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VISUAL ATTENTION IN RETARDED ADULTS: COMBINING STIMULI WHICH CONTROL INCOMPATIBLE BEHAVIOR

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Eight severely retarded young men learned color and line-tilt discriminations. After 95% accuracy was achieved for both dimensions, they were combined to form "conflict-compound" stimuli in which prior reinforcement history was reversed for one element of the compound and unchanged for the other. When responding to the compound was 95% accurate, control exerted by each element was measured. The unchanged element consistently exercised control in agreement with the reinforcement contingencies associated with the compound, regardless of whether it was color or line orientation. The reversed element, which had a conflicting prior history or reinforcement, most often exerted control associated with original training, or no control, suggesting that it had been "ignored" during the compound. Conflict compounds produced selective attention. When elements were combined to form "compatible-compound" stimuli, both exercised control in agreement with the compound in post-tests. Selective attention was not produced by compatible compounds.

Key words: stimulus control, visual attention, compound stimuli, prior reinforcement history, prolonged training, retarded adults

Following compound stimulus discrimination training, typically only one element of the compound exhibits a high level of stimulus control (Birkimer, 1969; Born & Peterson, 1969; D'Amato & Fazzaro, 1966; James & Greeno, 1967; Johnson & Cumming, 1968; LoLordo & Furrow, 1976; Reynolds, 1961; Segal & Harrison, 1978; Wilkie, 1973; Williams, 1972). This form of selective attention (Ray, 1969) is evident in both compound visual (Reynolds, 1961) and auditory stimuli (Segal & Harrison, 1978). While selective attention is commonly observed, the particular element of a compound stimulus which exhibits control can differ across subjects (Reynolds, 1961; Reynolds & Limpo, 1969; Touchette, 1969). Reynolds (1961) found intersubject variability with two pigeons when key pecking was reinforced in the presence of a white triangle on a red background and extinguished in the presence of a white circle on a green background. When stimulus components were presented alone, one pigeon responded predominantly in the presence of red. The second pigeon responded reliably only when the triangle was present.

Identifying environmental manipulations which determine the element of a compound stimulus that controls responding is a central issue in the area of attention (Born & Peterson, 1969; Johnson & Cumming, 1968). One variable which has been shown to determine which features of compound stimuli exert control is prior history of reinforcement. If a discrimination is first established between two unidimensional stimuli and reinforcement contingencies are maintained as a second set of stimuli are added to form a compound, typically the initial stimuli alone control responding following differentiation of the compound (Fields, 1978; Fields, Bruno & Keller, 1976; Johnson & Cumming, 1968; Mackintosh, 1965; Schusterman, 1967; vom Saal & Jenkins, 1970). This effect has been observed when the second stimulus element was introduced abruptly (Fields, Bruno, & Keller, 1976) and gradually (Fields, 1978).

Ray (1969) assessed control exerted by compound stimuli made up of two elements with *conflicting* prior histories. In her experimental paradigm, all stimulus elements have a known baseline of control, and when stimuli are com-

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bined such that they control incompatible responses, selective attention reliably results. In the investigation reported here, Ray's (1969) paradigm was used with eight retarded adults in order to ascertain whether their attention to compound stimuli would be selective in accordance with the prior reinforcement history of the individual stimulus elements.

It has been suggested that a primary reason for the failure of retarded individuals to learn complex discriminations as quickly as normals is that they attend to fewer and possibly different aspects of their environment than normals (Lovaas, Schreibman, Koegel, & Rehm, 1971; Zeaman & House, 1963). They have, however, been shown to be able to acquire simple, unidimensional discriminations readily under a variety of training regimens (Orlando, 1961; Touchette, 1968). An analysis of contingencies of reinforcement which influence the attention of retarded individuals to features of complex stimuli is lacking.

Prior history of reinforcement of individual stimulus elements and the juxtaposition of those elements in a compound are variables which Ray's (1969) findings suggest as critical to the establishment, maintenance and elimination of selective attention. Yet studies of selective attention in developmentally delayed children typically fail to establish or measure control exerted by stimulus elements before compounds are formed (e.g., Koegel & Wilhelm, 1973; Lovaas & Schreibman, 1971; Lovaas, Schreibman, Koegel, & Rehm, 1971; Wilhelm & Lovaas, 1976). In essence, these studies failed to establish a baseline prior to carrying out the compounding manipulation of interest.

Assessing element control following exposure to compound stimuli is no simple task. When a single testing procedure is used, the effect of the procedure itself on the measured behavior is difficult to assess. Wilkie & Masson (1976) demonstrated, for instance, that the reinforcement contingency in effect during the test sessions was critical. When they tested in extinction, only one element of a compound appeared to exert control. Nondifferential reinforcement during testing, however, revealed that both stimulus elements controlled responding. Differential and nondifferential reinforcement tests were used during this study.

Nondifferential reinforcement testing contingencies have been used infrequently in the past (Schusterman, 1967; Sutherland & Holgate, 1966; Williams, 1972). They are, however, especially appropriate to the study of weak or recently altered stimulus control since they avoid the variability of behavior (Eckerman & Lanson, 1969; Millenson & Hurwitz, 1961) and "emotional" byproducts (Holmes, 1972; Stoddard & Sidman, 1967; Terrace, 1966) which extinction produces in both human and nonhuman organisms.

METHOD

Subjects

Eight severely retarded male state school residents served. Their chronological ages ranged between 20 to 26 years. Duration of institutionalization was from 20 to 24 years. All were diagnosed as Down's Syndrome with the exception of one subject. IQ scores ranged from 21 to 47.

Apparatus

Automated, relay-controlled equipment presented stimuli, delivered reinforcement, and recorded responses. In a separate room, the subjects sat facing a black display panel which contained two clear plastic response keys 3.2 cm in diameter and 14 cm apart, center to center. Pressure of 50 to 90 gm at any point on the surface of the hinged plastic disks closed the microswitches beneath them. Stimuli were presented to the subjects by two Industrial Electronic Engineers projectors directly behind the keys. A six-pen Gerbrands event recorder kept a running account of the onset of trials, stimuli and response latencies. A BCI reinforcement dispenser was located to the right of one subject. When this device was operated, tokens dropped into a 9.6- by 14- by 9.6-cm receptacle at the base of the dispenser, and a 7-watt light bulb above the token tray illuminated for 1 sec.

Procedure

General procedure. Each session consisted of 60 trials. Trials began when visual stimuli were projected on both transparent response keys. Trials ended when the subject pressed and released one or both keys. An 8-sec intertrial interval during which the keys were dark followed each response. Any press during the intertrial interval reinitiated it. Correct key presses produced a token. An incorrect key press or pressing both keys simultaneously terminated the trial without reinforcement. At the close of each 60-trial session, the subject exchanged tokens for candy or special privileges. Stimuli were presented in a random sequence with the restriction that no stimulus was presented more than twice in succession.

Phase one. Ray's (1969) procedure was replicated in the first part of this study. The procedure is illustrated in Figure 1. A color discrimination was achieved by reinforcing a left key press whenever red stimuli appeared behind both keys and a right key press when green stimuli appeared. When 95% accuracy in one 60-trial session was obtained, line-orientation stimuli were then presented. Now, a left key press was reinforced in the presence of vertical lines, and a right key press was reinforced when horizontal lines appeared until criterion accuracy was reached.

Following acquisition of the color and line-orientation performances, 30 trials of each discrimination were presented. This was the "immediate history check" session, given to insure that both discriminations were still at 95% accuracy before the stimuli were combined. If criterion accuracy was not met for either dimension, the immediate history check was continued until 95% accuracy was obtained for both during one 60-trial session.

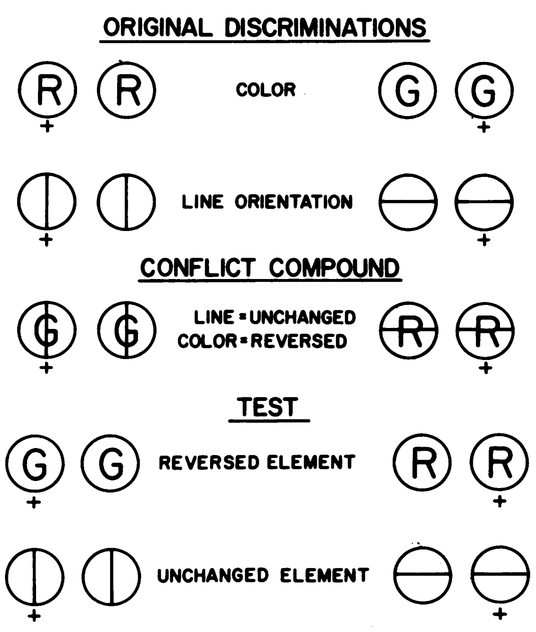

Fig. 1. Diagram of Ray's (1969) experimental procedure. The location where a key press would produce reinforcement is indicated by a plus (+). In this example, color is the reversed element of the conflict compound, and line orientation is the unchanged element.

A conflict compound was created in the next step by keeping the original reinforcement contingencies unchanged for one of the stimulus elements and reversing them for the remaining stimulus element. In Figure 1, the conflict compound is composed of unchanged line orientation and reversed colors. Line orientation is the unchanged element, since reinforcement continued to be contingent on left key presses during vertical lines and on right key presses during horizontal lines. The reinforcement contingencies for color are, however, reversed. In order to obtain a token on the basis of color, a subject had to press the left key during green and the right key during red. Conflict compounds were sometimes composed of unchanged color/reversed line and other times, reversed line/unchanged color. Tables 1 and 2 provide a guide to the sequence of experimental procedures. Subjects were presented with conflict compounds until they met a criterion of 95% accuracy in one 60-trial session.

The final step was a test session to determine the effects of the conflict compound (Figure 1). During a test session, 20 trials of the conflict compound, 20 trials of the reversed element alone, and 20 trials of the unchanged element alone were presented. The sequence consisted of 10 trials of the conflict compound, 10 trials of the reversed element alone, 10 trials of the unchanged element alone, 10 trials of the reversed element alone, 10 trials of the unchanged element alone, and 10 trials of the conflict compound. The same differential-reinforcement contingency was used in the stimulus-element trials as was present when these elements were combined to form the preceding conflict compound.

The purpose of the test session was to determine if subjects were attending to one or both stimulus elements during the conflict compound. The agreement of responses during reversed-element and unchanged-element test trials with reinforcement history during the conflict compound was calculated by taking the number of responses in agreement with the reinforcement contingency of the conflict compound and dividing it by the total number of trials. If, for instance, high agreement was obtained in both the reversed-element and the unchanged-element test trials, this would indicate that the subject was attending to both stimulus elements during the conflict compound. If a high agreement level was obtained for only one stimulus element while the remaining stimulus element produced an agreement score of 50%, selective attention would be inferred during the conflict compound. Reversed-element agreement scores approximating 0% would suggest that the original discrimination had been unaffected by the interposed conflict compound.

At the end of the test session, one cycle of Ray's paradigm was complete. Each of the eight subjects was given a second cycle. Original color and line-orientation discriminations were reestablished. The stimulus element which in cycle one had been the reversed element was now made the unchanged element in the conflict compound. When criterion accuracy was obtained, another test was given. For Subjects 1, 2, 3, 7, and 8 the first conflict compound was composed of line orientation as the unchanged element and color as the reversed element. In cycle two, color was the unchanged element, and line orientation was the reversed element of the conflict compound. Subjects 4, 5, and 6 received the conflict compounds in reversed order.

Phase two. In this phase of the study, the test-session reinforcement contingency was manipulated. The procedures described in the first phase were repeated, but nondifferential reinforcement was employed in the reversed-element and unchanged-element test trials instead of differential reinforcement used in the first phase. During nondifferential test trials, whichever key the subject pressed produced reinforcement regardless of the stimulus presented. Pressing both keys simultaneously or during the intertrial interval were the only behaviors paired with extinction. Table 1 indicates the sequence of stimuli and procedures presented to subjects in phases one and two.

Phase three. In this phase, compatible elements were combined to determine whether compounding alone was sufficient to produce selective attention. Original color and line-orientation discriminations were recaptured for Subjects 2 and 8. A compatible compound was then created, keeping the prior reinforcement histories unchanged for both stimulus elements when the stimuli were combined. The compatible compound was composed of two unchanged elements. After criterion accuracy was obtained for the compatible compound, nondifferential test sessions were administered.

Phase four. The effect of six conflict-compound sessions (360 trials) beyond criterion on stimulus-element control was examined in the fourth phase. Original discriminations were reconditioned to criterion accuracy for all 8 subjects. The stimuli were next combined. Color constituted the reversed element of the conflict compound, and line orientation was the unchanged element. After 95% accuracy was obtained, a nondifferential-reinforcement test session followed. Three conflict-compound sessions were next administered, another nondifferential-reinforcement test session, three additional conflict-compound sessions, and a third nondifferential-reinforcement test ses-

Table 1

Sequence of Stimuli and Procedures in Phases One and Two

PHASE ONE		*PHASE TWO*	
S-1, S-2, S-3 S-7, S-8	*S-4, S-5 S-6*	*S-1, S-2, S-3 S-7, S-8*	*S-4, S-5 S-6*
Original Color	Original Color	Original Color	Original Color
Original Line	Original Line	Original Line	Original Line
Conflict Compound:	Conflict Compound:	Conflict Compound:	Conflict Compound:
Line Unchanged	Color Unchanged	Line Unchanged	Color Unchanged
Color Reversed	Line Reversed	Color Reversed	Line Reversed
Test (Diff. S^R)	Test (Diff. S^R)	Test (Nondiff. S^R)	Test (Nondiff. S^R)
Original Color	Original Color	Original Color	Original Color
Original Line	Original Line	Original Line	Original Line
Conflict Compound:	Conflict Compound:	Conflict Compound:	Conflict Compound:
Color Unchanged	Line Unchanged	Color Unchanged	Line Unchanged
Line Reversed	Color Reversed	Line Reversed	Color Reversed
Test (Diff. S^R)	Test (Diff. S^R)	Test (Nondiff. S^R)	Test (Nondiff. S^R)

Table 2

Sequence of stimuli and procedures in phases three and four.

PHASE THREE	*PHASE FOUR*
S-2, S-8	*S-1, S-2, S-3, S-4 S-5, S-6, S-7, S-8*
Original Color	Original Color
Original Line	Original Line
Compatible Compound:	Conflict Compound:
Line Unchanged	Line Unnchanged
Color Unchanged	Color Reversed
Test (Nondiff. S^R)	Test (Nondiff. S^R)
Original Color	3 Extra Conflict
Original Line	Compound Sessions
Compatible Compound:	Test (Nondiff. S^R)
Line Unchanged	3 Extra Conflict
Color Unchanged	Compound Sessions
Test (Nondiff. S^R)	Test (Nondiff. S^R)

sion. Table 2 indicates the sequence of stimuli and procedures in phases three and four.

RESULTS

Unchanged elements were the most consistent and reliable source of stimulus control throughout. The change from differential reinforcement to nondifferential reinforcement in test sessions produced a decrease in reversed element agreement scores for most subjects. The unchanged element appears to have supported conflict-compound accuracy for the majority of subjects.

Differential-Reinforcement Tests

During differential reinforcement test sessions unchanged elements exerted control in seven of eight cases when line was the unchanged element and in all cases when color was unchanged. Figure 2 shows the percent of responses, in agreement with the reinforcement contingencies of the conflict compound, emitted during the stimulus element tests. Reversed elements exerted control in six of eight subjects when the reversed element was color and in five of the eight when the reversed element was line orientation.

During differential reinforcement testing, color exerted near perfect control as a reversed element in 6 of 8 cases (see Figure 2, top). Subject 3 was controlled by color alone whether it was the unchanged or reversed element. Although hardly a dramatic effect, color was more likely to command attention in either role (reversed or unchanged) than was line

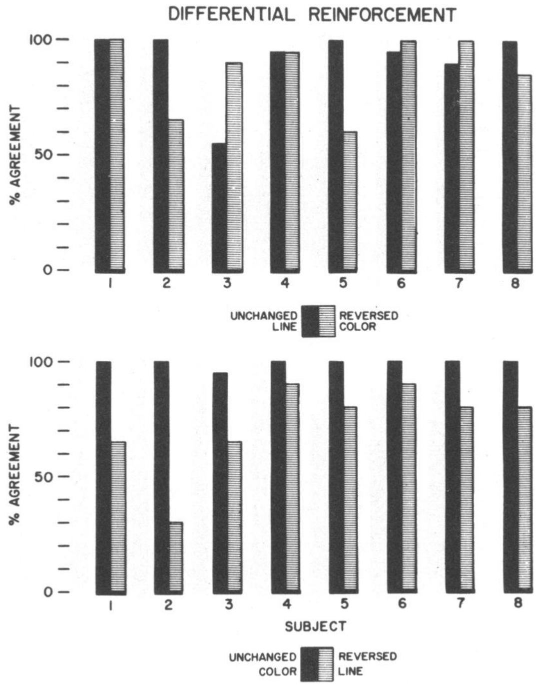

Fig. 2. Percent agreement of responses during 20 reversed-element test trials (gray bars) and 20 unchanged-element test trials (black bars) with the reinforcement contingencies of conflict compound training. The percentages are based on single test sessions in which differential reinforcement contingencies were in effect.

orientation. This tendency has been reported in nonhuman organisms (Carter and Eckerman, 1975).

Nondifferential Tests

In nondifferential-reinforcement test sessions there was a greater tendency for the unchanged element alone to exert stimulus control in agreement with the conflict compound's training contingencies (Figure 3). Only the unchanged element was associated with an agreement value above chance (50%) for most subjects.

Agreement between conflict compound training and individual element tests was perfect or near perfect for the unchanged element, whether it was color or line orientation. In contrast, agreement scores were variable during the reversed element test trials. Subjects 1, 2, 4, 5, and 6 produced reversed-color scores so low that they strongly suggest that the conflict compound left the original controlling relation untouched (Figure 3, upper portion). Subjects 3 and 8 responded at near chance level

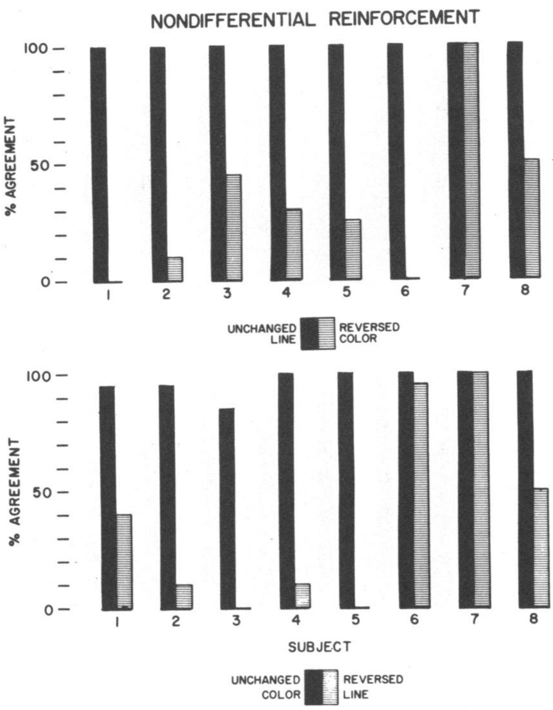

Fig. 3. Percent agreement of responses during 20 reversed-element test trials (gray bars) and 20 unchanged-element test trials (black bars) with the reinforcement contingencies of conflict compound training. The percentages are based on single test sessions in which nondifferential reinforcement contingencies were in effect.

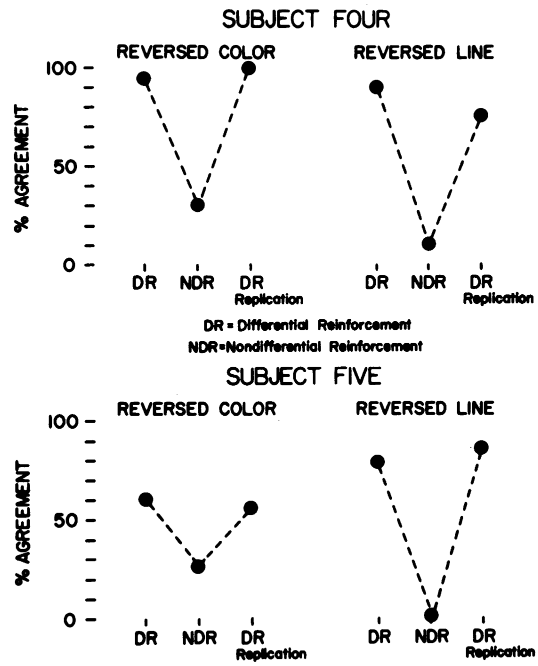

Fig. 4. Percent agreement of responses during 20 reversed-element test trials with the reinforcement contingencies of conflict compound training for Subjects 4 and 5. They were tested with differential reinforcement (DR) before and after testing with nondifferential reinforcement (NDR). Each percentage value was derived from a single test session.

when the reversed-color stimuli were presented, and Subject 7 was the only one whose data indicated that he had reversed the original-color controlling relation during the conflict compound.

When line was the reversed element, Subjects 2, 3, 4, and 5 exhibited the original controlling relation (Figure 3, lower portion). Subjects 1 and 8 responded at or near chance level, while Subjects 6 and 7 responded in agreement with the conflict compound configuration.

Retesting with Differential Reinforcement

Subjects 4 and 5 were exposed to additional cycles of the original discrimination, immediate history check, conflict compound and differential reinforcement testing in order to determine whether test results would reverse with the reinstatement of differential reinforcement during testing. These subjects had exhibited lower reversed-element agreement when nondifferential reinforcement was used in the second set of tests. When differential reinforcement was reinstated agreement scores for the reversed-element increased to the levels previously observed (Figure 4). The data in Figure 4 suggest that stimulus control for the reversed element was produced by the test-session differential reinforcement contingency. Identical stimulus control baselines had been established prior to both types of testing suggesting that the observed difference resulted from events within the test sessions themselves.

Compatible Compounds vs. Conflict Compounds

Compatible compounds, where the prior reinforcement histories of both stimulus elements were unchanged, were presented to Subjects 2 and 8 to determine whether selective attention evident in the nondifferential test sessions was a function of compounding alone. Following compatible-compound training, selective attention was not evident (Figure 5). Both elements exercised stimulus control in

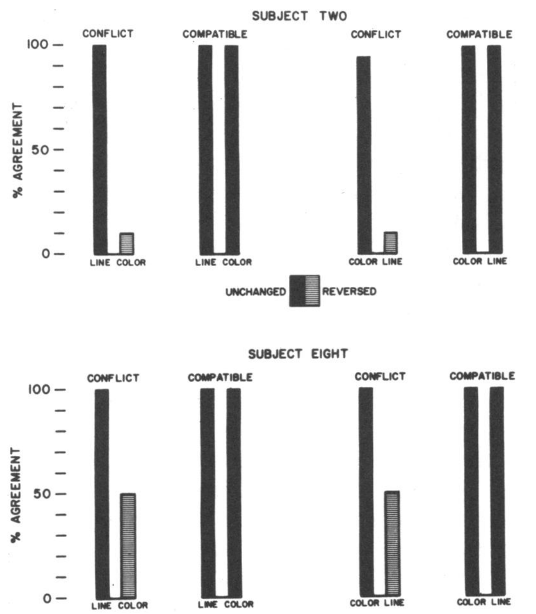

Fig. 5. Percent agreement of responses during 20 stimulus-element test trials with the reinforcement contingencies of conflict-compound and compatible-compound training. The black bars represent the unchanged elements, and the gray bars represent the reversed elements. The percentages are based on single test sessions in which nondifferential reinforcement contingencies were in effect.

agreement with the reinforcement contingencies of the compatible compound. In contrast, the unchanged element had previously produced high agreement following conflict compound training while reversed-element test trials resulted in only 10% agreement for Subject 2 and 50% agreement for Subject 8.

Prolonged Training

Nondifferential-reinforcement tests were given to all eight subjects prior to extended conflict compound training, then after three and six sessions beyond criterion accuracy. Line orientation was unchanged and color reversed. The unchanged element continued to be the only reliable source of stimulus control. The eight subjects continued at 90% or greater agreement for the unchanged element in all three test sessions.

Extended training did not produce reversed-element stimulus control for six of eight subjects (Figure 6). Subjects 7 and 8 did reverse the original color discrimination following extended training with the compound well beyond the point at which high accuracy re-

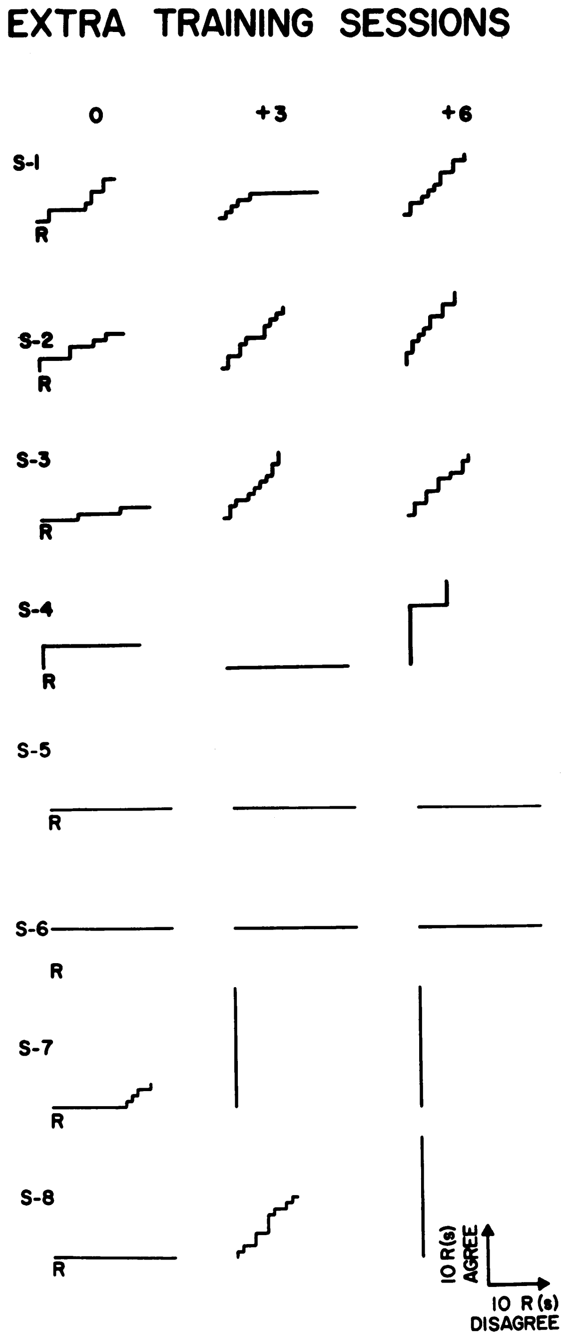

Fig. 6. Reversed-color (R) cumulative records from nondifferential-reinforcement test sessions administered followed zero, three, and six conflict-compound sessions beyond criterion accuracy for all eight subjects. Each response in agreement with the reinforcement history during the conflict compound advanced the record one unit along the ordinate. Each response in disagreement advanced the record one unit along the abscissa. A vertical line therefore indicates 100% agreement and a horizontal line 0% agreement.

sponding was initially achieved. The failure of overtraining to produce control by the reversed element was unexpected. We had thought it likely that extended training would broaden control within the compound stimulus (Touchette, 1969; Williams, 1972). It has been pointed out before (Fields, 1976) that acquisition of control by the non-controlling member of a compound while both elements are present, is prerequisite to the errorless transfer of stimulus control. Factors associated with the prior history of this stimulus, however, made ignoring the most likely outcome despite extended exposure to the compound.

DISCUSSION

These findings suggest that retarded adults exhibit selective attention to compound visual stimuli as a function of their prior history of reinforcement. Selective attention was usually evident when prior controlling relations were in conflict in the compound. Selective attention was not demonstrated when prior reinforcement histories of both stimulus elements were compatible in the compound. These data do not support the view that restricted visual attention is an unmodifiable (Zeaman, 1973) or perhaps even diagnostic (Lovaas, Schreibman, Koegel, & Rehm, 1971; Ullman, 1974; Wilhelm & Lovaas, 1976) characteristic of retarded individuals. On the contrary, the difference in results when differential and nondifferential consequences were applied during testing show how readily selectivity can be modified in this population. Each subject's prior history of attention to each of the elements of the compound may, however, be crucial.

Ray (1969) found that the unchanged element alone controlled responding in monkeys following training with a conflict compound. She tested using the differential reinforcement contingency which had prevailed during training trials. Our data, collected under similar contingencies revealed control in agreement with the conflict compound by both unchanged and reversed elements. Tests conducted under nondifferential reinforcement, however, revealed consistent responding to the unchanged element with rare evidence of control in agreement with the compound by the reversed element.

If the subjects came into the test with response tendencies not in line with the differential reinforcement contingencies of the test, learning within the test proved likely. Nondifferential testing, however, tended to stabilize initial controlling stimulus-response relations. When we reduced the opportunity for conditioning new stimulus control during testing, by applying nondifferential consequences, the majority of our subjects performed as Ray's data and analysis would predict.

The discovery that differential reinforcement during test sessions modified the stimulus-response relations of interest illustrates the danger of assessing stimulus control with only one test. The influence of test variables on the behavior of interest may overwhelm the effect of the training variable. Other investigators have demonstrated the value of using more than one stimulus control test. Newman and Benefield (1968), Wilkie and Masson (1976) and Freeman and Thomas (Note 1) found that both elements of compound stimuli exerted stimulus control but that their first assessment technique was not sensitive enough to detect it. In our investigation the reverse occurred. When differential-reinforcement testing was used, both elements exhibited stimulus control at the end of testing although selective attention was initially present.

When original reinforcement contingencies for one stimulus element are reversed in a compound, reinforcement of the associated stimulus-response relationship is omitted. The original controlling relation for the reversed element now produces errors. Its probability of occurrence would therefore be expected to drop. It did so in Ray's (1969) animal study. Her monkeys tended to solve the problem presented by the reversed element in the compound by "ignoring" the stimulus controlling incompatible behavior. Original control by the reversed element would have caused errors during the compound or 0% agreement in the post-compound test. The term ignore is used here, as it was by Ray (1969), to describe the subject's reliance on one element of the compound. On the whole, her animals responded at or near 50% during test trials of the reversed element following conflict-compound training indicating a loss of control by the reversed element. Several of our subjects displayed this same pattern. The most common finding in our subjects, however, was that the original controlling relation, established prior to the conflict compound, continued unaltered (0%

agreement) in post conflict testing. It is apparently possible for the original controlling relation, compatible with the compound, to support responding while the stimulus-response relation which causes errors in the compound is lowered in frequency without being topographically altered. Whether a controlling relation can survive topographically intact despite its reduction in frequency to 0, is of major theoretical significance, and this issue deserves further investigation. Our findings are variable across subjects in this regard and may not be robust. Neither is it clear to what extent the nondifferential test contingency is reflected in these data.

Two of our subjects (4 and 5) had indeterminate reversed-element scores between those which would indicate original control (0%) and no control (50%). Ray reported similar findings and suggested that this probably represented a mixture of control by position or some other nonrelevant stimulus and the reemergence of the original controlling relation. We concur. Figure 7 presents data for Subjects 4 and 5 plotted cumulatively during nondifferential testing with color reversed and line unchanged. Agreement scores during one half of the test session indicated perfect control by original color (0% agreement). Responses were controlled by key position 80% or more of the time during the remaining test trials.

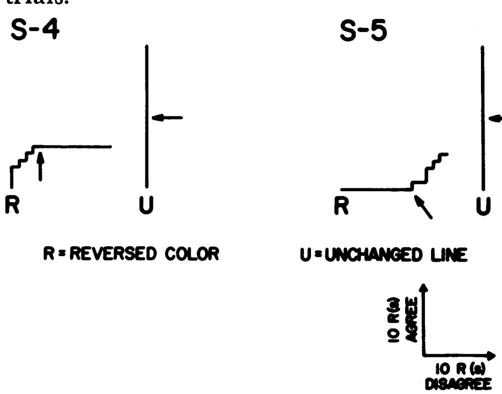

Fig. 7. Cumulative records for Subjects 4 and 5 from tests under nondifferential-reinforcement. Each response in agreement with the reinforcement history during the conflict compound advanced the record one unit along the ordinate. Each response in disagreement advanced the record one unit along the abscissa. A vertical line indicates 100% agreement, and a horizontal line 0% agreement. Line orientation was the unchanged element (U) and color was the reversed element (R). Arrows separate the first and last half of the test.

We observed a pattern which never occurred in Ray's animal study. Subjects 6 and 7 learned the reversed element discrimination during the conflict compound. For Subject 7, this occurred when either color or line was the reversed element, while reversed line alone was learned by Subject 6 (Fig. 3).

The data reported here, from an admittedly heterogeneous population, are somewhat more variable than were Ray's. They offer convincing evidence, however, that elements in a compound whose prior history conflicts with the contingencies applied to the compound are likely to continue to exert their original control, or to evidence no control tested in subsequent isolation. The two subjects who learned something about the reversed element during the conflict compound training demonstrate, in addition, that this outcome is also possible. Whichever form of control was evidenced by the reversed element following conflict-compound training, it was readily altered by differential reinforcement applied to that element in isolation. The general conclusion to be drawn is that assumptions about control exerted by elements of a compound whose prior history is unknown, cannot be inferred without direct observation in individuals such as these. Control by both elements of the compound can, however, be virtually assured by training each in isolation prior to forming the compound.

In this systematic replication (Sidman, 1960), it was found that with relatively minor procedural changes, Ray's (1969) stimulus control baseline procedure could be applied to the analysis of selective attention in a neurologically impaired population. Continued investigation of variables which produce and eliminate selective control by components of complex visual stimuli will lead to better specifications of normal and abnormal attention patterns, and may suggest ameliorative procedures.

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