulatory, profoundly mentally retarded children can be assessed by recognition memory tests typically used with infants.

Visual Recognition Memory Methodologies

Typically, tests for visual recognition memory employ the corneal reflection technique to measure visual fixations. A subject is considered to be fixating a stimulus when the reflection of that stimulus is centered over the subject's pupil (Slater & Findlay, 1975). This technique is useful with both infants and nonambulatory, profoundly mentally retarded children, as it is easy to implement and allows some head movement (Maurer, 1975). Moreover, satisfactory interobserver reliabilities have been found for measures of visual fixations with nonambulatory, profoundly mentally retarded subjects (e.g., Kelman & Whiteley, 1986; Whiteley, Shaw, & Graham, 1987).

Three basic procedures have been employed to assess visual recognition memory. Two such procedures, fixed-trial and subject-control, are commonly known as habituation-

dishabituation procedures. The third procedure is the paired-comparison task or novelty preference paradigm.

The fixed-trial procedure involves presentations of the habituating stimulus for a predetermined number of trials whose duration is prespecified (Bornstein & Sigman, 1986). Onset and offset of the stimulus is independent of the subject's fixations. In the subject-control procedure, stimulus presentations are dependent on the subject's visual fixations, thus reflecting subject attention to a greater degree than the fixed-trial procedure (Bornstein & Benasich, 1986). A trial typically begins when the subject is oriented in the direction of the stimulus. It is terminated when the subject looks away for a predetermined time period. Number of trials is typically determined by a habituation criterion (e.g., a total fixation time decrement to 50% of the initial total fixation time). Thus, trial duration and trial number is controlled by subject looking behavior. (Haaf, Smith, & Smitley, 1983). This procedure ensures subject looking in the spatial location of the stimulus at stimulus onset, and it fixes stimulus offset to the end of subject looking (Bornstein & Benasich, 1986; Switzky, Woolsey-Hill & Quoss, 1979).

For both these procedures, a decline in looking times over familiarization trials is referred to as habituation. Once a subject has been habituated to a stimulus, test trials involving presentations of a novel stimulus tend to

lead to an increase in looking behavior known as dishabituation. Dishabituation indicates that the subject can discriminate between the novel stimulus and the habituating stimulus.

In the paired-comparison procedure, a subject is presented with a pair of identical stimuli for a fixed familiarization period. A subsequent test phase involves the presentation of the familiar stimulus paired with a novel stimulus. Differential looking at the novel and familiar stimuli reveal the ability of a subject to discriminate between the two stimuli.

It has been argued that the paired-comparison task has advantages over the habituation-dishabituation procedures. Olson and Sherman (1983) report that the paired-comparison method can be used to test memory under conditions of very limited familiarization. These familiarization periods are briefer than most single trials in a fixed trial habituation task. For example, Fagan (1974) found significant novelty preferences in infants' attention after only 5 seconds of familiarization. This advantage is potentially important for testing nonambulatory, profoundly mentally retarded children whose behavior is not conducive to lengthy testing periods. Werner and Perlmutter (1979) have suggested that since the paired-comparison method allows for direct comparison of familiar and novel stimuli, it is probably more sensitive for detecting memory than the successive

presentation procedures. Specifically, even if partial forgetting occurs, the new stimulus will appear to be novel along some dimensions. Another advantage that results from the relatively brief familiarization and testing times used in the paired-comparison procedure is that a number of discrimination problems can be studied during one session. In this paradigm, a problem consists of the discrimination of one novel stimulus from one familiar stimulus. The habituation-dishabituation task can only test one type of problem per session because a considerable number of trials are needed during habituation and test phases.

An additional advantage of the paired-comparison task is that the data from multiple problems over a series of test sessions can be combined to allow a statistical analysis of individual performance (Ellis & Boyd, 1982; Shepherd & Fagan, 1980). Thus, the paired-comparison task can be used as an assessment tool to describe performance of individual nonambulatory, profoundly mentally retarded children. A tool that could reveal individual differences in recognition memory may be useful for identifying those children who are most likely to benefit from educational programs (Shepherd & Fagan, 1981).

Paired-Comparison Research with Nonambulatory, Profoundly Mentally Retarded Children

The paired-comparison task has been used to study visual discrimination and visual recognition memory in nonambulatory, profoundly mentally retarded children. Ellis and Boyd (1982) used a paired-comparison method to examine memory processes in a final sample of 10 profoundly, 6 severely and 14 moderately retarded persons. Group mean IQ's were 15.0, 30.5 and 44.3, respectively. Six severely retarded subjects were excluded due to either extreme position bias or severe strabismus, with neither eye obviously dominant. Twenty-two profoundly retarded subjects were excluded due to one of several reasons. These reasons included: (a) stereoscopic movements that obscurred a subject's vision; (b) refusal to sit before the apparatus; (c) only momentary fixations to stimuli; (d) subjects looking at themselves in the experimenter's mirror; and (e) intractable severe position bias. Level of retardation was treated as two levels based on IQ, with the subjects divided at the median.

The familiarization period involved the presentation of a pair of identical face stimuli until subjects had accumulated 30 seconds of looking time. The test phase consisted of two 10-s presentations of the familiar face paired with a novel face. The left-right positions of the familiar and novel stimuli were reversed on the second test

trial to control for position bias. This procedure was used for four 8-trial sessions. Each session involved problems with randomized retention intervals of 0, 10, 30 and 180 seconds between familiarization and test phases. The results revealed that 20 of the 30 subjects showed novelty preferences that were significantly above chance. There was no main effect for level of retardation. Furthermore, results indicated a significant effect for retention interval. The greatest decline in novelty preference was found over the first 10 seconds. Thereafter, novelty preferences levelled off for the 30- and 180-s delay intervals. This study shows that profoundly mentally retarded children can discriminate between familiar and novel faces.

Butcher (1977) examined recognition memory for photograghs of faces and colors using a paired-comparison procedure. Subjects were 16 profoundly mentally retarded children (mean chronological age (CA) = 6.1 years; mean MA = 5.3 months on the Bayley Scales of Infant Development). Stimuli were achromatic face photographs (2 male, 2 female) and colored patterns (red diamond, green diamond, red square, green square). A 2-minute familiarization period was followed by two 5-s test trials. This procedure was used for both classes of stimuli. The results indicated significant novelty preferences for all stimuli except the colored diamond pattern. These results reveal subjects'

ability to discriminate between novel and familiar faces and between a red square and a green square.

Shepherd and Fagan (1980) used a paired-comparison method to examine memory in 17 profoundly retarded children (mean CA = 7 years; mean MA = 4 months on the Bayley Scales of Infant Development). Stimuli consisted of black and white abstract patterns (high contrast) and grey and white abstract patterns (low contrast). An experimental session consisted of four memory problems each involving two 15-s study periods (the familiarization phase) followed by two 5-s test trials. All subjects participated in three experimental sessions, yielding a total of 12 novelty preference scores. The first two sessions involved high contrast stimuli, whereas the third session involved low contrast stimuli. Novelty data was collapsed across the three experimental sessions, yielding a mean novelty preference for each serial position. Results revealed an unequal distribution of visual fixation to novel and familiar stimuli, with significantly more attention to novel stimuli for three of the four recognition problems administered during a test session. Thus, these profoundly mentally retarded children could discriminate between familiar and novel stimuli of high or low contrast.

Each of these paired-comparison studies revealed that profoundly mentally retarded children could discriminate between familiar and novel stimuli. This discrimination

ability holds for face, color, and high or low contrast abstract patterned stimuli. Taken together, the results of these studies support the notion that the paired-comparison method is a useful tool for examining stimulus discrimination in nonambulatory, profoundly mentally retarded children.

Orientation Perception Research

One critical process for perceiving stimuli in visual space is orientation discrimination (Bornstein, Gross, & Wolf, 1978). Orientation is defined as the extent to which an object is rotated about the origin of its axes (McGurk, 1970). Psychological research throughout the century has studied the ability of both human and nonhuman organisms to detect, remember, and discriminate various orientations of stimuli (Bomba, 1984). While previous research has demonstrated the ability of nonambulatory, profoundly mentally retarded children to discriminate faces, colors, and abstract patterns, only one study has investigated orientation discrimination in this population (Krenn, 1986). Investigations into the role of orientation perception in infants show that infants do discriminate between different orientations of a stimulus (e.g., Bornstein, Krinsky, & Benasich, 1986; Columbo, Laurie, Martelli, & Hartig, 1984; Maurer & Martello, 1980; McCall, Kennedy, & Appelbaum, 1977; McGurk, 1972; Watson, 1966).

McGurk (1970) examined infant perception of orientation of facial and abstract objects. The infants' CAs ranged from 6 to 26 weeks. In three experiments, stimuli were presented at either 0 degree or 180 degree orientations (upright or upside down). In Experiment 1, a spontaneous visual preference procedure revealed a failure to discriminate between different orientations of the same stimuli. In Experiment 2, a habituation-dishabituation procedure was employed, consisting of successive presentations of the familiar stimulus followed by a single test trial involving a 180 degree rotation of the familiar stimulus. In Experiment 3, subjects were familiarized to a pair of identical stimuli for a continuous 80-s period. A 20-s test period involved a presentation of the familiar stimulus paired with a 180 degree rotation of that stimulus. The results of these final two experiments indicated habituation to the familiar stimulus and a significant novelty response to a 180 degree rotation of the stimulus. Thus, infants can discriminate between 180 degree orientations of a stimulus.

McKenzie and Day (1971) compared visual fixation and operant training methods for assessing orientation discrimination in normal infants aged 7 to 12 weeks. Stimuli involved nine patterns: one white stimulus and four pairs of stimuli with either horizontal or vertical alternating black and white bars. Each stimulus pair had

different widths of the alternating bars. In the first session, seven stimuli were presented one at a time for a duration of 20 s. Each subject was presented a random order of the set of seven stimuli in which each stimulus was presented three times. This spontaneous fixation method yielded little evidence that infants discriminate between horizontal and vertical patterns. Specifically, total duration of fixation time did not differ between horizontal and vertical orientations of a pattern. The following four sessions involved the operant training of head turning to either a horizontal or vertical pattern, and tests for generalization of that training to other striped patterns of varying width. Results showed that when infants were reinforced for turning their heads to the right for one orientation of a pattern and to the left for the other orientation, the frequency of correct responses indicated discrimination between the different orientations of a stimulus pattern. The results suggest that discrimination ability of infants for orientation depends on the type of discrimination task. Specifically, an operant training method appears to be a more sensitive test to assess discrimination abilities in infants than a spontaneous fixation method.

In three experiments, Bomba (1984) examined the perception of orientation in 2-, 3- and 4-month-old infants. These experiments employed a paired-comparison procedure

with square-wave gratings as stimuli. The square-wave grating (diameter = 16 cm) consisted of black and white bars (width = .8 cm) so that when viewed fron a distance of 30 cm, they had a spatial frequency of .33 cycles per degree and subtended a visual angle of 30.6 degrees. All experiments used a 90-s familiarization period involving six 15-s presentations of the familiar stimulus. The familiarization phase was followed by a paired-comparison testing phase consisting of two 10-s trials. In Experiment 1, the six 15-s familiarization trials involved six different orientations of a particular stimulus. The test phase consisted of two new orientations of the familiarized stimulus, either 0 or 45 degrees. In Experiment 2, all six 15-s familiarization trials involved a pair of the same 45 degree orientations of a stimulus followed by a test phase with either a 45 degree vs. 22.5 degree comparison or a 45 degree vs. 14.5 degree comparison. The same general procedure was used in Experiment 3, except that only one test pair was used, 2.5 degree vs. 25 degree.

Infants familiarized to oblique orientations preferred the vertical stimulus, while infants familiarized to a near vertical stimulus preferred a 45 degree oblique. Moreover, discriminations of 45 degree vs. 22.5 degree and 45 degree vs. 14.5 degree orientations were found in older subjects. The results of these three experiments provide further specification of the ability of infants to discriminate between orientations of stimuli.

Bornstein, Gross, and Wolf (1978) studied the perception of mirror images in 3- to 4-month-old infants. A series of five experiments employed a habituation-dishabituation procedure. In Experiment 1, subjects were familiarized to a right-side profile of a man for a 60-s period, and were then given six 10-s presentations of each test stimulus: the familiar profile, a left-side profile of the same man and a right-side profile of a different man. The results of the test phase showed infants looked significantly longer at the profile of the different man in comparison to both the familiar profile and its mirror image. Experiments 2 through 5 investigated the effects of different amounts of change in orientation between the familiar and novel stimuli. Experiments 2 and 3 used line segments, whereas Experiments 4 and 5 used a square bracket ([) shape. These experiments employed a habituation phase in which a stimulus was presented in a constant orientation. Test phases involved randomized presentations of the familiar and novel orientations of the stimulus. Results showed that infants habituated to familiar stimuli. Recovery of response was found for a change from a 20 degree to a 70 degree oblique and for 90 degree rotations of a stimulus. Infants did not discriminate between mirror images of a stimulus.

In a series of four experiments, Slater and Sykes (1977) used a spontaneous visual preference method to examine newborn infant (up to 8 days of age) visual responses to

stimuli. Stimuli were checkerboards (Experiment 1), and horizontal and vertical gratings (Experiments 1-4) all of which were equated for contour. In Experiment 1, a random order of the six possible pairs was presented to each subject for a duration of 30 s. The results indicated longer fixations on horizontal than on checkerboard stimuli and longer fixations on checkerboard than on vertical stimuli. Experiment 2 examined horizontal and vertical pattern comparisons across four different stripe widths: 2 inch, 1 inch, 1/2 inch, and 1/4 inch. An experimental session involved the presentations of the four stimulus pairs with alternating left and right positions. Thus, each subject was presented a random order of eight stimulus pairs. The results demonstrated a preference for horizontal over vertical stimuli. This preference held across all stripe widths. Experiments 3 and 4 examined the interaction between stripe width and horizontal and vertical pattern preferences. When gratings of the same orientation of a particular pattern were presented, results revealed a preference for an intermediate stripe width (between 1 and 1 1/2 inch). Taken together, the results of these three experiments suggest that neonates look longer at stimuli oriented in a horizontal position, and that they discriminate between two orientations of a stimulus.

These investigations provide evidence of the ability of young infants to discriminate between different orientations

of a stimulus. The habituation-dishabituation methods used in these infant studies have also be used to study discrimination of orientation in nonambulatory, profoundly mentally retarded subjects.

A recent study by Krenn (1986) investigated the perception of figure orientation in nonambulatory, profoundly mentally retarded children (mean CA = 10.2 years; mean MA = 6.2 months on the Bayley Mental Scale). Stimuli were arrangements of four black circles in a straight line (vertical, horizontal, oblique) or a square pattern. A fixed-trial habituation-dishabituation procedure was used. Subjects were given sixteen 20-s habituation trials with either a vertical or horizontal line, followed by eight 20-s test trials involving alternations of the habituating and novel stimuli. Intertrial intervals were 2 s in duration. Different novel stimuli were presented on each of three testing days: (a) a line differing by 45 degrees angular rotation from the familiar stimulus; (b) a line differing by 90 degrees from the familiar stimulus; and (c) a square pattern. The order of the presentation of novel stimuli was counterbalanced across three groups.

Subjects showed evidence of habituation to the familiar stimulus and response recovery to novel stimuli. These results suggest that nonambulatory, profoundly mentally retarded children are capable of discriminating between different orientations of a stimulus. The results also

indicated that although subjects perceived changes in orientation, there was a lack of sensitivity to different amounts of stimulus change. This lack of sensitivity may have been due to the use of the habituation-dishabituation procedure as this method does not allow for a direct comparison of the familiar stimulus with the novel stimulus.

The Present Study

In the present study, a paired-comparison paradigm was used to further examine orientation perception by nonambulatory, profoundly mentally retarded children. This method was used rather than the successive presentation procedure (fixed-trials procedure) used in Krenn's (1986) study because: (a) it required a briefer familiarization time; (b) it facilitated a comparison of the familiar and novel stimuli by the subject; and (c) it allowed presentation of multiple test problems in one session. Moreover, the paired-comparison procedure allowed an analysis of individual performance.

Stimuli consisted of line stimuli and square-wave gratings. Line stimuli identical to those used by Krenn (1986) were used in order to verify her findings using a paired-comparison method. Square-wave gratings were used based on the success of infant studies of orientation discrimination employing this type of stimulus (e.g., Bomba, 1984; Slater & Sykes, 1977). Moreover, the use of two

classes of stimuli facilitated the investigation of several different orientation comparisons within each test session by minimizing interference effects between paired-comparison test problems.

Each subject participated in four test sessions which were separated by at least 24 hours. Each test session consisted of four problems. A problem consisted of three 10-s familiarization trials followed by two 10-s test trials. During the familiarization trials, the same orientation of a stimulus appeared on the two screens. The test trials involved the simultaneous presentation of the familiarized orientation of the stimulus on one screen and a novel orientation of the stimulus on the other screen. Counterbalancing procedures were used to control for position of the test stimuli on the initial test trial. Positions of test stimuli were reversed on the second trial to control for position bias.

Six orientation discrimination problems were used. The V-H and V-O problems involved familiarization to the vertical orientation of a stimulus and testing with vertical and horizontal orientations and vertical and oblique orientations, respectively. The H-V and H-O problems consisted of familiarization to the horizontal orientation of a stimulus and testing with horizontal and vertical orientations and horizontal and oblique orientations, respectively. The O-V and O-H problems involved

familiarization to the oblique orientation of a stimulus and testing with oblique and vertical orientations and oblique and horizontal orientations, respectively. testing with the oblique and horizontal orientations. Within a session, subjects received both types of stimuli in an alternating fashion to minimize interference effects. Two problems involving 45 degree rotations and two problems involving 90 degree rotations were presented in each session.

It was expected that participants would fixate longer on novel orientations of stimuli than on familiar orientations during test trials. Such an outcome would indicate that nonambulatory, profoundly mentally retarded persons can discriminate 45 degree and 90 degree changes in orientation.

Method

Subjects

Subjects were 15 profoundly mentally retarded individuals selected from the population of a residential institution for mentally retarded persons. Their CAs ranged from 5.0 to 20.4 years (see Table 1). Their MAs ranged from below 2 months to 6 months as assessed by the Bayley Scales of Infant Development Mental Scale (Bayley, 1969; see Table 1). Medical histories, including motor and sensory assessments, are presented in Table 2. Most of the subjects were nonambulatory due to quadriplegia. Subjects 5, 15, and 16 had some mobility.

Table 1

Subject Characteristics

Subject	Sex	CA	MA	BRS	VF
1	M	16.83	3.0	34	5
2	F	20.42	4.5	51	7
3	M	18.50	6.0	79	8
4	F	10.67	4.0	46	4
5	F	13.58	4.5	52	6
6	M	9.33	4.5	48	4
7	F	11.17	3.5	42	6
9	F	20.33	3.0	34	6
10	F	12.00	5.0	56	6
11	M	11.75	5.0	56	8
13	F	10.92	3.5	41	7
14	F	10.75	5.5	66	8
15	M	11.25	6.0	67	7
16	M	5.00	4.0	47	8
17	M	9.17	2.0	26	6

Note: CA = Age in years.

MA = Mental age equivalents in months.

BRS = Bayley Scales of Infant Development (Mental Scale) raw scores.

VF = Number of items passed on the Mental Scale requiring visual fixation.

Table 2

Subject Description

Subject Number	Diagnosis/ Medical History	Motor	Sensory
1	Microcephaly Seizure disorder	Spastic Quadriplegia	Sees and hears well
2	Hydrocephalic Seizure disorder	Diplegia	Visual impairment in one eye
3	Microcephaly of unknown prenatal origin Seizure disorder	Spastic Quadriplegia Scoliosis	Sees and hears well
4	Born to Grava II Para I mother Possilble encephalitis	Athetoid Cerebral palsy	Sees and hears well
5	Cornelia de Lange syndrome	Can move wheeled walker	Hearing impaired Sees well

Subject Number	Diagnosis/ Medical History	Motor	Sensory
6	Microcephaly Seizure disorder	Spastic Quadriplegia	Sees and hears well
7	Hyaline membrane disease Seizure disorder	Spastic Quadriplegia	Stabismus Eye movements jerky
9	Hyperbilirubinemia Kernicteric brain damage	Spastic Quadriplegia Scoliosis	Eyes are not well co-ordinated
10	Severe brain damage due to encephalitis at 1 year Seizure disorder	Spasticity of hands Quadriplegia	Sees and hears well
11	Hydrocephalitis at 3 months due to aqueducal stenosis Hypernatremia	Spastic Quadriplegia Cerebral palsy	Hears normally

Subject Number	Diagnosis/ Medical History	Motor	Sensory
13	Microcephaly Delayed development of unknown origin	Choreoathetoid Scoliosis	Hearing loss in right ear Sees well
14	Seizure disorder from 6 months Prenatal toxemia	Spastic Cerebral palsy Quadriplegia	Sees and hears adequately
15	General cortico reticular dysfunction Ictal disorder	Walks with assistance	Sees and hears well
16	Microcephaly Partial agenesis of corpus callosum	Walks dependently	Sees and hears well
17	Born to Grava II Para I mother Pancreas nesidioblastosis	Bilateral equinovarus deformities	Vision and hearing intact

Subject selection was based on ability to visually fixate as determined by Bayley Mental Scale test items requiring this response (see Table 3), assessment by ward staff, and medical records (see Table 2). Scores on the Bayley test items requiring visual fixation ranged from 4 to 8 items passed (see Table 1).

Stimuli and Apparatus

Two types of stimuli were employed: a square-wave grating and a line pattern (see Figure 1). The square-wave grating consisted of black and white bars (width = 2.9 cm) enclosed within a thin black circle (diameter = 17.3 cm). When viewed from a distance of 1 meter, the grating had a spatial frequency of .31 cycles per degree and subtended a visual angle of 9.8 degrees. The line pattern was composed of 4 black circles (diameters = 4.1 cm) arranged in a straight line (length = 16.9 cm) on a white background. The visual angle of the line stimulus was 2.3 degrees. The stimuli were presented in vertical, horizontal, or oblique (45 degree angular rotation) orientations.

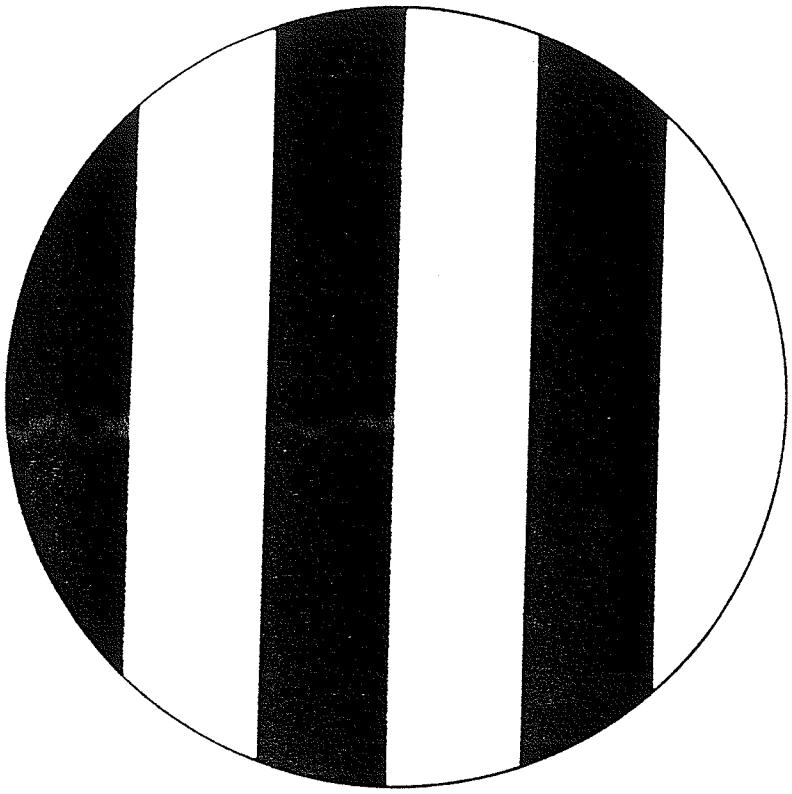
The viewing apparatus consisted of a white frame (height = 113 cm, width = 159 cm) mounted on a table. Within the white frame, two stimulus projection screens (22 cm x 27 cm) were positioned 35 cm apart. The stimuli were rear projected by two Kodak Carousel 800 projectors onto these screens. A prompt light was produced by two orange bulbs located behind a third screen (27 cm x 35 cm) centered

Table 3

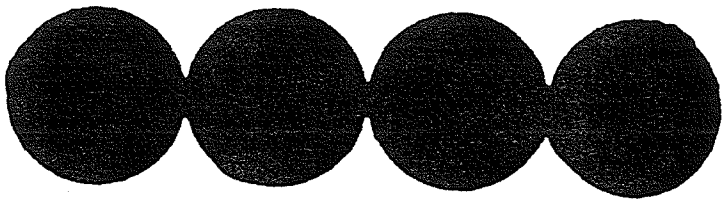
Visual Fixation Test Items from the Mental Scale of the Bayley Scales of Infant Development

Item Number	Item Description
5	Momentary regard of red ring
6	Regards person momentarily
7	Prolonged regard of red ring
19	Turns eyes to red ring
20	Turns eyes to light
34	Glances from one object to another
37	Reaches for dangling ring
45	Inspects own hands
46	Closes on dangling ring

Figure 1. The stimuli used in this study: Panel (a) shows square-wave grating; and Panel (b) shows line pattern.



(a)



(b)

between the stimulus projection screens. A 15-W fluorescent light was positioned horizontally 66.9 cm above the screens to provide sufficient light for the operation of the video camera and to serve as a reference point for scoring visual fixations.

A video camera (Panasonic W-V 3230) equipped with a zoom lens was mounted behind the apparatus midline between the screens. The camera superimposed a timebase accurate to 0.03 s onto the videotapes. A black cloth, extending from the white frame to the camera, was used to shield the camera from the subject's view. To shield the experimenter from the subject's view, a white sheet was hung from the bottom of the white frame to the floor, and two white wooden panels (height = 150 cm, width = 60 cm) were attached to the sides of the viewing apparatus.

From behind the viewing apparatus, the experimenter observed the subject's eyes on the video monitor, and controlled the prompt light and onset of the stimuli. Electromechanical equipment was used to operate the projector and time stimulus presentations.

Procedure

Subjects were tested in the wheelchairs they normally use on their wards. Each subject was placed in the testing room such that his or her head was alligned with the prompt light

and the viewing screens were at eye level. The room lights were turned off, leaving only the illumination provided by the fluorescent light. During the test session, the experimenter observed the subject's face through the video monitor and made any adjustments necessary to keep the face clearly visible. For six subjects who lacked adequate head or neck control, an additional experimenter provided manual head support.

The session began with the experimenter repeatedly pressing a button that flashed the prompt light on and off. When the subject oriented toward the midline of the two screens, the experimenter turned off the prompt light and presented the first stimulus pair. Each trial followed this same procedure. Each problem consisted of three 10-s familiarization trials and two 10-s test trials. During the three familiarization trials, the habituating stimulus appeared on both screens for 10 s. The two test trials immediately followed the familiarization trials. The test trials involved the simultaneous presentation of the familiar orientation of the stimulus on one screen and a novel orientation of that stimulus on the other screen. The novel orientation was presented on the left screen for one test trial and on the right screen for the other test trial.

Counterbalancing procedures were used to control for left-right position bias. For one-half of the subjects, during the first problem in Session 1, the novel stimulus

appeared in the left position for the first test trial and then in the right position for the second test trial. The reverse positions were used for the other subjects. For each subject, the position of the novel stimulus on the first test trial was alternated over the four problems and across the four sessions. Intertrial and interproblem intervals were controlled by the subject's orientation to the prompt light. Consequently, these intervals varied over trials and across subjects.

Each subject participated in four test sessions, separated by at least 24 hours. Four discrimination problems were presented in each session. Considering orientation of the familiar stimulus and the amount of rotation (45 degrees or 90 degrees) of the novel stimulus, there were six different problems (see Table 4). Within each session, each of the first three problems involved one of the three stimulus orientations (vertical, horizontal, or oblique) as the familiar stimulus. The fourth problem repeated the orientation used in the first problem.

Each session included two 45 degree problems and two 90 degree problems. That is, the test phase involved a novel stimulus that was a 45 degree or 90 degree angular rotation of the familiar stimulus, respectively. One 45 degree and one 90 degree problem was presented using the line stimulus and the other 45 degree and 90 degree problem involved the square-wave stimulus.

Table 4

Orientation Discrimination Problems

Familiar Stimulus	Test Stimuli
V	V - H
V	V - O
H	H - V
H	H - O
O	O - V
O	O - H

Note: V = Vertical orientation.
H = Horizontal orientation.
O = Oblique orientation.

Problems were assigned to each session under the constraint that the four sessions included one session with two vertical orientations as the familiar stimulus, another session with two horizontal orientations and a third session with two oblique orientations. Type of stimulus, line stimulus (LS) and square wave grating (SW), alternated over problems within each session. The two possible orders of stimulus type within a session (LS, SW, LS, SW or SW, LS, SW, LS) alternated over the four sessions. One of these orders was randomly assigned to a subject's first session.

Results

Visual fixations were coded from videotapes using two millisecond timers. A fixation on either the left or right stimulus was scored when the reflection of that stimulus was centered over the left or right pupil, respectively. An observer pressed left and right buttons to activate the timers for the duration of the fixations to the left and right stimuli, respectively.

Interobserver reliablity was calculated for total fixation time on the left stimulus (left looking), total fixation time on the right stimulus (right looking), and total fixation time (left + right looking) for one randomly selected session per subject. Pearson product-moment correlations were calculated for all familiarization and test trials for each of the four problems within the session. The ranges of r values were .24 to .99 (M = .81)

for left looking, .36 to .97 (M = .82) for right looking, and .16 to .94 (M = .80) for total looking time. For two subjects, reliablity was assessed for a second session when low scores (r < .65) were obtained for total looking time on the first session. From the first to second sessions, reliablity increased from r = .16 and r = .52 to r = .86 and r = .84, respectively.

Familiarization Phase

The data from the three familiarization trials were examined for a response decrement. For each trial a total fixation time was calculated by summing total fixation time on the left stimulus and total fixation time on the right stimulus. A logarithmic transformation ($\log_{10}x + 1$) was used to reduce the degree of positive skewness of the distribution of total fixation times.

Table 5 presents the results of a 4 x 2 x 3 factorial analysis of variance on these data. The three within subject variables were session (1 to 4), type of stimulus (line stimulus vs. square wave grating), and trial (1 to 3). A significant trials effect was obtained, $F(2, 28) = 16.65$, $p < .001$. This effect was examined using Tukey's HSD paired comparison procedure (Kirk, 1982). The transformed mean total fixation time on Trial 1 was significantly greater than on both Trials 2 and 3 (.71, .64 and .61, respectively), $HSD = 0.06$, $p = .05$. The difference between trials 2 and 3 was nonsignificant.

Table 5

Familiarization Phase Data: Analysis of Variance on Sessions x Type x Trials

Source	Sums of Squares	df	Mean Square	F	p
Sessions (S)	.868	3	.289	4.78	.006
Error	2.542	42	.061		
Type of Stimulus (T)	.073	3	.024	.51	.681
Error	2.034	42	.048		
Trials (A)	1.093	2	.546	16.65	.001
Error	.919	28	.032		
S x T	.339	9	.038	.77	.646
Error	6.175	126	.049		
S x A	.186	6	.031	.71	.645
Error	3.693	84	.044		
T x A	.266	6	.044	1.18	.325
Error	3.154	84	.038		
S x T x A	1.082	18	.060	1.38	.140
Error	10.957	252	.043		

A significant effect for sessions was also found $F(3, 42) = 4.78$, $p = .006$. The transformed mean total fixation times for sessions 1 to 4 were .69, .64, .59, and .67, respectively. Pairwise comparisons using the Tukey's HSD test revealed that the mean total fixation time for Session 3 was significantly lower than for Sessions 1 and 4, HSD = .07, $p = .05$. All other main effects and interactions were nonsignificant.

The familiarization phase data were also analyzed to assess the effect of the orientation of the familiar stimulus (vertical, horizontal, oblique) on fixation times. The first three problems of each session were used in this analysis. A 4 x 3 x 3 repeated measures analysis of variance was carried out (see Table 6). The within subject variables were sessions (1 to 4), orientation of familiar stimulus (vertical vs. horizontal vs. oblique) and trials (1 to 3). The main effect for orientation of familiar stimulus was nonsignificant; however, a significant interaction between orientation of familiar stimulus and trial was found, $F(4, 56) = 2.74$, $p = .04$. The transformed means involved in this interaction are shown in Table 7. No significant differences were found when examining pairwise differences between these means using Tukey's HSD test, HSD = .15, $p = .05$. Trend analyses revealed significant linear decreases in mean total fixation times over trials for vertical stimuli, $F(1, 14) = 12.04$, $p = .004$, and horizontal

Table 6

Familiarization Phase Data: Summary of Analysis of Variance involving Session, Orientation, and Trial

Source	Sums of Squares	df	Mean Squares	F	p
Sessions (S)	.610	3	.203	4.89	.005
Error	1.746	42	.042		
Orientation of Familiar Stimulus (O)	.018	2	.009	.22	.806
Error	1.152	28	.041		
Trials (T)	.940	2	.470	10.77	.0003
Error	1.223	28	.044		
S x O	.164	6	.027	.53	.788
Error	4.377	84	.052		
S x T	.141	6	.023	.49	.813
Error	4.007	84	.048		
O x T	.288	4	.072	2.74	.038
Error	1.473	56	.026		
S x O x T	.498	12	.041	.90	.546
Error	7.721	168	.046		

Table 7

Transformed Mean Total Fixation Times on Vertical, Horizontal, and Oblique Orientations of Stimuli during Familiarization Phase

	Vertical	Horizontal	Oblique
Trial 1	.71	.70	.72
Trial 2	.67	.66	.59
Trial 3	.60	.60	.63

Note: Tukey HSD critical value = .15 for p = .05.

stimuli, $F(1, 14) = 8.06$, $p = .01$. Attention to the oblique stimuli revealed a significant quadratic effect, $F(1, 14) = 7.08$, $p = .02$, where mean total fixation times decreased from trials 1 to 2 but then increased from trials 2 to 3. All other interactions in the analysis of variance were nonsignificant.

Test Phase

The test phase data were examined to determine whether subjects' preferences for the novel stimuli depended on session, type of stimulus, or the amount of change in orientation. For each problem, total fixation times on the novel stimulus were summed over the two test trials. Similarly, total fixation times on the familiar stimulus were summed over the two test trials. Novelty preference scores were then calculated by dividing total fixation time on the novel stimulus by the total fixation time on both the familiar and novel stimuli. Subject 13 was excluded from this analysis due to her failure to look at either the familiar or novel stimuli on both test trials for two problems.

The novelty preference scores were examined using a 4 x 2 x 2 factorial analysis of variance (see Table 8). The within subject variables were session (1 to 4), amount of change (90 degrees vs. 45 degrees), and type of stimulus (line stimulus vs. square wave grating). There were no significant effects.

Table 8

Test Phase Data: Summary of Analysis of Variance on Sessions x Amount of Change x Type of Stimulus

Source	Sums of Squares	df	Mean Squares	F	p
Sessions (S)	.003	3	.001	.02	.996
Error	1.781	39	.046		
Amount of Change (C)	.122	1	.122	3.63	.079
Error	.435	13	.033		
Type of Stimulus (T)	.015	1	.015	.55	.471
Error	.344	13	.026		
S x C	.143	3	.048	.79	.507
Error	2.354	39	.060		
S x T	.147	3	.049	1.03	.390
Error	1.857	39	.048		
C x T	.069	1	.069	.81	.386
Error	1.108	13	.085		
S x C x T	.329	3	.110	1.93	.141
Error	2.214	39	.057		

The overall novelty preference score (.565) was examined using a *t* test to determine whether it was significantly greater than chance (.50). This test revealed that the overall novelty preference score was significantly greater than chance, $t(237) = 4.47$, $p = .01$. Thus, subjects looked significantly longer at novel orientations of the stimuli than at familiar orientations.

Individual Subject Analyses

Position bias. A measure of position bias was calculated for each subject. For each problem, total fixation times to the left position were summed over the three familiarization trials and total fixation times to the right position were also summed over the three trials. A left preference score (preference to look to the left position) was then obtained by dividing total fixation time to the left position by total fixation time to the left and right positions. *T* tests were then used to determine whether an individual's mean left preference score was significantly different from chance (.50). As can be seen in Table 9, 12 of the 15 subjects had a position preference. Scores above .50 signify a left preference while scores below .50 signify a right preference. Five subjects showed a bias to look left (scores significantly greater than .50) and 7 subjects preferred to look right (scores significantly less than .50).

Table 9

Individual Novelty Preference and Position Preference Scores

Subject	LEFTPREF	NOVPREF
1	.37*	.57
2	.19**	.55
3	.74**	.63*
4	.77**	.53
5	.57	.52
6	.86**	.53
7	.45	.67**
9	.31*	.43
10	.37*	.67**
11	.45**	.52
13	.46	.45
14	.35*	.61
15	.91**	.48
16	.37**	.68**
17	.78**	.65*

* $p < .05$

** $p < .01$

Note: NOVPREF = Mean novelty preference score.

LEFTPREF = Mean preference to look to the left stimulus.

Novelty preferences. Individual novelty preference scores were also examined using *t* tests to determine if they were significantly greater than chance (.50). Fourteen subjects had scores for each of the 16 problems while one subject had scores for only 14 problems. Five of the 15 subjects had scores that were significantly greater than chance (see Table 9).

Task Performance. Three measures of task performance were calculated for each subject. (a) A mean total fixation time on the three familiarization trials was obtained by averaging these times over the four problems within a session. (b) A mean novelty preference score was obtained by averaging novelty preference scores for the four problems within a session. (c) Session duration for each session was also obtained.

These data were assessed for stability. Intercorrelations of mean total fixation times are shown in Table 10. These times were significantly correlated across all sessions. Mean novelty preference score correlations also appear in Table 10. These scores were not related. Session duration for Session 1 was significantly correlated with session duration of Sessions 2 and 3 (see Table 11). There was also a significant correlation between the durations of Sessions 2 and 3.

Table 10

Correlations of Mean Novelty Preference Score and Mean Total Fixation Time during Familiarization Phase

	MTOT1	MTOT2	MTOT3	MTOT4	MNOV1	MNOV2	MNOV3
MTOT2	.72**						
MTOT3	.85**	.89**					
MTOT4	.89**	.91**	.94**				
MNOV1	-.36	-.31	-.30	-.33			
MNOV2	.15	-.09	-.06	-.10	.28		
MNOV3	.50	.23	.49	.35	.20	.46	
MNOV4	.37	.32	.30	.27	-.05	.19	.33

* $p < .05$

** $p < .01$

Note: MTOT = Mean total fixation time during familiarization trials for Session 1 to 4.

MNOV = Mean novelty preference scores for Sessions 1 to 4.

Table 11

Correlations of Session Duration

	SD 1	SD 2	SD 3
SD 2	.62*		
SD 3	.72**	.55*	
SD 4	.45	.40	.41

* p < .05

** p < .01

Note: SD = Session Duration for Sessions 1 to 4.

The three task performance measures were examined for possible interrelationships. Session duration and mean total fixation times for the corresponding session were not significantly correlated (r = -.19, -.44, .05 and -.17 for Sessions 1 to 4, respectively). Session duration and mean novelty preference scores were also not significantly correlated (r = -.03, .06, .26 and -.12 for Sessions 1 to 4, respectively). Mean total fixation times and mean novelty preference scores were also not related (see Table 10).

Subject characteristics and mean task performance measures. The subject characteristics used in this analysis were chronological age (CA), Bayley raw scores (BRS), mental age equivalents (MAs), and IQ. IQ was calculated as (MA/CA) x 100. The task performance measures were mean scores across the four sessions for total fixation during familiarization trials, novelty preference scores, and session duration.

The correlations between these measures are shown in Table 11. None of the subject characteristic variables was significantly correlated with task performance measures. A significant negative correlation was found between IQ and CA (see Table 12), r = -.74, $p < .01$. Finally, BRS was significantly correlated with MA, r = .98, $p < .01$. This finding is trivial as MA is defined by BRS.

Table 12

Correlations between Subject Characteristics and Mean Task Performance Measures

	CA	BRS	MA	MNOV	MTOT	MSESDUR
BRS	.09					
MA	.06	.98**				
MNOV	-.34	.09	.03			
MTOT	.26	-.07	-.03	.16		
MSESDUR	.42	.27	.26	-.08	-.26	
IQ	-.74**	.40	.45	.31	-.33	-.24

* $p < .05$

** $p < .01$

Note: CA = Chronological age.

BRS = Bayley raw score.

MA = Mental age equivalent.

MNOV = Mean novelty preference score.

MTOT = Mean total fixation time during familiarization.

MSESDUR = Mean session duration.

IQ = Intelligence quotient scores.

Discussion

The present study investigated orientation discrimination by nonambulatory, profoundly mentally retarded children and adolescents through the use of a paired-comparison procedure. In this procedure, differential looking at novel and familiar stimuli during the test phase reveals the ability to discriminate between familiar and novel stimuli. Novelty preferences were found during the test phase, indicating that these individuals did perceive changes in orientation. This result is consistent with Krenn's (1986) study which also found orientation discrimination in nonambulatory, profoundly mentally retarded subjects using a habituation-dishabituation procedure.

Mean novelty preference scores did not differ according to the amount of change in orientation (45 or 90 degrees) during the test phase. This result is consistent with other studies involving nonambulatory, profoundly mentally retarded children which have not found differential responding when amount of stimulus change was manipulated. Krenn (1986) found that the magnitude of response recovery during the test phase was not a function of the amount of discrepancy between the habituating and novel stimuli. Kelman and Whiteley (1986) found no differential responding to test stimuli varying along a form dimension.

The novelty preference scores obtained in the present study can be compared with scores obtained in previous research with profoundly mentally retarded individuals. Five of the 15 subjects (33%) showed individual scores that were significantly greater than chance. The number of significant individual scores has been somewhat higher in other studies involving profoundly mentally retarded subjects. In a study by Ellis and Boyd (1982), 5 of 10 profoundly mentally retarded subjects (50%) showed significant novelty preferences. Novelty preference scores in Shepherd and Fagan's (1980) study yielded 7 of 17 significant scores (41%). The range of novelty preference scores has also varied from study to study. In the present study, scores ranged from .43 to .68. This range is comparable to other studies using this method. Shepherd and Fagan (1980) found a range of .47 to .75; whereas, Butcher (1977) and Ellis and Boyd (1981) obtained novelty preference score ranges of .50 to .64 and .55 to .67, respectively. Overall novelty preference scores also vary, as the present study found a score of .56, whereas Butcher (1977) obtained scores of .61 and .64 for face problems and .57 for color problems. Overall, the novelty preference scores obtained in the present study are comparable to those of other studies but at the lower end of the range of scores obtained in these studies.

This variance in subject performance from study to study may result from the use of different familiarization periods. For example, the 2-minute familiarization phase used in Butcher's (1977) study was longer than the three 10-s trials used in the present study. Longer familiarization may lead to stronger memory traces for the familiar stimulus and consequently to greater overall novelty preference scores than the scores in the present study. In a study with nonhandicapped infants, Fagan (1974) found greater overall preference scores for problems involving longer amounts of familiarization when using the same type of stimuli. Future research could examine the effects of varying familiarization times. For example, 10 s vs. 30 s criteria for amount of fixation to the familiar stimulus could be compared.

Alternatively, the amount of stimulus change might have been somewhat greater in previous studies than in the present study. Perhaps the change in only stimulus orientation in the present study was not sufficient to produce a strong preference for the novel stimulus. Fagan (1974) obtained differing scores for problems with different kinds of stimuli when infants were tested.

It appears that novelty preference scores found in studies with profoundly mentally retarded subjects are similar in magnitude to those found in infant studies. For example, the majority of individual novelty preference

scores in Miranda and Fantz's (1974) study lie within the .50 to .60 range (highest score = .68). This range is comparable to the ranges of profoundly mentally retarded subjects scores found in Shepherd and Fagan's (1980) study (.47 to .78), Butcher's study (.50 to .64), Ellis and Boyd's study (.55 to .67), and the present study (.43 to .68). Nevertheless, it is possible that novelty preferences in the profoundly mentally retarded population are not as strong as in nonhandicapped infants and children. Some support for this hypothesis is provided by a study by Terdal (1967) which examined satiation differences in mildly and moderately retarded and nonretarded subjects. Terdal's (1967) paired-comparison procedure involved the repeated presentation of a familiar stimulus on one screen and novel stimuli on a second screen. The retarded subjects did not show increasing novelty preferences over trials. They had smaller novelty preference scores and total looking times than the nonretarded subjects. Terdal (1967) attributed these results to an inability of the mentally retarded subjects to satiate to stimuli. Further research providing a comparison of the performance of profoundly mentally retarded persons and nonretarded infants is needed to address this question.

In the present study, no difference was found in total fixation time to the three orientations of the stimuli on the familiarization trials. These results suggest that

nonambulatory, profoundly mentally retarded children do not prefer to look at one orientation of a stimulus over another. However, differential patterns of responding to the various orientations of stimuli occurred over the three familiarization trials. Whereas vertical and horizontal orientations led to a linear decrease over trials, attention to the oblique stimulus decreased from Trial 1 to 2 but then increased on Trial 3. Thus, subjects appear to process oblique stimuli in a different way from vertical and horizontal stimuli. Further research could examine changes involving other orientations of stimuli. For example, perception of changes of 90 degree rotations of oblique stimuli are not found in infants (Bornstein et al., 1978). The ability to categorize different orientations of stimuli could also be examined in the nonambulatory, profoundly mentally retarded population.

Individual differences in task performance were assessed for stability over sessions. Mean total fixation times during the familiarization phase were highly positively correlated across all sessions. These results suggest that total fixation time is a stable individual difference variable. The stability of total amount of fixation is consistent with Abraham's (1987) findings. Mean novelty preference scores were not stable across sessions. This result is also in agreement with Abraham (1987) who found that amount of dishabituation was not consistent across all

immediate and delayed tests of recognition memory. In the present study, session duration was moderately stable across sessions, indicating that the variable intertrial and interproblem intervals led to similar total session lengths for individual subjects.

Task performance measures were also examined for their relationship to one another. Correlations between mean novelty preference scores and mean total fixation times during the familiarization trials were not significant. This finding is not consistent with Abraham (1987) who found that fixation time during habituation was positively correlated with the amount of dishabituation on immediate and delayed tests of recognition memory. This difference could be due to the limited range of novelty preference scores obtained in the present study. Perhaps, the subject-control procedure used by Abraham (1987) allowed for a larger range of dishabituation scores. The large range of total looking times revealed by profoundly mentally retarded persons is more likely to be correlated with a large range of dishabituation scores than a limited range of novelty preference scores.

Subject characteristic variables yielded significant correlations with each other but not with task performance. The significant negative correlation between IQ and chronological age is consistent with the results of Krenn (1986) and Kelman and Whiteley (1986). This relationship

results from the fact that MA did not increase as CA increased. The relationship between mean novelty preference scores and chronological age was not significant in this study. This failure of subject variables to predict task performance is also found in other studies (i.e., Butcher, 1977). Thus, it appears that performance on this paired-comparison task by nonambulatory, profoundly mentally retarded children cannot be predicted from chronological age and Bayley Mental Scale scores.

The results of the present study support the view that it is appropriate to study nonambulatory, profoundly mentally retarded children using the paired-comparison procedure that was initially developed for infant research. This could be due to the fact that novelty preferences emerge early in development relative to other behavioral systems (Spelke, 1985). Participants in the present study showed habituation to the familiar stimulus after only 30 s of familiarization time. Moreover, testing of four problems was possible using this procedure. Thus, the paired-comparison procedure is a more efficient method for testing these individuals than the habituation-dishabituation procedure.

In summary, the present research demonstrated that nonambulatory, profoundly mentally retarded children preferred to look at a novel orientation of a stimulus rather than at its familiar orientation. This result indicates that these individuals are capable of

discriminating 45 degree and 90 degree rotations of a stimulus.

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APPENDIX A

Data

Each subject's data is provided by a block of 72 lines. The data for each session is arranged as follows:

Subject identification and description

Line 1: subject number; session number (1 to 4); chronological age in years; Bayley Raw Score; sex (1 = male; 2 = female); mental age in months.

Data for Problem 1, Session 1 (4 lines)

Line 2: order of problem in the session (1 to 4); type of familiar stimulus (1 = vertical square-wave (SW); 2 = horizontal SW; 3 = oblique SW; 4 = vertical line stimulus (LS); 5 = horizontal LS; 6 = oblique LS); type of novel stimulus (same as previous 1 to 6); location of novel stimulus on first test trial (1 = right screen; 2 = left screen).

Line 3: total fixation time to left and right stimuli, respectively, during familiarization (trials 1 to 3), i.e., Trial 1 - Left, Trial 1 - Right, Trial 2 - Left, Trial 2 - Right etc.

Line 4: total fixation time to novel and familiar stimuli, respectively, during test phase (trials 1 to 2); latency to first fixation per trial (trials 1 to 2).

Line 5: latency to first fixation per trial (trials 3 to 5); intertrial interval per trial (trials 1 to 5).

(Data for Problems 2-4 on Lines 19-17)

Line 18: three interproblem interval (problems 1 to 4); session duration.

(Data for Sessions 2-4 on Lines 19-72)

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01.00   01.00   16.83   34.00   01.00   03.00
04.00   04.00   05.00   01.00
00.00   09.62   04.00   05.86   00.00   06.49
03.42   04.12   04.20   02.50   00.37   00.00
00.30   00.33   00.30   11.64   08.34   08.91   04.28
01.00   01.00   02.00   02.00
04.47   04.39   01.80   06.78   01.70   07.11
00.00   09.67   09.67   00.00   00.77   00.70
00.30   00.33   00.27   09.05   11.42   06.48   05.30
02.00   05.00   06.00   01.00
00.00   09.77   00.00   07.60   04.81   04.50
01.95   02.34   05.68   03.92   03.00   03.37
03.30   00.00   00.37   06.34   07.20   06.78   23.19
03.00   03.00   02.00   02.00
00.86   08.83   02.05   07.67   00.00   09.65
00.00   09.81   06.62   00.00   00.30   00.26
00.40   00.30   00.26   06.34   06.34   07.27   08.18
07.81   05.60   05.60  360.22
01.00   02.00   16.83   34.00   01.00
01.00   05.00   04.00   01.00
07.23   02.36   03.87   06.05   00.00   07.06
02.46   06.82   08.89   00.74   00.40   00.27
00.33   00.40   00.00   12.95   06.62   14.71   05.03
04.00   02.00   01.00   02.00
09.95   00.00   00.00   09.83   00.00   09.74
01.69   07.90   03.20   00.00   00.00   00.37
00.30   00.30   00.34   05.40   09.37   10.85   07.34
03.00   06.00   04.00   01.00
05.03   04.85   03.93   03.97   07.64   00.76
03.90   05.71   05.48   04.32   00.33   00.00
01.03   00.26   00.00   08.84   06.84   08.51   05.47
02.00   01.00   03.00   02.00
05.22   04.20   04.47   04.90   04.74   04.99
04.23   05.43   05.41   04.24   00.30   00.43
00.27   00.30   00.40   12.42   06.57   04.74   07.04
12.11   05.47   05.61  359.65
01.00   03.00   16.83   34.00   01.00
02.00   05.00   04.00   01.00
03.49   05.40   01.50   07.85   04.02   05.40
09.73   00.00   00.00   09.62   00.00   00.36
00.30   00.40   00.30   04.24   05.20   05.41   04.61
03.00   01.00   02.00   02.00
01.05   06.79   05.40   04.04   03.84   03.80
02.28   03.06   05.20   04.13   00.33   00.36
00.34   00.67   00.00   06.38   11.44   07.64   06.20
04.00   06.00   05.00   01.00
00.86   06.69   06.65   02.13   03.99   02.30
08.31   00.53   06.89   02.68   00.57   00.20
00.33   00.40   00.30   05.71   07.64   06.20   08.94
01.00   03.00   01.00   02.00
01.51   07.81   00.00   04.12   02.48   06.31
02.58   03.93   06.22   00.81   00.50   00.40
00.40   00.00   00.40   04.31   17.29   04.94   04.84
05.77   04.58   09.50  334.69
01.00   04.00   16.83   34.00   01.00
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01.00   04.00   05.00   01.00
07.04   02.68   03.09   05.41   01.78   07.69
07.66   00.00   04.94   01.20   00.23   00.34
00.30   00.33   00.53   04.40   06.44   09.91   22.23
02.00   02.00   01.00   02.00
05.98   03.15   04.65   03.84   02.56   07.00
05.66   03.02   02.09   06.80   00.73   00.38
00.37   00.30   00.47   05.93   07.04   06.64   07.17
03.00   06.00   04.00   01.00
09.78   00.00   03.17   03.31   07.97   01.40
06.89   02.61   00.00   02.40   00.00   00.30
00.00   00.66   00.14   06.37   09.90   04.54   07.14
04.00   01.00   03.00   02.00
02.07   04.00   00.56   06.39   01.27   05.68
05.34   04.38   09.72   00.00   00.36   00.34
00.10   00.30   00.30   06.87   16.19   05.88   03.60
12.88   12.18   06.91  366.21
02.00   01.00   20.42   51.00   02.00   04.50
01.00   05.00   04.00   01.00
00.00   09.98   02.91   06.55   00.00   00.85
00.00   06.77   03.75   05.87   00.00   00.37
00.48   01.79   00.40   04.47   29.39   10.01   03.04
04.00   02.00   01.00   02.00
01.82   01.45   01.71   01.27   00.00   07.16
00.00   07.28   01.12   00.00   00.44   00.34
03.21   01.47   00.48   07.87   08.98   03.10   27.49
03.00   06.00   05.00   01.00
00.00   09.12   01.09   07.30   00.89   00.00
07.58   00.00   01.42   01.07   00.10   00.37
00.64   01.70   00.17   07.24   17.86   53.39   41.87
02.00   01.00   03.00   02.00
00.00   08.47   00.00   02.37   00.00   08.75
09.92   00.00   06.43   00.00   02.14   00.10
00.94   00.37   00.04   06.68   06.91   03.26   04.31
01.09   09.67   17.28  472.92
02.00   02.00   20.42   51.00   02.00
02.00   05.00   04.00   01.00
03.12   00.00   00.00   05.98   00.00   06.23
07.88   00.00   01.56   05.47   00.67   00.10
00.40   00.20   00.30   08.17   09.17   07.14   03.87
01.00   01.00   02.00   02.00
00.00   08.99   00.00   02.65   00.00   05.03
00.00   00.00   07.67   00.00   00.47   00.13
04.53   *****   00.06   21.72   13.59   05.96   17.05
04.00   04.00   06.00   01.00
00.00   03.82   00.00   02.31   00.00   01.93
06.92   00.90   08.09   00.29   00.17   00.30
00.17   00.15   00.16   16.75   09.14   10.16   03.20
03.00   03.00   01.00   02.00
00.00   08.84   01.52   07.77   01.02   07.80
00.34   06.09   00.00   00.00   00.80   00.10
01.04   01.14   *****   04.61   05.00   03.03   15.95
03.27   25.13   06.81  394.02
02.00   03.00   20.42   51.00   02.00
03.00   05.00   04.00   01.00
```

00.00	01.21	03.12	01.91	02.06	00.00	
00.00	00.00	01.30	02.16	01.63	00.90	
02.13	*****	00.53	23.59	10.78	11.57	09.28
02.00	01.00	02.00	02.00			
00.00	03.56	00.00	09.08	00.00	06.59	
00.00	05.24	07.83	00.00	00.73	01.64	
00.60	00.86	05.05	07.31	03.26	06.84	07.00
01.00	06.00	05.00	01.00			
00.79	02.40	01.18	00.62	01.17	04.52	
00.00	02.32	07.86	01.36	00.44	02.31	
00.50	00.36	00.16	05.64	09.68	10.18	16.79
04.00	03.00	01.00	02.00			
00.00	05.09	00.97	01.49	01.31	00.00	
00.00	02.87	06.18	00.00	01.13	00.71	
00.10	00.10	00.81	12.51	03.10	13.52	19.88
06.28	05.27	14.25	400.85			
02.00	04.00	20.42	51.00	02.00		
04.00	05.00	04.00	01.00			
00.38	02.87	00.00	09.59	02.44	05.81	
08.60	00.00	02.60	06.75	00.03	00.30	
00.10	01.50	00.20	25.40	02.70	02.68	10.61
01.00	02.00	01.00	02.00			
03.30	03.41	01.92	03.72	00.00	09.41	
00.00	04.29	07.75	01.01	00.43	00.10	
00.10	00.10	00.47	16.85	07.58	03.00	07.84
02.00	04.00	06.00	01.00			
03.34	02.44	04.78	03.34	00.00	00.53	
00.00	00.00	00.00	01.32	01.27	00.07	
00.03	*****	00.30	06.64	03.01	34.47	08.24
03.00	03.00	01.00	02.00			
00.00	04.63	01.10	00.00	00.00	06.93	
00.00	01.31	01.19	00.90	00.03	01.63	
02.28	02.40	00.50	04.37	23.36	08.90	37.27
07.54	33.00	06.13	453.38			
03.00	01.00	18.50	79.00	01.00	06.00	
01.00	05.00	04.00	02.00			
02.67	00.00	02.37	00.81	05.25	00.52	
01.98	01.65	01.47	06.02	03.34	00.88	
00.60	00.93	00.63	23.92	11.38	09.54	32.54
04.00	02.00	01.00	01.00			
01.58	01.04	04.33	00.73	00.27	02.19	
03.11	01.63	03.59	00.94	00.27	00.47	
00.57	00.43	00.43	06.57	09.55	10.84	13.18
03.00	06.00	05.00	02.00			
04.26	00.68	02.02	00.58	03.33	00.81	
01.69	01.83	00.94	06.35	00.17	00.26	
00.70	00.26	00.57	13.12	04.50	07.41	34.26
02.00	01.00	03.00	01.00			
02.28	00.88	01.87	02.30	01.52	03.06	
04.85	00.80	06.73	01.14	00.34	00.30	
00.27	00.67	00.23	15.02	05.34	40.64	03.71
12.51	14.98	08.84	481.51			
03.00	02.00	18.50	79.00	01.00		
02.00	04.00	05.00	02.00			
02.59	01.11	05.57	01.75	00.44	02.23	

01.07	00.30	03.73	01.56	00.47	00.54	
00.26	00.70	00.36	10.87	06.11	09.00	10.69
03.00	02.00	01.00	01.00			
04.46	03.47	04.22	01.34	04.18	00.67	
02.15	02.53	02.30	00.59	00.47	00.33	
00.30	00.63	00.40	14.48	30.90	11.25	06.67
04.00	06.00	05.00	02.00			
03.06	03.87	07.03	01.35	05.73	03.51	
01.51	01.26	00.40	00.65	00.26	00.30	
00.33	00.37	00.37	05.51	11.95	05.21	05.30
01.00	03.00	01.00	01.00			
04.12	00.28	00.63	00.38	02.47	02.61	
00.63	00.78	06.98	00.43	00.33	00.23	
00.24	00.46	00.27	05.73	16.01	05.47	09.97
36.80	06.98	05.51	418.24			
03.00	03.00	18.50	79.00	01.00		
01.00	04.00	05.00	02.00			
03.09	00.76	01.57	00.75	02.20	01.99	
01.21	00.33	05.25	01.97	00.73	00.43	
00.26	00.27	00.27	05.61	03.78	06.81	15.25
04.00	01.00	02.00	01.00			
08.01	00.56	02.39	00.21	02.24	01.02	
01.45	02.73	05.74	02.78	00.40	00.40	
00.40	00.30	00.24	06.40	23.79	65.00	05.14
03.00	06.00	05.00	02.00			
07.22	01.38	04.37	00.70	05.00	00.35	
05.70	02.69	02.40	04.17	00.34	00.24	
00.23	00.34	00.27	03.21	03.24	43.04	04.11
02.00	02.00	03.00	01.00			
03.83	00.34	01.73	00.20	00.29	01.62	
05.01	02.79	05.10	00.59	00.53	00.26	
00.40	00.37	00.43	06.68	21.19	15.41	03.80
03.61	32.80	03.96	416.87			
03.00	04.00	18.50	79.00	01.00		
04.00	05.00	04.00	02.00			
07.43	01.22	02.80	00.20	03.95	01.48	
03.26	01.62	01.34	02.60	00.53	00.40	
00.47	00.33	00.54	03.97	04.74	03.94	04.76
01.00	02.00	01.00	01.00			
01.25	00.58	04.41	01.36	00.97	00.24	
00.62	00.40	03.92	00.32	00.37	00.44	
00.47	00.24	00.30	05.46	04.21	05.37	11.34
02.00	04.00	06.00	02.00			
04.00	00.72	02.38	00.20	03.09	00.18	
03.01	00.22	03.45	00.77	01.33	00.30	
00.27	00.26	00.30	12.98	15.38	04.54	04.24
03.00	03.00	02.00	01.00			
00.76	00.71	06.18	01.27	00.99	00.71	
01.96	03.46	00.38	00.20	00.27	00.36	
00.70	00.30	00.40	12.19	24.46	10.22	04.70
05.34	03.57	29.69	375.30			
04.00	01.00	10.67	46.00	02.00	04.00	
02.00	04.00	05.00	02.00			
05.35	03.89	02.13	04.56	04.55	00.00	
01.95	00.00	00.00	01.97	00.50	00.06	

05.20	00.70	00.30	04.94	05.80	05.07	08.14
03.00	02.00	01.00	01.00			
07.38	01.75	05.17	01.00	02.64	01.10	
00.20	05.63	03.53	00.00	00.27	00.17	
00.46	00.26	03.57	08.24	10.18	12.88	03.57
04.00	06.00	04.00	02.00			
09.54	00.00	03.48	00.00	01.41	00.86	
04.16	01.66	00.53	04.79	00.27	00.74	
03.66	00.78	00.56	05.67	05.95	03.53	03.34
01.00	03.00	02.00	01.00			
05.26	02.48	01.45	03.36	03.63	01.55	
00.92	00.49	03.58	00.00	00.27	01.20	
00.14	09.37	00.30	05.03	18.95	05.18	08.64
05.54	06.74	07.58	339.46			
04.00	02.00	10.67	46.00	02.00		
03.00	04.00	05.00	02.00			
04.01	00.00	03.20	00.00	07.17	00.00	
06.78	00.00	00.00	03.56	00.53	00.77	
02.58	00.20	00.60	09.94	08.37	17.72	06.41
04.00	02.00	01.00	01.00			
07.82	00.91	05.76	01.07	08.29	00.00	
00.00	09.34	07.57	00.00	01.04	00.64	
05.57	00.84	02.86	04.76	00.90	06.04	13.55
01.00	05.00	06.00	02.00			
07.40	01.81	03.79	00.00	02.10	00.27	
03.07	00.00	00.98	03.14	00.40	00.40	
00.87	00.41	01.53	07.61	06.48	05.67	03.80
02.00	03.00	02.00	01.00			
07.59	00.75	00.00	00.00	04.53	00.00	
00.00	03.27	02.55	00.29	00.44	*****	
03.20	03.20	01.00	03.87	06.24	04.77	05.97
08.14	04.44	06.24	340.24			
04.00	03.00	10.67	46.00	02.00		
04.00	04.00	05.00	02.00			
01.74	01.04	08.55	00.71	05.31	03.82	
04.66	00.47	02.48	04.81	00.40	00.10	
01.04	00.20	01.77	06.11	09.17	11.29	05.87
01.00	01.00	02.00	01.00			
02.35	00.56	03.10	00.70	06.66	01.54	
01.63	02.73	02.37	00.46	00.30	01.34	
01.07	02.34	02.15	05.93	07.34	06.17	04.70
02.00	05.00	06.00	02.00			
02.87	00.62	03.03	00.00	03.15	02.93	
02.83	00.73	00.00	02.21	00.53	01.56	
03.36	00.77	00.60	03.81	04.64	03.06	06.44
03.00	03.00	01.00	01.00			
04.43	00.00	00.65	00.00	03.66	00.00	
00.00	03.59	03.02	00.00	00.77	02.77	
05.54	02.73	01.80	04.98	08.78	06.44	05.64
05.07	02.91	05.38	318.98			
04.00	04.00	10.67	46.00	02.00		
03.00	05.00	04.00	02.00			
06.91	00.00	06.40	00.89	03.20	00.00	
01.78	00.00	00.00	05.26	00.27	00.34	
06.87	03.27	04.61	12.80	27.23	03.37	05.86

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02.00   01.00   02.00   01.00
04.76   04.20   05.62   02.66   03.88   01.50
01.12   05.10   07.97   00.00   00.30   01.46
02.37   01.67   01.37   06.01   03.10   10.58   04.10
01.00   06.00   04.00   02.00
03.90   03.34   01.37   01.27   01.27   00.69
04.17   01.63   04.39   03.70   01.03   01.20
00.34   00.70   00.27   04.21   07.01   08.61   07.41
04.00   03.00   02.00   01.00
03.76   04.23   00.84   05.72   02.61   04.90
02.29   06.30   07.41   00.58   00.13   01.07
00.03   00.40   00.11   03.10   08.57   03.20   07.66
08.87   06.20   03.57  346.26
05.00   01.00   13.58   52.00   02.00   04.50
02.00   04.00   05.00   01.00
06.74   00.00   00.89   00.54   02.52   05.68
07.78   01.12   00.00   00.00   00.00   00.66
00.37   00.00   *****   07.14   05.51   15.41   18.99
03.00   02.00   01.00   02.00
00.00   05.28   08.99   00.00   00.89   00.80
00.00   04.33   00.00   08.25   02.30   00.33
00.76   00.47   01.30   06.81   17.42   05.34   08.41
04.00   06.00   04.00   01.00
08.74   00.00   00.00   03.34   00.00   00.00
00.84   02.25   00.00   09.10   00.60   00.57
*****   01.73   00.87   24.53   06.11   07.51   12.05
01.00   03.00   01.00   02.00
02.10   04.72   00.87   00.00   01.56   01.95
06.95   00.00   04.50   00.89   00.46   08.64
00.23   00.00   00.60   08.74   17.32   07.87   27.09
08.67   06.68   09.72  425.71
05.00   02.00   13.58   52.00   02.00
01.00   04.00   05.00   01.00
03.62   05.60   01.10   03.01   00.00   03.49
01.12   06.48   00.00   00.00   00.50   00.53
00.91   00.87   *****   14.25   11.71   07.37   07.47
02.00   02.00   01.00   02.00
06.58   02.32   04.49   00.00   03.96   00.24
02.36   02.08   08.49   00.00   00.50   05.65
04.41   00.67   01.44   05.84   04.41   05.37   05.97
03.00   06.00   05.00   01.00
00.00   05.04   00.46   01.27   00.00   01.86
00.00   02.84   01.05   01.09   02.33   01.90
04.84   00.00   01.10   12.38   04.04   11.64   08.75
04.00   01.00   03.00   02.00
01.10   00.00   03.88   02.75   04.98   03.61
00.78   04.66   00.00   01.69   00.90   00.47
00.40   00.43   00.00   13.77   05.97   09.58   05.31
09.74   28.16   06.84  382.81
05.00   03.00   13.58   52.00   02.00
04.00   05.00   04.00   01.00
00.00   02.94   00.76   02.39   00.00   03.58
03.33   01.25   00.00   00.58   04.90   00.00
00.44   00.00   06.24   17.15   05.10   14.62   04.74
03.00   01.00   02.00   02.00
```

00.00	01.66	08.59	00.00	00.00	01.40	
00.00	03.45	01.03	00.40	02.27	00.10	
03.14	05.08	05.71	13.78	22.12	12.50	13.24
02.00	06.00	04.00	01.00			
03.82	00.21	02.91	06.17	00.00	03.12	
01.54	00.00	00.00	00.00	02.34	00.23	
03.00	07.65	*****	12.27	05.48	06.90	04.34
01.00	02.00	03.00	02.00			
05.02	03.74	09.56	00.00	00.00	01.51	
00.77	01.21	01.77	00.00	00.74	00.50	
04.04	02.41	01.01	04.83	17.69	04.57	16.24
13.91	32.20	06.38	431.16			
05.00	04.00	13.58	52.00	02.00		
03.00	05.00	04.00	01.00			
04.13	00.45	03.00	00.00	07.15	00.00	
01.81	03.10	02.32	00.00	00.10	01.37	
00.54	02.13	02.56	22.49	18.28	09.84	49.32
02.00	01.00	02.00	02.00			
08.18	00.00	05.45	00.00	00.00	00.00	
07.53	00.57	00.00	04.51	00.00	00.33	
*****	00.35	00.77	05.91	08.71	03.73	05.80
01.00	06.00	04.00	01.00			
09.85	00.00	00.00	03.86	05.38	02.64	
02.72	02.34	03.08	05.42	00.00	02.53	
01.44	00.26	00.00	08.31	10.88	51.65	06.14
04.00	03.00	01.00	02.00			
00.21	08.00	01.74	00.39	02.30	01.67	
05.48	00.69	04.94	00.00	00.00	01.36	
01.00	00.00	03.13	02.87	18.82	08.48	03.78
04.25	04.24	44.22	491.72			
06.00	01.00	09.33	48.00	01.00	04.50	
02.00	05.00	04.00	02.00			
03.00	00.90	03.85	03.29	03.71	00.53	
04.30	01.85	00.75	08.73	00.07	00.43	
00.04	00.06	00.27	04.87	12.07	06.87	06.47
01.00	01.00	02.00	01.00			
05.92	00.70	06.53	00.32	00.30	00.60	
03.50	05.81	04.07	00.92	00.03	00.04	
00.30	00.38	00.06	04.84	06.48	03.90	07.71
04.00	03.00	02.00	01.00			
04.58	03.31	02.84	00.85	03.23	04.09	
02.69	04.48	01.57	04.16	00.47	00.06	
00.03	00.53	00.47	09.21	05.64	06.45	05.34
03.00	04.00	06.00	02.00			
09.16	01.05	04.50	03.20	05.80	00.72	
01.39	02.16	07.37	01.30	00.37	00.10	
00.06	00.54	00.03	06.68	12.52	12.88	42.98
17.15	10.28	05.98	393.78			
06.00	02.00	09.33	48.00	01.00		
03.00	05.00	04.00	02.00			
03.96	00.83	00.89	01.14	02.27	00.41	
04.47	01.23	01.22	02.50	00.03	00.47	
00.43	00.03	00.40	06.97	04.77	09.98	04.03
02.00	01.00	02.00	01.00			
03.71	01.85	04.79	00.50	02.91	00.63	

01.92	02.39	05.31	02.79	00.33	00.13	
00.07	00.07	00.07	04.87	21.79	04.37	03.60
01.00	06.00	04.00	02.00			
05.20	00.00	03.80	00.00	02.89	00.45	
04.06	00.39	00.82	05.67	00.34	00.43	
00.06	00.07	00.07	05.74	05.90	04.23	09.88
04.00	03.00	01.00	01.00			
04.49	00.71	05.94	01.94	03.71	00.82	
01.99	01.78	02.99	00.28	00.50	00.13	
00.03	00.06	00.07	10.74	06.14	06.11	08.34
13.71	06.03	11.94	350.21			
06.00	03.00	09.33	48.00	01.00		
04.00	05.00	04.00	02.00			
03.69	00.60	05.11	00.00	03.55	00.00	
01.39	00.28	06.49	01.54	00.30	00.10	
00.07	00.07	00.47	05.64	06.61	03.87	08.67
01.00	02.00	01.00	01.00			
03.35	00.00	03.13	00.59	01.46	00.65	
02.42	02.40	02.39	00.53	00.27	00.36	
00.06	00.13	00.10	04.95	03.64	07.14	04.60
02.00	06.00	04.00	02.00			
02.48	00.94	04.28	00.00	01.67	00.00	
02.05	00.00	00.00	02.42	00.07	00.40	
00.24	00.07	00.43	04.64	08.07	12.11	04.07
03.00	03.00	02.00	01.00			
02.86	00.00	04.74	00.60	04.85	00.00	
00.00	04.88	02.26	00.00	00.50	00.44	
00.07	00.43	00.26	04.97	05.64	08.45	15.25
10.58	23.23	03.17	349.67			
06.00	04.00	09.33	48.00	01.00		
01.00	04.00	05.00	02.00			
04.23	00.44	05.14	00.49	03.34	00.00	
03.35	00.00	00.39	03.83	00.36	00.47	
00.33	00.44	00.06	04.87	03.61	12.11	03.10
04.00	01.00	02.00	01.00			
05.90	00.00	01.62	00.00	01.61	00.62	
00.97	07.75	01.65	00.44	00.34	00.04	
00.07	00.07	01.03	04.01	04.74	03.33	03.28
03.00	06.00	05.00	02.00			
06.14	00.44	05.19	00.00	04.48	00.00	
06.16	00.00	00.00	02.34	00.40	00.47	
00.07	00.40	00.07	03.20	03.13	05.57	02.77
02.00	02.00	03.00	01.00			
05.08	00.00	08.81	00.70	03.06	00.00	
00.00	02.54	04.40	00.00	00.07	00.11	
00.06	00.07	00.33	03.30	02.94	02.97	03.27
03.11	03.31	02.86	280.24			
07.00	01.00	11.17	42.00	02.00	03.50	
02.00	04.00	05.00	01.00			
01.48	02.58	00.52	01.86	00.72	02.26	
03.31	00.97	00.52	00.97	00.27	00.24	
00.70	00.26	00.27	04.86	07.01	12.42	21.79
01.00	02.00	01.00	02.00			
03.36	03.58	02.06	01.72	01.75	05.54	
03.60	00.23	02.07	01.05	00.20	00.13	

00.30	00.27	00.33	13.29	05.17	32.77	10.95
04.00	05.00	06.00	01.00			
03.66	00.00	01.39	00.00	00.76	00.40	
01.61	00.35	00.00	00.00	00.23	00.23	
00.17	00.13	*****	34.23	14.12	07.07	07.28
03.00	03.00	02.00	02.00			
00.77	00.24	00.74	00.30	01.58	00.45	
01.42	01.08	03.50	00.26	00.30	00.43	
00.47	00.30	00.23	05.74	22.32	04.64	09.01
05.00	06.11	04.47	432.56			
07.00	02.00	11.17	42.00	02.00		
01.00	04.00	05.00	01.00			
00.28	05.02	01.65	03.85	00.69	00.00	
02.37	00.71	01.94	00.00	00.26	02.40	
00.17	00.20	00.27	05.28	07.08	26.83	16.38
04.00	01.00	02.00	02.00			
02.12	00.23	00.63	00.00	02.25	00.00	
01.69	00.00	00.29	01.10	00.17	00.36	
00.47	00.20	00.50	25.86	04.06	16.75	04.23
03.00	06.00	05.00	01.00			
00.68	02.79	00.94	00.38	01.89	00.00	
01.29	00.19	03.26	00.44	00.23	00.11	
00.37	00.00	00.20	03.94	03.56	08.97	24.89
02.00	02.00	03.00	02.00			
02.75	01.16	00.20	02.05	00.00	02.20	
00.19	00.62	01.00	00.65	00.16	00.50	
00.20	00.24	00.30	06.84	14.92	06.57	13.12
05.68	25.96	16.82	442.43			
07.00	03.00	11.17	42.00	02.00		
02.00	05.00	04.00	01.00			
02.01	02.05	01.01	00.70	01.69	01.06	
00.58	00.20	00.89	00.17	00.00	00.14	
00.37	00.00	00.00	03.80	04.60	12.20	06.87
03.00	01.00	02.00	02.00			
01.74	00.54	00.38	00.91	00.26	01.40	
02.37	00.30	00.83	00.56	00.00	00.17	
00.21	00.17	00.17	14.62	04.43	14.88	23.13
04.00	06.00	04.00	01.00			
03.58	00.00	00.74	05.00	00.17	00.59	
00.41	00.56	03.18	00.83	01.23	00.24	
00.27	00.00	00.37	04.14	03.84	05.11	07.64
01.00	03.00	01.00	02.00			
02.48	01.71	00.52	05.13	00.00	00.62	
00.00	00.99	00.35	00.00	00.30	00.17	
01.50	00.33	02.77	05.20	12.24	06.91	11.68
26.72	11.82	04.50	386.24			
07.00	04.00	11.17	42.00	02.00		
01.00	05.00	04.00	01.00			
00.73	01.04	00.16	00.86	00.16	08.82	
02.56	00.16	00.15	01.51	00.30	00.13	
00.00	00.17	00.20	25.86	04.60	04.77	07.31
02.00	01.00	02.00	02.00			
00.81	00.98	00.00	00.00	01.58	01.25	
00.58	00.64	01.21	00.13	01.94	*****	
00.40	00.17	00.10	06.54	06.28	12.48	05.34

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03.00   06.00   04.00   01.00
00.20   03.78   00.00   03.13   00.00   02.04
00.72   06.89   02.75   00.81   00.40   07.08
04.71   00.00   00.17   36.23   24.32   26.86   16.22
04.00   02.00   03.00   02.00
00.55   03.41   02.25   00.00   00.00   01.55
01.95   03.76   04.22   02.54   00.00   00.00
00.50   00.20   00.17   19.85   18.45   05.47   04.44
06.04   05.60   11.41  452.27
09.00   01.00   20.33   34.00   02.00   03.00
01.00   04.00   05.00   02.00
00.00   04.13   00.00   01.47   00.00   04.25
00.00   03.60   02.77   00.33   00.10   00.06
01.30   00.60   00.60   03.60   14.42   13.52   06.81
04.00   01.00   02.00   01.00
00.82   01.17   00.00   00.89   00.00   01.77
03.06   00.21   00.00   02.85   00.83   00.36
03.51   00.07   00.07   03.91   09.80   18.69   04.33
03.00   05.00   06.00   02.00
00.00   01.52   00.00   02.30   00.00   01.77
01.90   01.92   01.27   00.64   00.13   00.03
00.07   00.73   00.63   03.58   02.86   10.82   03.34
02.00   03.00   02.00   01.00
00.00   01.68   00.00   02.21   00.00   01.87
02.79   00.00   02.68   02.30   00.07   03.11
00.83   00.64   00.03   16.45   22.08   03.84   03.03
15.72   03.27   21.15  375.33
09.00   02.00   20.33   34.00   02.00
02.00   04.00   05.00   02.00
00.00   00.00   00.00   03.62   00.00   02.32
00.90   01.95   02.53   01.11   *****   00.63
00.13   01.37   00.20   19.36   06.14   06.54   06.41
03.00   02.00   01.00   01.00
00.00   00.30   01.40   01.30   03.18   01.79
00.34   01.76   00.00   00.00   09.31   00.37
04.67   00.67   *****   07.40   14.68   14.84   05.63
04.00   06.00   01.00   02.00
02.89   00.56   00.00   00.59   00.00   00.00
01.50   00.25   01.53   00.00   01.13   00.13
*****   00.23   02.20   22.52   06.14   14.08   07.64
01.00   03.00   02.00   01.00
00.57   02.05   00.00   01.13   00.43   01.36
00.52   01.54   03.66   01.97   00.54   00.77
00.57   00.53   00.31   04.07   07.67   08.11   17.52
03.83   03.27   05.47  385.68
09.00   03.00   20.33   34.00   02.00
01.00   05.00   04.00   02.00
00.71   01.37   00.43   01.70   00.00   00.27
01.30   03.59   01.67   00.20   00.10   00.80
09.94   00.10   03.78   02.77   04.04   04.10   06.00
04.00   02.00   01.00   01.00
03.05   00.76   00.00   00.00   01.24   00.00
00.00   04.86   00.00   01.82   00.07   *****
04.73   00.10   02.00   14.05   07.91   03.61   02.74
03.00   06.00   05.00   02.00
```

00.00	00.00	00.00	05.94	01.78	00.81	
00.00	01.35	01.79	00.26	*****	00.10	
05.96	00.10	00.10	22.52	20.93	03.74	16.47
02.00	01.00	03.00	01.00			
02.27	00.58	04.16	00.83	05.67	00.00	
00.37	00.00	03.74	00.86	00.10	00.10	
02.94	00.73	00.43	17.58	04.34	02.68	12.74
02.77	03.30	08.81	365.86			
09.00	04.00	10.33	34.00	02.00		
04.00	04.00	05.00	02.00			
00.00	03.09	00.00	00.00	00.00	00.69	
00.00	01.82	00.00	00.00	00.40	00.00	
00.06	04.48	00.00	02.90	03.38	03.20	07.54
01.00	01.00	02.00	01.00			
01.39	04.12	01.57	02.28	00.70	00.92	
01.70	03.40	00.69	02.17	01.10	00.93	
07.37	00.06	00.71	08.31	06.98	11.42	13.24
02.00	06.00	04.00	02.00			
01.97	03.04	00.00	00.00	00.50	00.33	
00.66	03.85	00.58	00.84	00.54	00.00	
00.24	02.14	00.91	11.42	07.74	03.23	07.10
03.00	02.00	03.00	01.00			
02.53	00.00	01.21	02.71	00.40	01.95	
00.00	01.06	00.74	00.51	00.07	01.27	
00.57	05.83	02.51	07.94	02.77	02.71	04.33
03.23	05.37	08.54	325.39			
10.00	01.00	12.00	56.00	02.00	05.00	
04.00	05.00	04.00	02.00			
06.11	02.50	06.59	01.17	02.05	05.53	
04.30	00.18	08.94	00.00	00.00	00.47	
00.00	00.33	00.26	04.13	04.40	05.44	08.61
01.00	02.00	01.00	01.00			
04.38	02.90	04.79	03.32	02.55	03.38	
03.27	03.29	03.32	04.58	01.27	00.00	
00.20	00.00	00.23	07.08	04.84	04.68	09.54
02.00	04.00	06.00	02.00			
04.96	04.76	05.09	03.77	01.88	04.25	
05.72	00.58	02.13	00.98	00.30	00.00	
00.20	01.00	06.58	04.25	07.38	05.41	04.43
03.00	03.00	01.00	01.00			
07.12	02.26	01.72	01.89	00.86	00.65	
03.55	01.12	02.22	02.58	00.24	00.16	
00.16	00.54	00.39	04.11	16.38	09.45	03.50
05.44	03.43	08.07	319.31			
10.00	02.00	12.00	56.00	02.00		
01.00	04.00	05.00	02.00			
03.19	06.37	01.28	06.40	02.44	01.62	
06.38	02.80	07.23	00.70	00.26	00.00	
00.60	00.26	00.30	03.96	03.77	03.61	04.06
04.00	01.00	02.00	01.00			
05.39	03.47	02.39	06.89	00.65	08.34	
04.48	04.18	00.19	09.20	00.20	00.40	
00.00	00.27	00.50	04.66	05.11	04.41	06.77
03.00	06.00	04.00	02.00			
03.66	04.21	06.86	00.00	03.99	03.57	

02.30	03.85	03.61	05.44	00.00	00.27	
00.23	00.33	00.20	04.60	04.10	04.48	04.78
02.00	02.00	03.00	01.00			
01.69	06.74	04.76	04.21	01.78	03.57	
08.67	00.00	01.16	01.26	00.30	00.00	
00.00	00.00	00.30	04.00	03.93	06.10	09.41
04.10	04.41	04.30	294.78			
10.00	03.00	12.00	56.00	02.00		
02.00	05.00	04.00	02.00			
07.41	00.00	00.00	00.00	00.00	07.38	
02.25	03.82	07.88	01.41	00.26	*****	
02.44	00.30	00.26	16.55	09.07	04.20	05.88
03.00	01.00	02.00	01.00			
03.96	03.96	00.00	09.31	00.00	02.73	
05.88	01.46	00.00	00.00	00.63	00.36	
07.21	00.24	*****	12.39	18.95	04.80	07.21
04.00	06.00	04.00	02.00			
00.00	05.88	02.58	04.69	00.29	09.00	
07.75	01.59	05.34	01.78	00.53	01.27	
00.24	00.36	00.33	03.97	06.34	10.24	05.01
01.00	03.00	01.00	01.00			
00.70	08.88	04.42	04.56	01.06	07.49	
08.27	00.61	06.12	01.78	00.44	00.20	
00.26	00.44	00.67	03.96	03.85	03.51	04.30
10.95	07.27	20.49	364.02			
10.00	04.00	12.00	56.00	02.00		
01.00	05.00	04.00	01.00			
00.00	06.47	00.00	09.17	00.42	06.16	
01.34	00.95	01.39	02.60	03.34	00.36	
00.30	00.00	03.57	05.30	19.16	17.02	19.09
04.00	02.00	01.00	02.00			
00.00	09.68	00.00	09.28	06.17	03.03	
06.85	02.49	08.20	00.48	00.37	00.54	
00.46	00.07	00.17	03.36	04.57	17.45	04.86
03.00	06.00	05.00	01.00			
00.79	07.73	00.00	09.78	01.45	04.31	
00.00	00.00	00.47	01.54	00.24	00.43	
00.26	*****	00.47	23.92	04.84	04.94	04.41
02.00	01.00	03.00	02.00			
02.83	00.00	08.70	00.00	01.68	07.83	
05.24	00.41	01.77	00.31	00.27	00.37	
00.20	00.30	00.36	06.34	07.97	03.50	06.40
05.53	08.20	46.28	417.57			
11.00	01.00	11.75	56.00	01.00	05.00	
01.00	05.00	04.00	02.00			
01.17	02.51	01.43	02.80	02.94	03.20	
03.17	03.93	02.46	01.92	00.30	00.86	
00.06	00.33	02.30	08.14	06.31	06.24	10.45
02.00	01.00	02.00	01.00			
02.17	00.75	00.46	01.73	02.14	03.48	
02.69	01.59	00.75	01.08	01.87	04.99	
01.03	00.43	00.37	07.34	06.85	06.41	04.08
03.00	06.00	04.00	02.00			
02.09	03.40	00.41	00.37	01.24	02.25	
01.75	02.05	01.05	00.63	00.10	01.40	

00.30	00.29	00.20	05.24	09.84	13.29	08.01
04.00	02.00	03.00	01.00			
01.57	04.16	01.26	02.55	00.32	00.48	
03.87	02.44	01.65	01.52	00.07	00.26	
00.66	00.30	00.07	05.68	10.30	08.94	06.07
06.81	17.68	04.61	356.95			
11.00	02.00	11.75	56.00	01.00		
02.00	05.00	04.00	01.00			
01.39	01.35	01.52	02.53	02.30	02.79	
02.93	02.55	01.03	02.15	00.30	00.07	
00.07	00.10	00.30	14.05	07.11	14.21	19.33
01.00	01.00	02.00	01.00			
02.90	02.94	02.15	02.57	03.44	02.54	
01.52	01.29	00.73	01.42	00.26	00.06	
00.10	00.06	00.27	04.40	04.94	04.38	08.94
04.00	04.00	06.00	02.00			
03.00	03.41	02.57	02.53	01.36	02.99	
00.82	01.44	03.08	01.31	00.20	00.30	
00.27	00.20	00.10	05.64	11.14	09.41	06.61
03.00	03.00	01.00	01.00			
01.95	03.43	00.67	00.39	01.13	01.52	
01.08	01.12	02.34	03.55	00.06	00.10	
00.57	00.07	00.07	10.54	04.24	04.93	05.17
06.41	03.63	04.37	354.98			
11.00	03.00	11.75	56.00	01.00		
03.00	05.00	04.00	02.00			
01.43	01.92	00.47	00.47	00.41	00.52	
00.29	01.23	00.73	00.00	00.07	00.07	
00.07	00.50	00.64	05.71	18.78	07.54	09.27
02.00	01.00	02.00	01.00			
01.79	02.24	00.95	01.29	00.28	00.85	
00.42	01.27	00.35	00.91	00.07	00.10	
01.77	00.26	00.94	06.84	17.20	06.44	12.28
01.00	06.00	05.00	02.00			
00.58	01.43	02.78	03.43	02.96	05.14	
00.95	01.01	00.81	00.39	00.23	00.07	
00.10	00.23	00.04	04.64	04.11	09.48	11.35
04.00	03.00	01.00	01.00			
00.00	00.43	00.90	00.81	01.37	00.31	
03.24	03.46	03.63	01.34	00.90	00.36	
00.73	00.10	00.07	09.24	05.64	05.77	05.67
06.11	15.41	11.34	376.66			
11.00	04.00	11.75	56.00	01.00		
04.00	05.00	04.00	02.00			
01.29	02.06	01.10	00.68	02.06	02.50	
02.00	01.42	01.31	01.28	00.53	00.14	
00.06	00.10	00.07	03.37	06.65	05.67	05.76
01.00	02.00	01.00	01.00			
02.78	02.54	02.53	03.36	02.54	02.78	
01.55	01.20	02.10	01.99	00.14	00.17	
00.13	00.17	00.13	27.60	06.58	04.03	12.21
02.00	04.00	06.00	02.00			
01.68	02.08	01.19	01.09	01.17	00.43	
01.43	00.53	03.76	01.68	00.13	00.00	
00.13	00.30	00.10	07.21	50.05	09.96	18.85

03.00	03.00	01.00	01.00			
01.57	01.90	00.66	00.75	01.29	00.72	
01.11	00.59	00.39	00.25	01.23	00.36	
00.70	00.44	00.20	05.37	10.61	11.04	18.13
23.73	05.33	09.25	445.30			
13.00	01.00	10.92	41.00	02.00	03.50	
02.00	05.00	04.00	01.00			
00.00	00.00	00.00	01.13	00.00	03.29	
02.05	01.21	00.00	00.00	*****	00.10	
01.88	01.90	*****	04.97	06.03	08.11	10.21
01.00	01.00	02.00	02.00			
05.45	01.04	00.00	02.00	00.00	00.60	
00.00	00.81	00.72	00.00	00.34	02.44	
00.07	00.00	00.10	19.82	11.44	24.29	15.25
04.00	04.00	06.00	01.00			
00.73	03.15	00.00	01.56	00.83	00.58	
00.00	00.00	00.97	00.00	00.27	00.10	
00.07	*****	06.87	06.95	05.37	20.03	05.68
03.00	03.00	01.00	02.00			
00.37	01.78	00.00	00.00	03.75	00.00	
00.00	02.62	02.22	00.34	04.01	*****	
01.63	00.00	00.00	06.77	22.18	21.63	06.74
18.33	08.71	06.01	432.53			
13.00	02.00	10.42	41.00	02.00		
03.00	05.00	04.00	01.00			
00.00	01.63	00.00	00.42	00.00	02.36	
*****	*****	*****	*****	00.28	09.61	
08.24	*****	*****	08.18	08.38	06.61	07.67
02.00	01.00	02.00	02.00			
00.00	00.00	00.00	00.00	00.00	00.53	
01.08	02.15	00.57	00.00	*****	*****	
02.61	00.27	09.74	09.58	45.81	05.56	03.55
01.00	06.00	05.00	01.00			
01.21	01.45	00.54	00.92	00.00	00.00	
00.00	00.52	00.00	00.00	02.58	01.10	
03.47	02.30	*****	09.11	16.25	14.58	17.49
04.00	03.00	01.00	02.00			
00.00	00.00	00.37	00.00	00.00	05.69	
01.72	01.12	00.00	01.73	*****	05.07	
01.10	00.00	02.63	03.64	35.30	04.01	17.42
10.19	03.57	05.41	400.30			
13.00	03.00	10.42	41.00	02.00		
04.00	05.00	04.00	01.00			
03.29	00.00	00.00	00.00	00.00	00.00	
00.00	00.00	00.74	00.00	00.26	*****	
*****	*****	00.00	12.48	05.90	08.51	05.27
03.00	01.00	02.00	02.00			
00.99	00.00	00.00	00.00	00.78	01.10	
00.62	02.07	00.00	00.00	09.41	*****	
01.47	00.13	*****	05.91	04.61	04.84	09.98
02.00	06.00	05.00	01.00			
00.00	03.59	00.37	00.37	01.14	00.00	
00.00	01.31	00.00	00.00	00.10	00.10	
09.30	10.07	*****	06.60	03.30	07.91	04.50
01.00	02.00	03.00	02.00			

04.00	02.79	04.09	00.00	00.00	00.00	
00.77	00.40	00.00	00.58	00.40	04.73	
*****	06.88	00.96	04.40	04.20	13.41	03.54
03.06	06.14	03.15	321.91			
13.00	04.00	10.92	41.00	02.00		
01.00	04.00	05.00	01.00			
02.09	03.69	04.22	00.00	01.29	00.00	
01.35	00.00	01.31	01.13	03.77	00.00	
07.37	04.00	00.07	03.51	20.36	07.87	07.50
02.00	02.00	01.00	02.00			
01.22	00.00	00.00	00.00	00.00	02.41	
00.42	00.00	00.00	01.67	06.74	*****	
00.93	00.00	00.00	10.58	32.77	18.78	18.42
03.00	06.00	04.00	01.00			
04.67	00.00	03.08	00.00	00.29	00.73	
*****	*****	*****	*****	00.00	06.00	
00.00	*****	*****	26.46	22.36	24.79	24.66
04.00	01.00	03.00	02.00			
02.64	00.00	01.62	01.92	01.95	00.00	
01.61	00.00	00.00	03.56	05.88	00.00	
01.83	07.41	05.27	18.06	16.82	15.58	30.43
30.00	14.67	08.47	556.48			
14.00	01.00	10.75	66.00	02.00	05.50	
03.00	05.00	04.00	01.00			
02.18	00.50	01.71	00.00	00.81	00.00	
00.73	00.79	00.79	00.00	00.57	01.04	
01.38	00.30	00.10	04.30	08.62	07.07	03.31
02.00	01.00	02.00	02.00			
01.79	04.64	04.55	00.85	01.04	00.00	
01.66	00.74	01.69	00.53	00.27	00.87	
00.77	07.41	00.07	07.37	07.43	11.94	08.54
01.00	06.00	04.00	01.00			
02.18	01.22	01.65	01.92	02.46	00.90	
01.14	01.03	01.86	01.00	00.07	00.34	
00.86	03.40	01.03	05.53	06.34	10.44	05.17
04.00	03.00	02.00	02.00			
00.00	01.63	00.49	01.43	01.29	00.48	
00.55	00.00	00.00	00.00	01.53	00.20	
00.34	06.44	*****	08.77	04.03	06.27	04.41
19.11	03.13	09.21	347.01			
14.00	02.00	10.75	66.00	02.00		
04.00	04.00	05.00	01.00			
00.67	00.00	00.00	00.00	00.78	00.00	
00.00	00.00	00.53	00.66	00.13	*****	
00.13	*****	00.96	07.97	18.42	11.65	07.78
03.00	02.00	01.00	02.00			
00.00	00.00	01.27	00.55	00.00	00.45	
00.82	00.00	00.00	00.00	*****	00.86	
00.67	00.60	*****	06.95	23.86	31.23	17.42
02.00	06.00	05.00	01.00			
02.61	04.04	01.48	02.74	00.91	00.83	
00.00	01.15	01.06	00.00	00.36	00.27	
00.06	03.70	00.24	02.73	08.54	15.73	15.55
01.00	01.00	03.00	02.00			
01.13	00.00	01.11	00.00	02.60	00.00	

00.60	00.00	00.61	01.37	00.07	00.10	
00.23	00.20	00.27	07.37	06.95	06.38	07.71
15.65	32.07	05.30	471.34			
14.00	03.00	10.75	66.00	02.00		
01.00	05.00	04.00	01.00			
01.08	00.00	01.00	00.00	01.02	00.00	
00.00	00.45	02.47	02.46	00.04	01.10	
01.93	00.10	00.10	05.26	06.01	09.09	07.18
02.00	01.00	02.00	02.00			
02.67	03.25	01.54	01.44	00.70	00.62	
01.89	00.38	00.59	00.48	00.33	00.33	
00.23	00.26	00.16	02.97	07.34	07.64	07.81
03.00	06.00	05.00	01.00			
00.34	00.51	00.00	00.00	00.88	00.00	
00.00	00.52	00.76	00.00	00.98	*****	
00.10	00.10	00.10	34.86	03.31	04.94	13.47
04.00	02.00	03.00	02.00			
00.00	00.00	00.00	00.25	00.00	00.00	
00.00	00.00	00.00	01.24	*****	01.11	
*****	*****	00.06	05.23	06.50	05.16	06.17
02.90	16.11	09.19	367.50			
14.00	04.00	10.75	66.00	02.00		
02.00	04.00	05.00	01.00			
00.86	00.00	01.15	01.37	01.37	00.78	
01.65	00.00	02.71	01.35	00.47	00.13	
00.61	00.40	00.70	08.58	05.23	09.14	04.18
03.00	02.00	01.00	02.00			
01.34	00.00	01.26	00.22	00.41	00.58	
00.00	00.64	00.29	00.50	05.57	00.27	
06.14	00.17	00.23	06.87	06.94	21.53	31.40
04.00	06.00	05.00	01.00			
00.70	00.38	01.89	00.46	01.67	00.70	
00.00	00.00	02.85	00.45	00.37	02.48	
00.33	*****	00.48	06.73	30.29	07.43	06.16
01.00	03.00	01.00	02.00			
01.56	00.64	02.92	00.57	02.12	02.07	
03.01	00.00	01.06	01.16	00.40	00.27	
00.27	00.80	01.40	05.20	04.08	03.61	06.01
05.52	04.74	30.02	411.00			
15.00	01.00	11.25	67.00	01.00	05.50	
03.00	04.00	05.00	01.00			
02.54	00.67	04.95	00.00	07.07	00.27	
04.28	01.97	00.00	00.32	00.80	00.50	
00.70	00.27	04.60	04.61	10.54	04.31	03.91
02.00	02.00	01.00	01.00			
03.24	00.00	02.96	00.00	02.90	00.00	
00.00	06.75	00.96	00.00	00.33	00.33	
00.33	00.50	00.34	04.41	05.51	06.31	08.87
01.00	06.00	04.00	02.00			
00.73	01.64	03.09	00.00	05.52	00.00	
02.85	00.00	00.00	09.74	00.46	00.36	
00.40	00.20	00.40	03.74	03.32	04.34	05.00
04.00	03.00	02.00	01.00			
01.95	00.00	03.17	00.00	03.43	00.00	
01.43	00.27	02.04	00.00	00.34	00.44	

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00.53   01.83   00.30   05.70   03.88   10.24   02.84
03.97   05.31   03.26  304.05
15.00   02.00   11.25   67.00   01.00
02.00   05.00   04.00   02.00
04.49   00.00   09.59   00.00   05.63   00.00
03.91   00.30   02.03   01.51   00.33   00.46
00.34   00.33   00.37   04.65   05.37   03.80   04.40
01.00   01.00   02.00   01.00
02.11   00.23   01.31   00.91   02.10   00.00
00.00   01.80   02.27   00.23   00.20   00.53
00.87   00.43   00.40   04.48   06.70   04.04   05.36
04.00   04.00   06.00   02.00
03.24   02.64   04.33   00.00   10.00   00.00
01.76   01.39   02.14   06.80   00.30   00.50
00.34   04.40   00.56   03.83   06.64   03.34   03.37
03.00   03.00   01.00   01.00
09.70   00.00   07.63   00.00   01.67   03.55
00.00   04.45   03.07   00.00   00.43   00.30
01.44   00.57   00.40   04.44   04.30   03.73   04.45
04.00   03.57   03.27  287.85
15.00   03.00   11.25   67.00   01.00
01.00   05.00   04.00   02.00
01.88   00.28   04.09   00.00   01.67   00.00
01.77   00.00   00.35   04.52   00.33   00.33
00.33   00.37   00.44   03.54   05.61   06.87   05.44
04.00   02.00   01.00   01.00
07.87   00.00   01.93   00.00   04.32   00.00
00.70   05.09   04.14   00.77   00.40   00.54
00.40   02.47   00.47   03.30   06.04   03.30   04.43
03.00   04.00   06.00   02.00
02.60   00.37   03.95   00.00   02.22   00.00
01.67   00.77   00.00   07.45   01.30   00.40
00.34   06.84   00.20   04.80   03.07   05.30   12.57
02.00   03.00   02.00   01.00
02.03   00.00   02.51   00.86   02.11   00.00
00.00   06.81   02.48   04.37   00.64   00.40
00.44   00.37   00.34   03.60   02.93   04.31   04.24
03.80   04.73   06.77  298.38
15.00   04.00   11.25   67.00   01.00
02.00   05.00   04.00   02.00
09.23   00.00   02.00   00.00   01.62   00.00
04.98   02.39   00.53   03.90   00.57   00.44
00.43   00.48   00.50   04.17   04.77   04.40   04.00
03.00   01.00   02.00   01.00
02.71   00.78   00.00   05.17   04.98   00.00
00.00   06.83   05.15   00.00   00.43   00.40
00.40   00.50   00.40   15.35   04.50   07.22   05.18
04.00   06.00   05.00   02.00
09.76   00.00   03.70   00.00   09.79   00.00
10.00   00.00   00.00   03.00   00.23   00.33
00.30   00.47   00.30   08.04   05.70   04.96   05.21
01.00   03.00   01.00   01.00
03.73   00.34   03.52   00.52   01.70   00.76
00.00   00.17   02.76   00.28   00.40   00.57
00.30   10.01   00.37   05.53   06.35   08.75   04.33
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31.53	04.28	10.24	348.97			
16.00	01.00	05.00	47.00	01.00	04.00	
03.00	05.00	04.00	01.00			
00.97	01.83	01.75	01.70	00.54	01.04	
00.97	00.00	00.93	00.81	00.00	00.73	
00.13	00.00	00.00	03.10	04.14	03.73	03.43
02.00	01.00	02.00	02.00			
01.69	02.61	01.23	01.25	00.00	00.64	
03.55	01.52	02.17	00.34	00.00	00.37	
00.90	00.57	00.16	05.90	04.44	04.34	04.18
01.00	06.00	04.00	01.00			
03.19	01.49	00.00	03.39	00.46	03.16	
01.28	00.00	00.82	01.26	00.40	00.43	
00.07	00.40	00.37	03.77	03.04	05.54	03.87
04.00	03.00	02.00	02.00			
01.29	01.01	02.67	03.38	00.00	00.68	
00.68	00.60	01.22	00.63	00.37	00.34	
00.70	00.74	00.00	04.44	04.03	03.57	04.61
07.94	04.80	03.97	287.45			
16.00	02.00	05.00	47.00	01.00		
04.00	04.00	05.00	01.00			
00.95	01.07	02.09	00.89	00.00	01.43	
01.30	00.89	00.66	00.82	00.37	00.44	
00.37	00.81	00.70	05.87	03.63	07.53	04.86
01.00	01.00	02.00	02.00			
00.66	00.77	00.90	01.06	00.43	00.88	
03.04	00.70	00.54	00.63	00.34	00.36	
00.33	00.67	00.20	04.58	09.31	05.74	04.25
02.00	05.00	06.00	01.00			
01.61	01.06	01.06	01.04	00.29	00.52	
00.50	00.46	02.09	00.00	00.56	00.00	
00.53	00.60	05.97	05.20	03.87	17.99	06.00
03.00	03.00	01.00	02.00			
00.77	00.60	00.14	02.11	01.63	00.00	
01.32	00.00	00.00	00.55	00.36	00.63	
00.00	00.00	00.37	05.91	13.05	05.31	09.87
05.20	05.55	20.09	348.10			
16.00	03.00	05.00	47.00	01.00		
01.00	05.00	04.00	01.00			
00.59	02.20	00.43	00.31	00.49	00.47	
00.75	00.00	00.86	00.25	00.00	00.36	
00.00	00.63	00.37	03.40	18.25	08.68	13.25
04.00	02.00	01.00	02.00			
01.77	01.81	00.54	00.39	00.76	02.51	
00.91	01.66	01.08	00.91	00.90	00.00	
00.13	00.50	01.43	03.27	03.74	04.64	03.97
03.00	06.00	05.00	01.00			
00.74	01.18	00.36	00.30	01.03	00.19	
00.32	00.27	00.92	00.28	00.96	00.33	
00.37	00.00	00.00	06.31	05.24	06.84	03.64
02.00	01.00	03.00	02.00			
00.82	01.53	00.00	01.04	00.00	00.62	
03.25	00.98	00.00	00.00	00.00	00.40	
00.13	01.50	*****	06.68	14.81	03.47	03.17
02.93	08.34	04.37	329.88			

16.00	04.00	05.00	47.00	01.00		
02.00	04.00	05.00	01.00			
00.45	01.03	00.00	00.98	00.69	02.37	
02.66	00.84	01.20	01.44	00.00	00.40	
00.47	00.27	00.00	08.74	05.10	13.64	03.26
03.00	02.00	01.00	02.00			
00.29	05.68	00.00	02.76	00.00	00.00	
00.36	01.82	00.93	01.21	01.10	00.00	
*****	00.13	00.00	04.76	05.20	51.86	03.60
04.00	06.00	05.00	01.00			
01.60	00.68	00.51	01.19	00.00	02.03	
03.80	00.23	00.21	00.76	00.00	00.63	
00.44	00.33	01.40	11.75	04.77	10.64	16.99
01.00	03.00	01.00	02.00			
00.24	00.67	01.62	03.21	00.00	00.96	
00.74	01.13	03.76	00.00	00.16	00.40	
01.13	00.14	00.36	03.10	03.07	06.81	03.35
12.87	12.25	04.33	390.31			
17.00	01.00	09.17	26.00	01.00	02.00	
02.00	04.00	05.00	01.00			
09.60	00.00	03.60	00.00	09.10	00.00	
00.00	07.57	06.51	01.95	00.55	00.27	
00.50	00.00	00.73	04.33	03.01	04.07	08.41
03.00	02.00	01.00	02.00			
09.69	00.00	08.77	00.00	08.69	00.00	
09.62	00.00	00.00	09.02	00.27	00.36	
00.00	00.40	02.54	06.67	03.66	06.01	09.15
04.00	06.00	04.00	01.00			
09.45	00.00	09.45	00.00	09.41	00.00	
00.00	09.62	09.92	00.00	00.00	00.27	
00.23	00.00	00.00	03.17	16.21	07.71	03.43
01.00	03.00	02.00	02.00			
01.34	01.07	00.58	00.00	00.00	08.30	
08.71	00.00	00.00	09.27	00.10	00.50	
00.67	00.00	00.30	03.24	02.97	03.06	03.41
03.13	03.00	05.27	298.63			
17.00	02.00	09.17	26.00	01.00		
01.00	04.00	05.00	01.00			
01.85	00.00	02.40	00.00	02.56	00.90	
01.44	01.91	00.00	04.04	02.27	00.00	
00.76	00.10	00.67	09.34	02.74	08.54	03.04
04.00	01.00	02.00	02.00			
00.00	00.00	05.85	00.00	01.43	00.56	
03.07	00.00	01.83	00.00	*****	00.00	
01.57	01.04	00.00	07.48	06.30	03.60	03.61
03.00	05.00	06.00	01.00			
00.51	00.56	00.39	00.64	01.02	00.49	
02.51	00.17	01.38	00.64	04.14	01.30	
02.76	00.64	00.10	05.57	09.61	05.50	04.47
02.00	03.00	01.00	02.00			
00.00	01.20	00.90	01.02	01.51	02.71	
00.57	00.00	01.63	00.30	01.08	00.67	
00.87	00.23	00.10	14.64	09.54	03.57	03.16
12.21	04.50	04.23	325.68			
17.00	03.00	09.17	26.00	01.00		

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04.00   05.00   04.00   01.00
01.13   00.00   05.18   00.00   00.90   00.00
00.00   07.94   10.04   00.00   00.00   05.81
00.00   00.00   00.00   04.88   03.17   04.14   03.74
01.00   02.00   01.00   02.00
08.25   00.00   07.21   00.00   03.05   00.00
07.34   00.00   02.15   02.42   00.26   00.80
00.91   00.00   00.73   02.90   02.90   04.50   05.11
02.00   06.00   05.00   01.00
06.25   00.00   01.16   00.00   06.02   00.00
00.00   08.45   09.05   00.00   00.00   00.00
00.00   01.46   00.00   02.97   04.63   03.88   07.91
03.00   01.00   03.00   02.00
05.60   00.00   04.80   00.00   00.00   00.00
03.96   00.00   00.00   00.19   00.00   01.66
*****   00.10   00.10   09.54   04.38   03.40   10.14
03.58   05.25   05.01  290.01
17.00   04.00   09.17   26.00   01.00
03.00   05.00   04.00   01.00
05.81   00.00   01.30   00.00   00.00   01.84
00.00   00.61   01.88   00.00   00.00   00.00
05.81   00.87   00.00   03.45   02.70   05.00   04.97
02.00   01.00   02.00   02.00
00.98   06.69   03.44   02.76   00.23   02.64
03.04   01.39   02.05   00.00   00.00   00.33
00.00   00.00   00.10   03.11   03.37   03.47   04.70
01.00   06.00   04.00   01.00
02.66   00.67   01.52   02.67   00.95   01.66
09.21   00.00   01.07   03.38   00.77   01.17
00.66   01.70   00.63   08.04   04.25   15.75   03.40
04.00   03.00   02.00   02.00
05.45   00.00   07.28   00.00   08.46   00.31
05.51   00.93   01.51   07.25   00.80   00.00
00.40   00.33   00.26   02.96   04.30   04.31   04.31
03.40   03.37   02.88  292.92
/end
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