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SEX AND SEX ROLE IDENTIFICATION DIFFERENCES ON A CONCEPT ATTAINMENT TASK

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INTRODUCTION

The purpose of this investigation is to determine whether males are superior to females on conceptual tasks and whether high masculine people are correspondingly superior to low masculine people. Also, another goal is whether males and high masculine people are better on the separately measured processes of logical reasoning and memory as manifested in conceptual behavior.

In a study of category width, presumably an important variable in conceptual functioning, Pettigrew (1958) found that females had significantly narrower categories than males. He noted, however, that these results may have been an artifact of his highly quantitative experimental task. Since, as Pettigrew states, males are more quantitative in their conceptual abilities, this would provide an adequate explanation for male superiority. But, Pettigrew offers an alternative explanation that males are reinforced more than females for wider categories. Wallach and Caron (1959) provide corroborative data for this hypothesis. They state that the female exhibits greater conceptual conservatism (narrower categories) because she has been subjected to greater societal pressures against expression. They go on to state, ". . . for girls there has been a generalization of fear of independence from the sphere of action to that of cognition. Concepts are subject to

social regulation as much as behavior; and because girls have been reluctant to overstep the behavior boundaries prescribed by authority, they are also loathe to be expansive in the realm of concepts (p. 49)."

Using a method similar to the one which will be used in this study, Milton (1957) found sex role identification differences on a problem solving task. He noted that his subjects with high masculine sex role identification performed significantly better on a problem solving task than did those subjects with low masculine sex role identification. He states (Milton, 1957, p. 211) that, "The acquisition of problem-solving skills may be affected by the same processes which govern the formation of sex role identification. If the Freudian hypothesis concerning the identification process is correct, then the important antecedents of adult problem solving are to be found in childhood."

Tiffany (1962) noted corroborative evidence for Milton's hypothesis when he found that adolescent subjects with high masculine identification were superior on concept attainment problems, somewhat similar to the problems to be administered in this investigation.

What appears to be the underlying trend in the studies cited above is that males, and more particularly males and females with a high masculine sex role identification, are superior to females and those with low masculine sex

role identification in a variety of problem solving tasks. It has been hypothesized that these problem solving differences are possibly due to some unique social pressures from parents or others which are applied in contrary ways to females and males at an early age, to lower quantitative abilities for females. These differences become learned and adopted as the individual matures in his sex role behavior.

Concept Attainment

At the beginning, it may be important to distinguish between concept attainment (or acquisition) and concept formation (or identification). Kendler (1964) succinctly makes this differentiation by stating that the latter process ". . . would be restricted to the situation in which a simple set of instructions would not suffice. The S would have to acquire a concept from the very beginning (p. 227)." The former process is defined as ". . . occurring when the instructions could produce the same behavior (e.g., sorting in terms of numbers) as the conventional training procedures (p. 227)." The difference appears to be a difference in whether or not the individual has a choice of concepts (concept formation), or whether he is forced to select or arrive at a correct concept previously established by the experimenter (concept attainment).

Bruner, Goodnow, and Austin (1956) look upon concept formation as the first step in the process of concept attainment. In the act of concept attainment, an individual seeks defining attributes that will distinguish exemplars and nonexemplars of a class previously determined. Concept formation, on the other hand, is a procedure in which an individual seeks to group stimulus objects into meaningful classes which have not been previously established. In essence, Bruner et al. feel that concept attainment, ". . . refers to the process of finding predictive defining attributes that distinguish exemplars from nonexemplars of the class one seeks to discriminate (p. 22, 1956)."

Of primary importance to Bruner et al.'s (1956) concept attainment process is the use of strategies. In the selection procedure, the individual is free to choose from an array of instances, the order of the instances he wishes to test in order to arrive at the correct concept. Through the use of certain strategies the individual increases the likelihood that the instances encountered will contain appropriate information, reduce the strain involved in the task of assimilating and keeping track of the information, and regulate the amount of risk necessary in attaining a correct solution in a limited number of choices.

However, in most cases, they (Bruner et al.) note that an individual's ". . . major area of freedom is in the hypotheses he chooses to adopt, not in the manner in which he can choose instances to test (p. 82, 1956)." Here the individual is exposed to the procedure in which the order of instances for testing are controlled by the experimenter. The individual is now faced with the problem of forming hypotheses and retaining or appropriately altering these hypotheses when any one of the following contingencies are met, positive confirming or infirming, or negative confirming or infirming. Bruner et al. state that the evaluation of strategies, which they define as regularities in decision making, provide the basis for making inferences about the processes involved in learning or attaining a concept.

Hunt (1963), taking a slightly different approach than Bruner et al., gives the following definition of concept learning, ". . . a term which applies to any situation in which a subject learns to make an identifying response to members of a set of not completely identical stimuli . . . (p. 6)." Hunt states that his definition of concept learning is essentially the same process referred to by Bruner et al. as concept acquisition. Hunt makes no distinction between the two types of strategies, reception or selection, as Bruner et al. do.

According to Heidbreder (1946), a concept exists when it is a logical construct which may be transferred to new situations and to people via signs and symbols. For her, concept attainment occurs when an experimental subject produces behavior which conforms to the specified conceptual criteria for the first time. Her definition is largely on an empirical basis, but nevertheless it serves to present a point of view which should be examined.

Seymour (1954) analyzes the process of concept attainment as follows: 1) the formation of a concept set and a generic model of the concept; 2) discrimination and identification of the various attributes of those events from which the concept will be derived; 3) differentiation of the relevant and irrelevant attributes that define the concept; 4) identification of those events which exhibit the concept; and 5) coding of the concept by a symbolic response.

At this point in our discussion it would be worthwhile to examine some of the commonalities and differences among the theorists cited above, and discuss these in the light of the problem of this paper. Both Heidbreder and Seymour note that part of the process of concept attainment involves the coding or symbolizing of the concept. This process is necessary for the transmission of any information of a "language" as a part of concept attainment. Males may have

cognitive superiority because of their wider range in coding and expressing their thoughts, while females may not be as wide. If there is less coding, logical reasoning and memory may be impaired since both apparently depend upon the manipulation and retrieval of symbols into which the relevant information is coded.

Bruner et al. emphasize the use of strategies in the process of concept attainment. If appropriate strategies are necessary for efficient concept attainment, then the manner in which these strategies are formulated and manipulated may be a factor which has an influence upon the masculine-feminine conceptual differences. Since the efficiency of strategies depends upon the manipulation of symbols, the possibility exists that females do not deal with these symbols as adequately as males. Perhaps it is this important aspect of the theories cited above--concept attainment involves the logical manipulation of information given and remembered--that may be one fundamental factor in conceptual differences between masculine and feminine people. All concept attainment rests on the individual's ability to store the given information efficiently, to recall this information at appropriate times, to manipulate and transform appropriate information, and to eliminate information that becomes inappropriate.

Concept Attainment and Memory

Bartlett (1932) argued for memory as an active reconstructive process. At first a scheme or vague idea of the item which is to be recalled is developed. Following this the details are filled in, partly from memory and partly from what the event to be recalled must have been. Since recollection is sensible and this sensibility depends on what the subject feels, to be true at the time of recall, memory should be influenced by present knowledge and opinion. From Bartlett, it may be inferred that the processes of concept attainment and memory are closely intertwined, and interact with each other. The problem is to isolate conditions of concept attainment which are free from any memory demands, and those in which memory plays a part necessary for more efficient cognitive operations.

In just such an attempt to free concept attainment from memory, Cahill and Hovland (1960) showed that concept attainment was more efficient under the simultaneous condition where memory demands were at a minimum when compared to the successive condition where memory was of primary importance in efficient attainment. Interestingly though, this increased efficiency of the simultaneous over successive condition was found for the negative series (i.e., negative instances only were used as exemplars). Hovland and Weiss (1953) and Glanzer, Huttenlocher, and Clark (1963) compared the efficiency of positive vs.

negative series and showed more efficient concepts of attainment in the positive than in the negative series.

Kates and Yudin (1964), using procedure similar to Cahill and Hovland (1960), obtained findings matching those of Cahill and Hovland. They also noted, in a separate experiment, that there were no differences in efficiency between a positive and a negative series when both the number of instances and amount of information were equated for the two series. In a related experiment, Yudin and Kates (1963) again noted no differences in efficiency between the positive and negative series with adolescent subjects.

Hunt (1962) makes the point that the concept learner must use memory for more efficient solution of problems. He also notes that it is easier to remember hypotheses than specific instances. Of course, the greater the efficiency in remembering and discarding hypotheses, the more efficient concept attainment will be. Those hypotheses are remembered that summarize and store as much of the information about discrete instances as possible.

In a slightly different approach to memory, Miller (1956) has proposed that by recoding stimuli into a few symbols, humans increase their capacity to retain information. The factor which limits human information capability is the number of symbols which can be stored.

What is then involved is a coding and recoding procedure which hopefully does not result in the loss of information. Similarly, Miller, Galanter, and Pribam (1960) propose that coding is the normal method of information storage. They further propose the use of mnemonic devices as a method of coding and recoding. In discussing Miller et al., Hunt (1962) notes the importance of recoding information that is later relevant for concept attainment if the recoding in memory at any one time is to be helpful. At first the concept learner may not know what information is relevant and may store useless information. There is some likelihood that males may tend to include more information at first in their symbolic coding, and thus be more efficient in concept attainment. In an experiment relevant to this discussion, Wickelgren and Cohen (1962) had their subjects construct an artificial memory. They found that the smaller artificial memory resulted in more efficient concept attainment. In attempting to explain these somewhat unusual results, they stated that, ". . . limited memory precludes extensive recording of instances and thereby induces earlier inference behavior (p. 826)."

From this discussion of a coding approach to memory we can conclude that memory does lead to more efficient concept attainment up to a certain optimal level. It may be recalled that both Heidbreder (1946) and Seymour (1954)

cited the coding of information as a necessary aspect of concept attainment. On the basis of the preceding material (Miller, 1956 and Miller et al., 1960), we also note that coding may be involved in memory. Thus the individual experiences a certain amount of "cognitive strain" when he uses logical operations to attain a concept, and he experiences added "cognitive strain" when he needs to remember previous information. We may conclude that concept attainment is made easier (less "cognitive strain") when memory is minimally required (also note Cahill and Hovland, 1960, and Kates and Yudin, 1964). The presumably inferior cognitive behavior of females may involve both their ability in manipulation of information as in logical operations, and their ability to remember relevant information. By reducing memory requirements to a minimum in conceptual behavior, we may be able to note whether impaired logical operations characterize feminine individuals. By increasing memory demands severely, we can evaluate their performance to determine if females are inferior under these conditions and contrast it with performance given minimal memory demands. If males' apparent superior cognitive performance over females is possibly due to their superior quantitative abilities (Pettigrew, 1958), we may infer that logical transformations, and coding and recoding behavior (i.e., memory) which appear

to be linked to the quantitative aspects of cognitive behavior, provide an explanation for male superiority.

When subjects have the opportunity to solve many problems in a concept attainment task, it is expected that their performance would improve on the later problems. They should learn how to get set for the task and develop more efficient modes of attaining solution. Using the same problems as in this study and controlling for problem difficulty and order, Brennan (1966) found superior performance on the second half of a set of concept attainment problems than on the first. If females' concept attainment abilities are inferior to males', they would be expected to show much less improvement from first to second half of a conceptual problem series as the males. This would imply that they do not learn to become increasingly efficient on logical operations, and coding and recoding as do males. This difference would be expected as well for individuals of low masculine sex role identification.

Sex Role Behavior and Sex Role Identification and Concept Attainment

According to Terman and Miles (1936), there exists a difference between the typical man and the typical woman in their emotional make-up. This difference in emotions also affects one's life and one's behavior. The woman, they

feel, will exhibit more tender emotions such as sympathy, pity, and maternal love. She is also more timid, more submissive, docile, and in general less adventurous when compared to men. The male role, on the other hand, is thought to show more aggressiveness, greater independence, and a greater interest in more active and mechanical pursuits. The male, unlike the female, is supposed to be relatively indifferent to artistic and cultural pursuits.

The above generalizations about the male and female role have been given empirical support (Allport, Vernon, and Lindzey, 1951; Terman and Miles, 1936). These studies showed men to have more interest in theoretical, economic, and political matters, while women preferred matters of aesthetic, social, and religious areas. The men's interests would seem to reflect drives for abstract knowledge and understanding, a desire for practical success, and prestige and power over others (Allport et al., 1951). The above research seems to indicate a relationship between the activities and interests reflecting masculine and feminine preferences, and the previously cited studies of Wallach and Caron (1959), Wallach and Kogan (1959), and Pettigrew (1958).

It seems plausible that the cultural factors which cause females to be relatively more conservative and restrictive (Wallach and Caron, 1959) in their behavior and

to be relatively less interested in abstract knowledge possibly generalize to the areas which require logical reasoning. The possible outcomes of these cultural pressures are that females use narrower limits for including relevant information (category width, Pettigrew, 1958), and are less capable of logical inferences. Thus, it would seem that their concept attainment would be less efficient. Males, however, are culturally encouraged to be more logical and less conservative in their behavior. Thus their greater expansiveness and logical capacities probably generalize to their cognitive behavior, and to more efficient concept attainment.

Since there appears to be a relationship between sex role behavior and efficiency in concept attainment, it seems logical to assume that a relationship may also exist between sex role identification and concept attainment (Tiffany, 1962). Sex role identification refers to the degree to which an individual possesses masculine or feminine interests or attitudes. This sex role identification is usually measured by standard masculinity-femininity inventories.

Lynn (1959) views sex role identification as a learning process which starts with both the male and female identifying with the mother. However, since our culture is heavily oriented toward males, boys shift their

identification to the masculine role, while girls keep their identification with the female role. This relationship may become weakened or strengthened depending on the degree which the individual with whom the person identifies shows affection, meets the person's needs, and in general clearly shows the sex role model.

Dollard and Miller (1950) view the process of sex role identification much the same as Lynn does. They feel that sex typing (sex role identification) in our society is strictly organized around sex specialization of personality. This begins with male and female names, and continues throughout life by defining specialized sex roles for men and women.

Stokes (1950) notes that there are many factors which may inhibit or facilitate identification with the proper sex role. Constitutional factors which predispose one to certain forms of behavior, social pressures to make one identify with the cultural norms for a sex, and the presence of significant persons and how they are perceived, all may interact and help to determine a person's sex role identification.

Bronfenbrenner (1960) presents a comprehensive survey of the literature regarding the Freudian theories of identification. He states that the meaning of identification is confused because it has been used in several different

ways: (1) as behavior, (2) as a motive, and (3) as a process. He goes on to note that the theories themselves have grown out of proportion to the facts, and that they (the theories) are too narrow in their approach, and fail to include factors that may be important in the process of identification. This multifactor conception of identification provides a means of seeing more clearly how a person's sex role identification generalizes and affects an individual's cognitive behavior. Whether sex role identification is either behavior, a motive, or a process as Bronfenbrenner states, nevertheless such identification would affect significantly the cognitive processes employed by male and female individuals. If, as has been suggested, females and those with feminine attitudes (low masculine sex role identification) do exhibit the conservative and less logical type of behavior, then this behavior may generalize into the cognitive sphere where inferior concept attainment may be one consequence.

Statement of the Problem

The problem of this study is to investigate whether males are more efficient in concept attainment than females. Further, this investigation seeks to determine whether males and females who are high in masculine sex role identification are more efficient than males and females low in masculine sex role identification. Another important

problem this study will investigate is whether males are more efficient than females in concept attainment when memory is required, and whether such superior efficiency is demonstrated by males and females of high masculine sex role identification when compared to males and females of low masculine sex role identification. Finally, we seek to determine whether males and subjects with high masculine identification possess superior ability to deal with information when memory is minimized than females and subjects with low masculine identification.

Hypotheses

Specifically, the hypotheses are as follows:

1. Males as compared to females will solve significantly more concept attainment problems and require fewer instances to solution.

2. Males of high masculine sex role identification will solve significantly more concept attainment problems and require fewer instances to solution than males of low masculine sex role identification.

2a. Females of high masculine sex role identification will solve significantly more concept attainment problems and require fewer instances to solution than females of low masculine sex role identification.

3. Males when compared to females will solve significantly and increasingly more problems and require

relatively fewer instances to solution when the no-memory condition is compared to the memory condition.

4. Males of high masculine sex role identification will solve significantly and increasingly more problems and require relatively fewer instances to solution than males of low masculine sex role identification when the no-memory condition is compared with the memory condition.

4a. Females of high masculine sex role identification will solve significantly and increasingly more problems and require relatively fewer instances to solution than females of low masculine sex role identification when the no-memory condition is compared to the memory condition.

5. Males as compared to females will show significantly better performance (more conceptual problems solved, fewer instances to solution) on the second half as compared to the first half.

6. Males of high masculine sex role identification as compared to males of low masculine sex role identification will show significantly better performance (more problems solved, and fewer instances to solution) on the second half as compared to the first half.

6a. Females of high masculine sex role identification will show significantly better performance (more problems solved and fewer instances to solution) than females of low masculine sex role identification on the second half as compared to the first half.

METHOD

Subjects

The subjects were 112 undergraduate students enrolled in an introductory psychology class at the University of Massachusetts. There were 56 males and 56 female subjects with the mean age for the males 19 years 2 months and the mean age for females 18 years 5 months. An attempt was made to control for intelligence by matching the subjects using the verbal and mathematics scores from their College Entrance Examination Board scores, and *t* tests were computed (Table 1).

Test Materials

The tests which were used to determine the high and low masculine sex role identification groups were the Terman-Miles Masculinity-Femininity test, part five and the Masculinity-Femininity scale from the Minnesota Multiphasic Personality Inventory (MMPI).

Shepler (1951) studied and evaluated the ability of M-F scales to differentiate between males and females. He found the Terman-Miles M-F scale to be the best, having a critical ratio (CR) of 12.35. The MMPI scale was the next best with a CR of 10.10. Shepler also obtained correlations significant at the .01 level between the two scales.

Barrows and Zuckerman (1960) found significant correlations between the MMPI and interest scales. Positive

Table 1

Means and Standard Deviations of CEEB Scores and Ages of the Experimental Subjects

	Verbal		Math		Age		
	M	SD	M	SD	M	SD	
Males	562.13	67.90	601.50	75.73	19-2	1.75	months
High Masculine	532.64	58.42	611.67	58.07	19-4	1.75	months
Memory Condition	526.36	54.70	634.57	48.70	19-0	1	month
No Memory Condition	538.93	61.30	588.79	57.40	19-8	2	months
Low Masculine	591.46	65.21	591.32	88.84	19-0	1	month
Memory Condition	584.07	68.60	631.21	64.10	19-1	1	month
No Memory Condition	598.86	51.10	551.43	92.00	18-11	1	month
Females	582.80	69.64	571.30	59.21	18-6	.75	month
High Masculine	584.50	69.28	570.78	39.17	18-5	.75	month
Memory Condition	590.64	71.60	579.71	62.00	18-4	.50	month
No Memory Condition	578.36	66.30	561.86	51.40	18-6	.50	month
Low Masculine	581.11	65.67	571.82	60.65	18-7	.75	month
Memory Condition	578.93	78.40	557.36	57.10	18-5	.50	month
No Memory Condition	583.28	48.50	586.28	60.10	18-9	.75	month

correlations were found with the mechanical, scientific, and computational scores and masculinity scores. Negative correlations were noted with artistic, clerical, musical, and literary scales and masculinity scores on the MMPI.

Ferguson (1952) found that part five of the Terman-Miles test (M-F scale) had one of the highest reliabilities (.80), and showed about the same degree of validity as the whole Terman-Miles test.

Copies of each of the scales used are shown in Appendix 1.

Concept Attainment Materials

The concept attainment materials used in this study were the same problems used by Brennan (1966), and similar to those used by Kates and Yudin (1964) and Yudin and Kates (1963). Each of the 16 experimental problems consisted of eight instances, and each instance contained a square, circle, triangle, diamond, hexagon, star, and cross of either red, green, or black color. The correct solution to a problem was any combination of form and color.

Each of the instances was designated as a positive, containing the correct answer, or a negative, not containing the correct answer, by means of a plus or a minus sign at the end of each instance. The problems were presented on 2" by 2" slides and projected on to a movie screen using a Carousal Slide Projector, which also

automatically controlled the interval between instances at 20 seconds. Sixteen experimental and three demonstration problems were used.

The problems were administered under either memory or no-memory conditions. Under the memory condition, each new instance appeared on the screen alone, and just prior to the presentation of each succeeding instance, the previous instance was removed. Under the no-memory condition, each succeeding instance remained on the screen with all previous instances until all eight instances of each problem had been presented.

For each experimental group the order was counter-balanced, and each of the two different orders used was equated for difficulty. Each problem had eight instances, and was soluble by the fourth instance. The problems used and their solutions appear in Appendix 2.

Procedure

Initially, 400 subjects received the two M-F scales, the MMPI and the Terman-Miles. From these subjects, 56 male and 56 female subjects were selected as the experimental subjects. Twenty-eight subjects in each of the sex groups were designated as high masculine and 28 subjects were designated as low masculine subjects. High masculine subjects were those who scored above the median on both of the M-F tests, and the low masculine subjects

were those who scored below the median on both the M-F tests. Separate distributions were used for males and females to determine the medians, and the respective cut off points.

These experimental subjects were then randomly assigned to one of two concept attainment conditions, memory or no-memory. Within each of these groups there was counter-balancing for order of problem presentation using different order of problems. Thus there were a total of four different experimental conditions: memory-order A, memory-order B, no memory-order A, and no memory-order B. There were 28 subjects in each of the experimental conditions, with equal numbers of male and female subjects. Table 2 shows the assignment of the subjects to the experimental conditions.

Approximately one and one-half months after the administration of the M-F scales, the subjects selected as the experimental subjects were recalled for the administration of the concept attainment problems. They were given the following instructions.

"We're going to solve some problems--not the usual kind of problem--these will be a little different. Instead of numbers or words, we'll be using geometric forms of various colors. A correct answer will always be some combination of form and color.

Table 2

Assignment of Subjects to Experimental Conditions

		Memory		No-Memory	
		Order A	Order B	Order A	Order B
Males	High Masculine	7 Ss	7 Ss	7 Ss	7 Ss
	Low Masculine	7 Ss	7 Ss	7 Ss	7 Ss
Females	High Masculine	7 Ss	7 Ss	7 Ss	7 Ss
	Low Masculine	7 Ss	7 Ss	7 Ss	7 Ss

	1st Half	2nd Half
	Problems	Problems
Order A:	1 - 8	9 - 16
Order B:	9 - 16	1 - 8

(Slide 1) Here are a few illustrations of the materials we'll be using. The answer to these problems may be one form of a certain color, or any two forms with various combinations of colors, or three, or four, or even five forms with different color combinations.

(Slide 2) Now here's a slide showing all of the seven forms we'll be using--square, circle, triangle, diamond, hexagon, star, and cross. The colors will always be red, green, or black.

You have been given answer sheets on which to record your answers. Please do not write anything on this sheet except your answers. Use the letters R, G, or B to indicate color, and a picture of the geometric form itself instead of words.

(Slide 3) Here's an illustration of a problem. This slide represents three instances. The first has a plus sign at the end. This means that the correct answer <u>is</u> included in that instance, so it could be any of these. The second instance is also a plus, but now the hexagon, the star, the diamond and the cross are different colors. If the correct answer is in the first <u>and</u> in the second, it cannot be the hexagon, the star, the diamond, or the cross, so it <u>must</u> be either the red circle and/or the green square. The third instance has a minus sign at the end. This means that the correct answer is not included. However, the green

square is included, and it cannot both be and not be the answer, so we're left with the red circle as the correct answer. I will tell you at the start of each problem which of the forms are possibly involved, and they will be indicated on the slide by a black dot underneath them on the first slide. I will present one instance at a time. After you have looked at it for a while, I'll put the next instance on the screen, and you'll have to write your answer. Also, please use the index card you were given to cover your previous guesses, do not look back at your previous guesses, keep them covered.

(Slide 4) Let's try a few sample problems. Here's the first instance. In this problem the circle, the hexagon, and the cross are involved. That is, any one of them or any combination of them may be the answer.

Record your best guess.

(Slide 5) Second instance--it's a plus, so the answer is included. The cross is green now, so it's out, and we're left with the circle and the hexagon.

(Slide 6) Third instance--plus again, the cross is red again, but it's already out of consideration. The third instance doesn't add anything new, but it does reinforce the information obtained from instances one and two.

Record your best guess.

(Slide 7) Fourth instance--this one is negative, the

correct answer is <u>not</u> included. But the hexagon is included, so now it's out of consideration, and the red circle is left as the correct answer. In the experimental problems, we'll have eight instances, but the principle is the same.

Now let's try another problem. (Slide 8) This time the square, the diamond, and the star are possibly involved. Here's the first instance.

Record your best guess.

(Slide 9) Second instance--red square is out, green diamond and black star are still in.

Record your best guess.

(Slide 10) Third instance--now the square is out on a plus instance, but the diamond and star are still in.

Record your best guess.

(Slide 11) Fourth instance--since this is a minus, the diamond is out and the black star is left as the correct answer.

Now let's try one more sample problem. This time I'm going to time the exposures, and you'll be on your own. Be sure to write quickly and cover your answers after each guess. (Present the four instances) The correct answer was black star; let me see a show of hands of those who got the answer right.

I guess you're ready to begin. From now on no talking, no writing except for your answers. Remember, the correct

answer may involve either one, two, three, four, or five of the forms and any combination of red, green, or black. I will tell you at the start of each problem which of the forms may be involved."

The dependent measures used to determine concept attainment ability and efficiency were the number of problems solved and the number of instances required to solve a given problem. The latter measure was used to discriminate between a subject who ordinarily solves each problem before all eight instances are exposed, and the subject who usually requires all eight instances to solve each problem.

A problem was considered solved, and was scored as such if the subject recorded the correct solution, and maintained it at or by the eighth instance. The number of instances to solution was scored at the instance the subject correctly solved and maintained the answer to a problem. If a subject did not solve a given problem, he received a score of nine for the number of instances to solution.

The resultant data were analyzed using analysis of variance procedures. Due to the fact that there was non-independence between sex and the masculinity measures used, separate analyses were performed comparing males and females on the two dependent variables. In addition, analyses of variance were completed that compared the high masculine

males with the low masculine males on the two dependent variables. The final two analyses of variance contrasted the high masculine females with the low masculine females.

RESULTS

Hypothesis 1 was not supported by the data. Inspection of Tables 3, 4, and 5 show that there were no significant differences between males and females either on the number of problems solved, or the number of instances required to solution. Males and females were nearly equal in their ability to solve the concept attainment problems, and were equal in their problem solving efficiency.

Tables 6, 7, 8, and 9 show that hypothesis 2 was not supported. There was no significant difference between the concept attainment abilities of the high and low masculine males. The high and low masculine males were approximately equal in both the number of problems solved and the number of instances required to solution.

Tables 8, 9, 10, and 11 show the data for hypothesis 2a. Again, the data do not support the hypothesis. Females of high and low masculine sex role identification were nearly equal in both the number of problems solved and the number of instances required to solution.

Hypothesis 3 was not supported by the data inasmuch as there was no significant increase in the number of problems solved when the performance of males was contrasted with that of the females in the comparison of the memory with the no-memory condition. Similarly, there was no significant change in performance in the number of instances

Table 3

Analysis of Variance of Number of

Problems Solved by Males and Females

Source	df	SS	MS	F	p <
Total	223	917.78			
A (Sex)	1	1.97	1.97		
B (Memory)	1	180.36	180.36	40.53	.001
AB	1	1.00	1.00		
S/AB	108	480.95	4.45		
T (Halves)	1	88.75	88.75	70.96	.001
AT	1	3.75	3.75	2.98	.10
BT	1	23.79	23.79	19.01	.005
ABT	1	.04	.04		
TS/AB	108	137.16	1.27		

Table 4

Analysis of Variance of Number of Instances to Solution for Males and females

Source	df	SS	MS	F	p <
Total	223	262.77			
A (Sex)	1	.002	.002		
B (Memory)	1	31.39	31.39	21.21	.001
AB	1	.13	.13		
S/AB	108	159.91	1.48		
T (Halves)	1	19.39	19.39	46.14	.001
AT	1	1.39	1.39	3.31	.10
BT	1	4.66	4.66	11.09	.005
ABT	1	.04	.04		
TS/AB	108	45.85	.42		

Table 5

Means and Standard Deviations for Main Effects, Number of Problems Solved, Number of Instances to Solution

	Problems Solved		Instances to Solution	
	M	SD	M	SD
Males	3.56	2.07	7.19	1.67
High Masculine	3.39	2.29	7.31	1.27
Low Masculine	3.73	1.78	7.08	1.96
Females	3.37	2.21	7.19	1.24
High Masculine	3.34	2.21	7.19	1.26
Low Masculine	3.41	2.06	7.20	1.19
Memory	2.57	1.36	7.57	1.25
No Memory	4.37	2.01	6.82	1.52
First Half	2.84	1.41	7.49	1.21
Second Half	4.10	2.30	6.90	1.74

Table 6

Analysis of Variance of Number of Problems Solved for Males High and Low in Masculinity

Source	df	SS	MS	F	p <
Total	111	455.56			
A (M-F)	1	3.22	3.22		
B (Memory)	1	77.22	77.22	58.94	.001
AB	1	4.72	4.72		
S/AB	52	219.89	219.89		
T (Halves)	1	64.51	64.51	49.25	.001
AT	1	5.58	5.58	4.26	.05
BT	1	10.94	10.94	8.35	.01
ABT	1	.44	.44		
TS/ABT	52	69.04	1.33		

Table 7

Analysis of Variance of Instances to Solution for Males High and Low in Masculinity

Source	df	SS	MS	F	p <
Total	111	137.14			
A (M-F)	1	1.52	1.52		
B (Memory)	1	13.77	13.77	9.00	.005
AB	1	.002	.002		
S/AB	52	79.36	1.53		
T (Halves)	1	15.58	15.58	35.41	.001
AT	1	.72	.72		
BT	1	2.81	2.81	6.38	.025
ABT	1	.38	.38		
TS/AB	52	23.01	.44		

Table 8

Mean and Standard Deviations for Number of Problems Solved

	First Half		Second Half		Overall Memory Conditions for Males	
	M	SD	M	SD	M	SD
Males	2.80	.53	4.32	2.25		
High Masculine	2.86	1.48	3.93	2.37		
Memory	2.07	.88	2.64	1.35	2.73	1.34
No Memory	3.64	1.54	5.21	2.49	4.39	1.97
Low Masculine	2.75	1.38	4.71	2.08		
Memory	2.50	1.05	3.71	1.87		
No Memory	3.00	1.36	5.71	1.76		
Overall Halves for Males	2.80	1.39	4.32	2.37		

Table 8 (continued)

	First Half		Second Half		Overall Memory Conditions for Females	
	M	SD	M	SD	M	SD
Females	2.87	1.46	3.87	2.36		
High Masculine	2.93	1.60	3.75	2.35		
Memory	2.21	1.27	2.36	1.58	2.41	1.42
No Memory	3.64	1.51	5.14	2.17	4.34	2.04
Low Masculine	2.82	1.31	4.00	2.36		
Memory	2.28	.71	2.78	1.53		
No Memory	3.36	1.53	5.21	2.43		
Overall Halves for Females	2.87	1.28	3.87	2.27		

Table 9

Means and Standard Deviations for Number of Instances to Solution

	First Half		Second Half		Overall Memory Conditions for Males	
	M	SD	M	SD	M	SD
Males	7.41	1.24	6.56	1.73		
High Masculine	7.46	1.32	7.02	1.16		
Memory	7.85	.60	7.46	.74	7.54	1.23
No Memory	7.21	.90	6.57	1.37	6.84	1.29
Low Masculine	7.30	1.48	6.11	2.02		
Memory	7.67	.50	6.17	2.58		
No Memory	6.93	1.96	6.05	1.19		
Overall Halves for Males	7.56	1.57	6.82	1.81		

Table 9 (continued)

	First Half		Second Half		Overall Memory Conditions for Females	
	M	SD	M	SD	M	SD
Females	7.41	.77	6.98	1.28		
High Masculine	7.37	.77	7.01	1.34		
Memory	7.69	.80	7.47	.91	7.60	.79
No Memory	7.04	.69	6.55	1.52	6.80	1.51
Low Masculine	7.46	.67	6.95	1.23		
Memory	7.67	.41	7.55	.73		
No Memory	7.25	.78	6.36	1.28		
Overall Halves for Females	7.41	.75	6.98	1.27		

Table 10

Analysis of Variance of Number of Problems Solved for Females High and Low in Masculinity

Source	df	SS	MS	F	p <
Total	111	460.25			
A (M-F)	1	.14	.14		
B (Memory)	1	104.14	104.14	21.47	.001
AB	1	.89	.89		
S/AB	52	252.07	4.85		
T (Halves)	1	28.00	28.00	24.21	.001
AT	1	.89	.89		
BT	1	12.89	12.89	11.15	.005
ABT	1	.000	.000		
TS/AB	52	61.21	1.18		

Table 11

Analysis of Variance of Instances to Solution for Females High and Low in Masculinity

Source	df	SS	MS	F	p <
Total	111	125.62			
A (M-F)	1	.006	.006		
B (Memory)	1	17.75	17.75	11.68	.005
AB	1	.003	.003		
S/AB	52	79.02	1.52		
T (Halves)	1	5.20	5.20	12.98	.001
AT	1	.15	.15		
BT	1	1.90	1.90	4.75	.05
ABT	1	.45	.45		
TS/AB	52	21.13	.41		

to solution for males as compared to females when the memory condition is contrasted with the no-memory condition (see Tables 8 and 9).

Hypotheses 4 and 4a were also not supported by the data. Neither males nor females of high masculine sex role identification performed in a significantly superior manner on the no-memory problems as compared to the memory problems than did the males and females of low masculine sex role identification. Tables 6, 7, 8, 9, 10, and 11 show the data for these hypotheses.

Although not highly significant, the data supported hypothesis 5. On both the number of problems solved and the number of instances required to solution, males improved more than females from first half to second half at the $p < .10$ level with F ratios of 2.98 and 3.31, respectively (see Tables 3, 4, 8, and 9). Figures 1 and 2 show the respective means plotted. For both the number of problems solved and the number of instances required to solution, the males' performance showed an increase from first to second half when compared to the females' performance.

Hypothesis 6 was not supported by the data. Examination of Table 6 shows that there is a significant Masculinity by Trials interaction. When the means for this effect were plotted (Fig. 3), they showed that males of low masculine sex role identification increased significantly

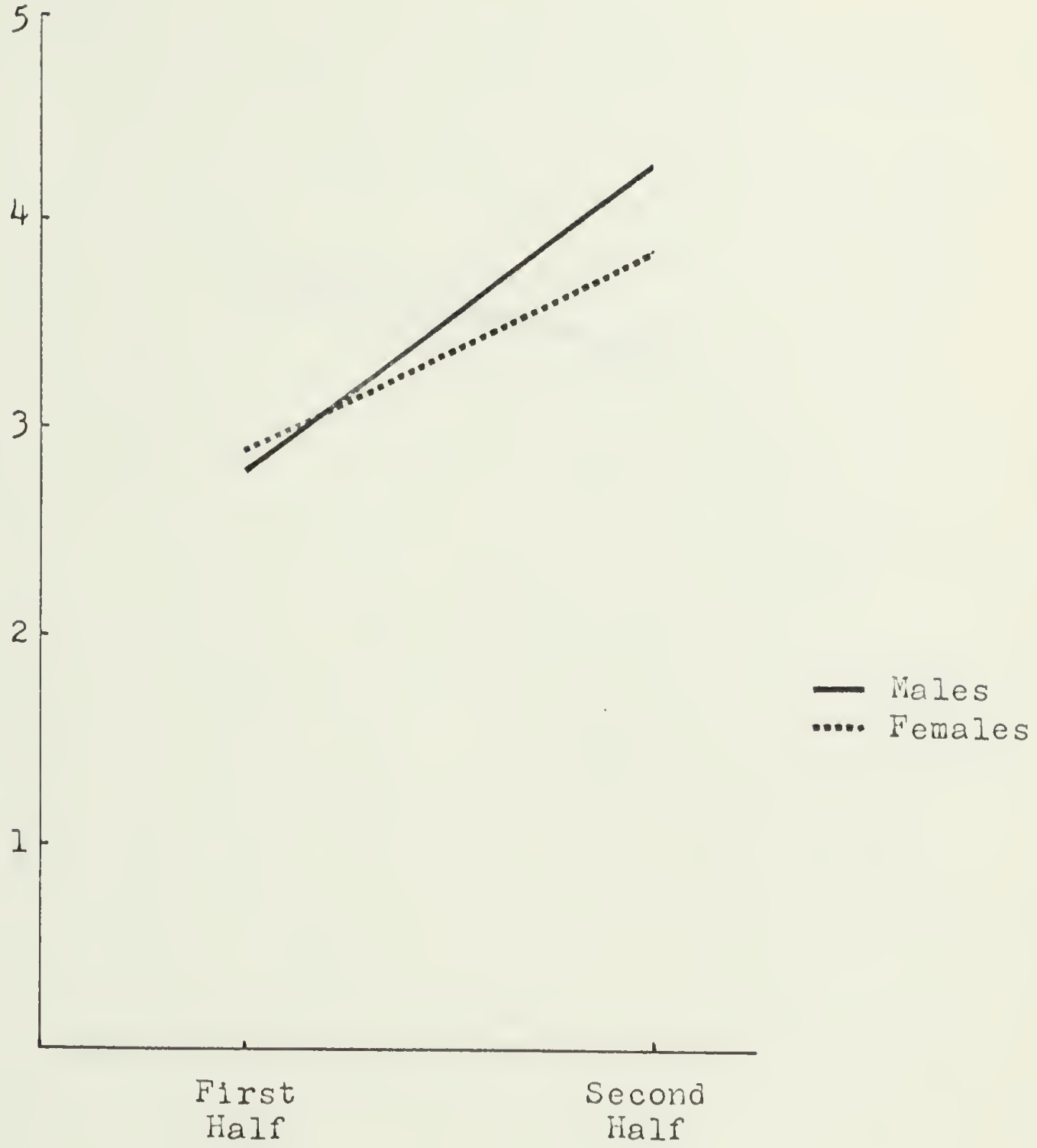

Fig. 1. Data for Sex x Halves Interaction for number of problems solved.

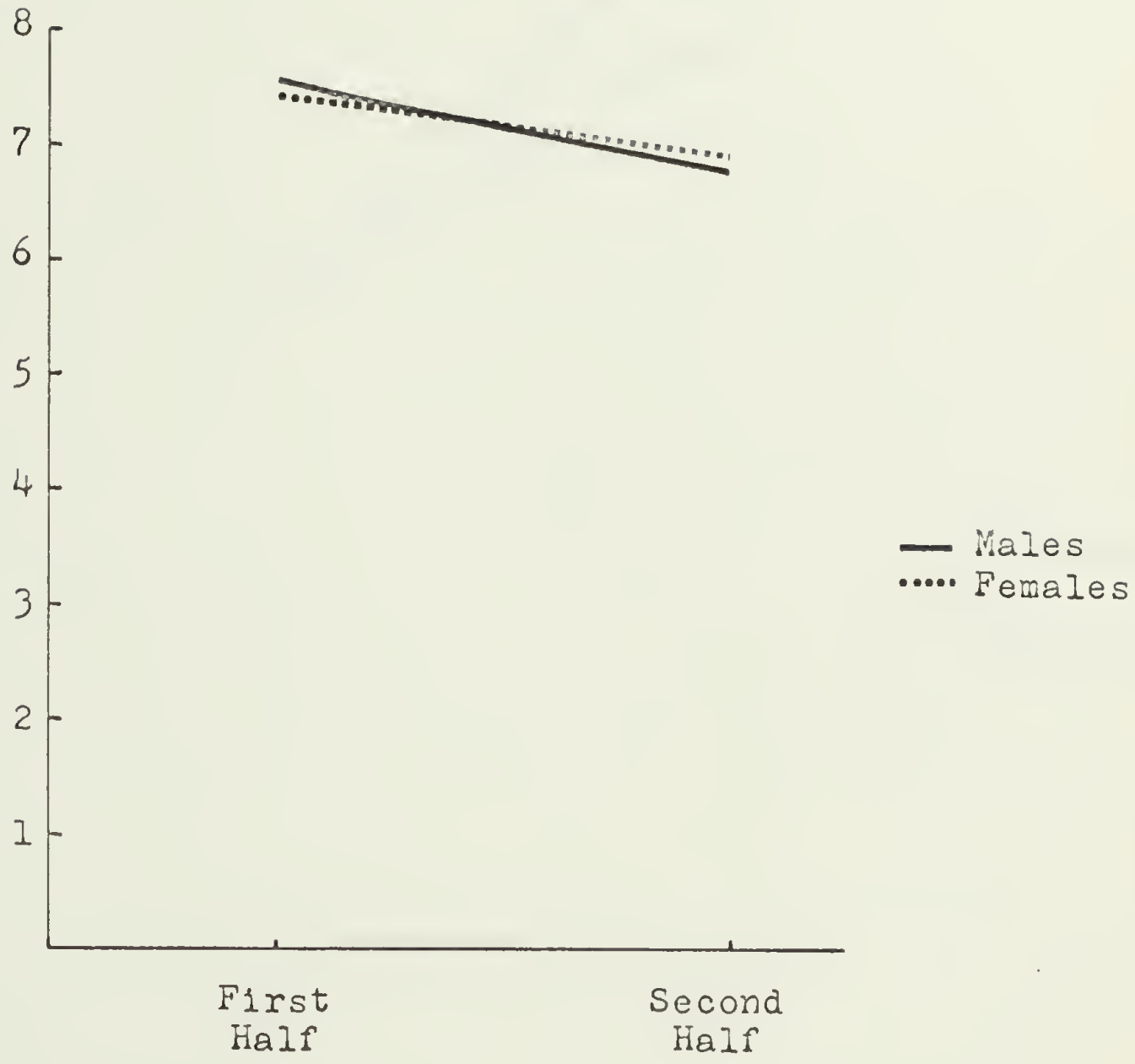

Fig. 2. Data for the Sex x Halves Interaction for number of instances to solution.

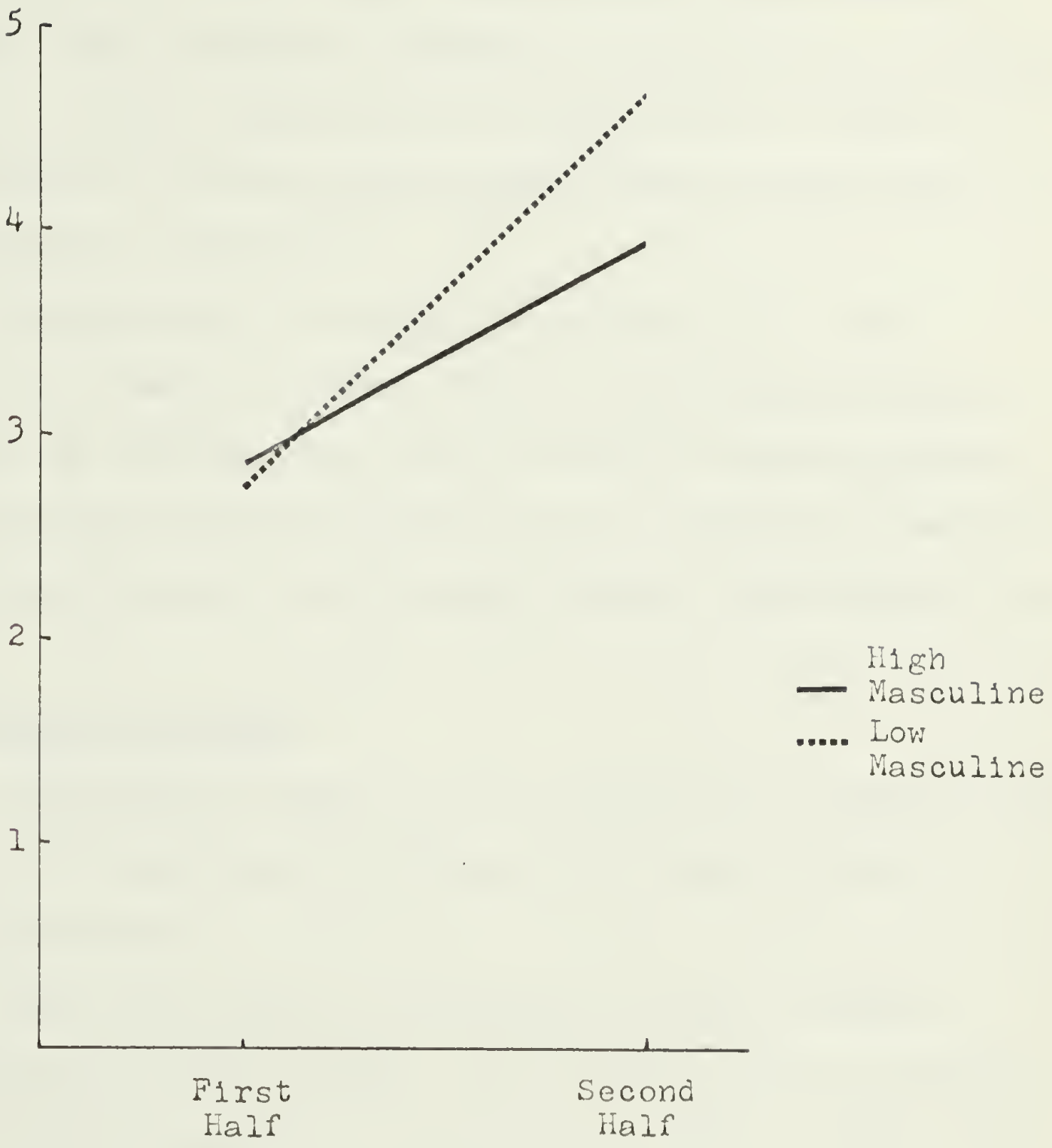

Fig. 3. Masculinity x Halves Interaction for males for number of problems solved.

in the number of problems solved on the second half as compared to the first half than did the high masculine males. This finding is contrary to hypothesis 6, but it was not further supported by the data for the number of instances to solution where there were no significant differences (Table 7).

The data did not support hypothesis 6a. High masculine females did not solve a significantly greater number of problems, nor did they require fewer instances to solution when the second half was compared to the first half than did the low masculine females (see Tables 10 and 11).

Additional Findings

Although the data did not support any of the hypotheses, there were additional findings which bear careful consideration.

Data from each of the analyses showed a highly significant memory effect. The F ratios for this effect were highly significant at either the .005 or .001 level (see Tables 3 through 11). All of the means showed superior performance for the no-memory group on both the number of problems solved and the number of instances required to solution. Therefore, when no memory demands were placed upon a subject, he was able to perform in a clearly superior manner on the concept attainment problems used.

Also highly significant was the first half performance compared to second half performance. All the F ratios were highly significant for all the analyses ($p < .001$), and examination of the means for this effect shows that performance on the second half of the problems was clearly superior to the performance on the first half (see Tables 3 through 11).

Another significant result was the memory by halves interaction. All analyses showed this interaction to be significant (see Tables 3 through 11). Figures 4 and 5 show the data from Tables 3 and 4. They were used as examples for all the other analyses because the data were essentially the same. The data show clearly that subjects under the no-memory condition were able to solve more problems than the subjects under the condition where memory was required, and that they were able to increase this superior ability during the second half of the problems as is shown by the diverging lines (see Fig. 4). Figure 5 shows that the subjects under the no-memory condition also required fewer instances to solution than did the subjects under the memory condition, and that this performance also showed significant improvement during the second half of the problems.

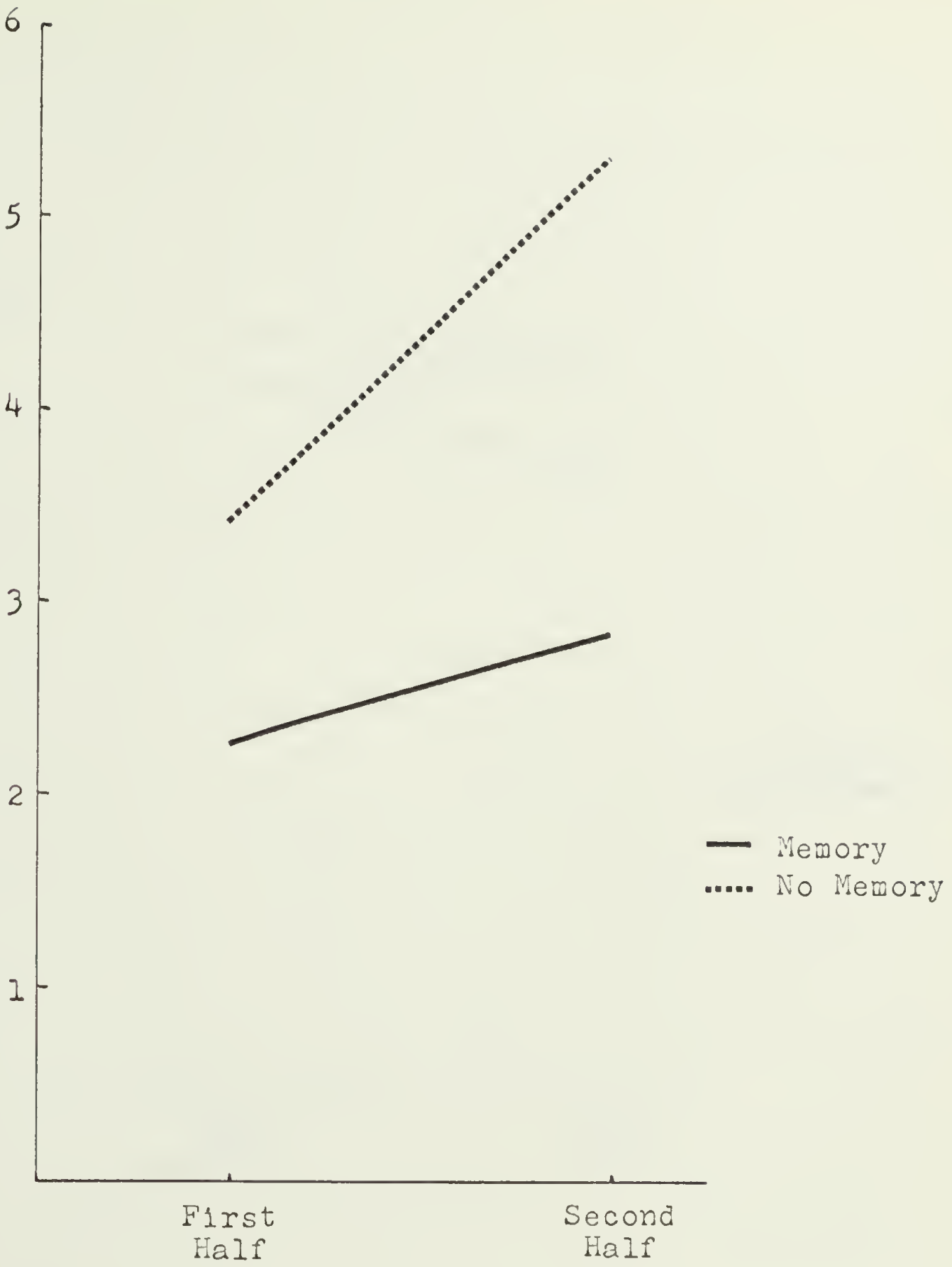

Fig. 4. Plot of the Memory x Halves Interaction of the number of problems solved.

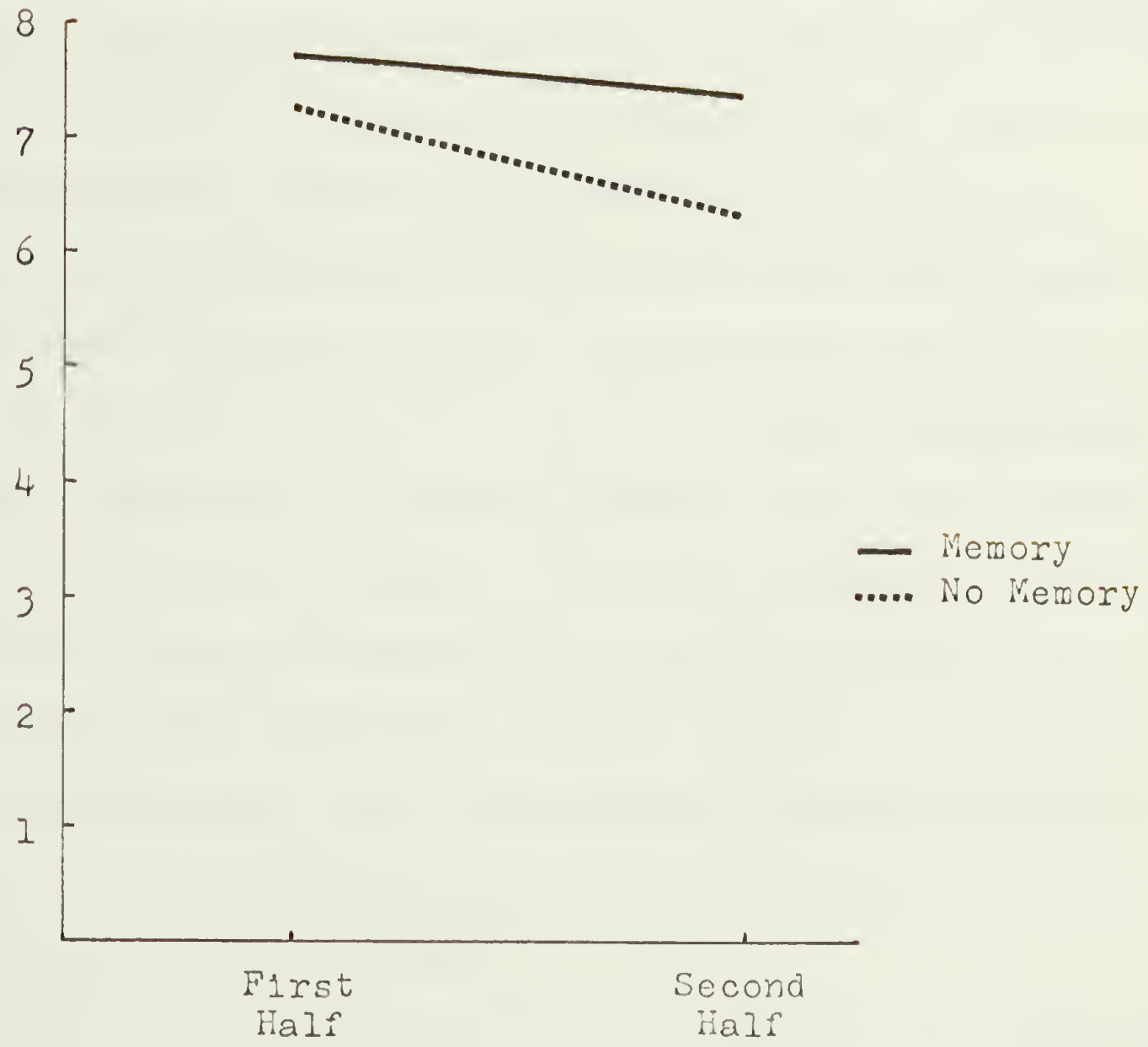

Fig. 5. Plot of Memory x Halves Interaction of number of instances to solution.

DISCUSSION

The first hypothesis was not supported by the results. This failure to find more efficient and quantitatively superior concept attainment on the part of the males over females needs some explanation. Initially, two alternative reasons were formulated and seemed to stand out to explain the previously obtained male superiority over females on problem solving tasks. The first speculation was that males have superior quantitative abilities when compared to females (Pettigrew, 1958). Such quantitative abilities involve dealing with and manipulating numbers and verbal symbolic materials involving numbers. The second reason was that females have been subjected to greater societal pressures against expansive conceptual boundaries, and these pressures generalize into the sphere of cognition. The implication is that the females' inferiority is due to some actual lack of good logical reasoning abilities (Wallach and Caron, 1959).

Since the concept attainment task demanded very little quantitative manipulation, if the females had performed in an inferior manner, we could have attributed their inferiority on this task to a lower level of cognitive reasoning abilities. Since this difference between males and females was not obtained, we thus believe that the crucial variable that distinguishes males and females is

whether the reasoning task demands quantitative abilities to a significant degree. Probably the overall results of this study support the view that females will manifest inferior cognitive abilities principally when quantitative manipulations are crucial to task solution. It is also likely that females and males are essentially equal in their ability to solve tasks which require chiefly the application of logical reasoning, and the adoption and modification of appropriate hypotheses regarding the solution of the problem.

An explanation of the lack of support for the second hypothesis would seem to follow logically from the previously cited explanation for the lack of any sex differences on the concept attainment problems used in this investigation. Since the males did not manifest any superior concept attainment performance, those male subjects who were more closely identified with the masculine role should not have been expected to display any superior ability to those male subjects who were less closely identified with the masculine sex role. Since sex role identification refers to the degree to which an individual possesses masculine (or feminine) interests or attitudes, the lack of support for hypothesis 2 follows from the lack of support for the first hypothesis asserting sex differences.

This same line of reasoning may explain the results pertaining to hypothesis 2a. Since males in this study did not perform in a significantly superior manner to the females, the females who highly identified with the masculine sex role would not have been expected to perform in a superior manner to the females of low masculine sex role identification.

When the demands of memory were placed on the subjects, there were no significant differences between the performance of males and females (hypothesis 3). Thus, females not only have logical operations equal to those of males, but also when the additional demands of memory are placed upon their cognitive abilities, they are still able to perform at an equal level with males. Both males and females then were shown to perform at essentially the same level under memory conditions. Their abilities to code and recode information as hypothesized by Miller (1956), Miller et al. (1960) and Seymour (1954) were comparable, and the females were able to cope with the additional "cognitive strain" of memory.

The data did not support hypothesis 4--high and low masculine males performed equally well when memory was required. Inasmuch as the males did not perform in a superior manner to the females when memory was required (from results mentioned in the third hypothesis), one would

not expect that those males who had high masculine sex role identification would have manifested better performance under memory conditions than the males of low masculine sex role identification.

Again the same reasoning can be applied as an explanation for the failure of the data to support hypothesis 4a. Since the males did not perform in a superior manner to females, there was no reason to expect that the females who had high masculine sex role identification would perform in a superior way to the females of low masculine sex role identification.

Despite the fact that the results were not highly significant, the data partially supported hypothesis 5. It was found that males tended to solve significantly ($p < .10$) more conceptual problems and tended to solve them more efficiently on the second half than on the first half than did the females. Examination of Figs. 1 and 2 show that although the females initially solved more problems and required fewer instances to solve them during the first half of the problems, on the second half the males were able to make up this deficit, and to solve the problems more efficiently. The male subjects seemed to profit more from continued exposure to problems than the females did. This experience may have enabled them to adopt more efficient methods of concept attainment. These results may

be taken as partial support for male superiority on concept attainment tasks, but only on continued exposure to conceptual problems. It must be noted that what the males adopt here is a more efficient set to deal with the problems, and this may be reflecting only greater drive to become increasingly more efficient on a logical reasoning task where extended performance may be required. Caution must be exercised with these theoretical statements inasmuch as there was only a tendency to significance.

The data did not support hypothesis 6; in fact, the opposite results were obtained. Low masculine males solved significantly more problems during the second half than did the high masculine males. An explanation for these contradictory results is by no means obvious as all the reported experiments plus the results noted above found the hypothesized direction of differences to exist. However, since none of the other hypotheses related to this one were in this direction, plus the fact that this contradictory result appeared only with the number of problems solved and not with the number of instances required to solution, it may be assumed in part that this was a chance finding.

No support was obtained for hypothesis 6a. High and low masculine females performed nearly equally on both the number of problems solved, and on the number of instances

required to solution on the first half as compared to the second half. We again conclude that this lack of support for the hypothesis was due to the lack of the predicted differences between sexes on the concept attainment problems (see hypothesis 1).

There were several additional results which served to provide additional support for previous studies which dealt with concept attainment.

It was found that subjects who were under the no-memory condition were able to solve significantly more problems and required fewer instances to solution. The demands placed on an individual by memory acted in such a manner that his concept attainment ability and efficiency were impaired. Memory then serves to increase the "cognitive strain" on the individual, thus impairing his cognitive abilities. This finding served to replicate the previous investigations of Cahill and Hovland (1960), Kates and Yudin (1964), and Yudin and Kates (1963).

Also highly significant was the effect of first half vs. second half performance. Subjects under all conditions were able to develop more efficient manners for use in solution of the concept attainment problems. Learning an efficient method of storing hypotheses and information is a crucial factor for the solution of problems, and exposure to problems and actually solving them provided subjects

with cues and better methods with which to solve subsequent problems. These results were the same as those obtained by Brennan (1966).

Another instance in which the demands of memory reduced the efficiency and ability of the concept attainer was the memory by halves interaction. Subjects under the memory condition were not able to improve their concept attainment behavior as much during the second half when compared to the subjects who were not subjected to the additional demands on cognition due to memory. By placing an additional amount of "cognitive strain" on the individual's conceptual abilities, memory demands restricted his opportunity to profit from continued exposure more than the no-memory condition. Apparently, the need to attend to coding, storing, and retrieving relevant materials in concept attainment inhibits the development of more efficient skills and learnings found in the condition where memory demands are slight.

SUMMARY

A study was conducted to determine if females and males and females of low masculine sex role identification had lower abilities in the realm of logical thinking.

Initially, 400 college students were tested using the MMPI M-F scale and the Terman Miles M-F test. On the basis of these tests, 112 subjects, 56 as high masculine, 56 as low masculine, were selected as experimental subjects. Equal numbers of males and females were randomly assigned to a memory or a no-memory condition on a concept attainment task. The subjects were further subdivided according to whether they had scored high or low on the M-F tests. Thus there were 16 different experimental groups. Two dependent measures, the number of problems solved, and the number of instances required to solution were analyzed using analysis of variance procedures with separate analyses performed for males and for females.

It was hypothesized that the males and the subjects of high masculine sex role identification would solve significantly more problems and require significantly fewer instances to solution than the females and the subjects of low masculine sex role identification. It was further hypothesized that these differences would also be manifested under the memory conditions, and in going from first to second half of the problems used.

None of the hypotheses were supported. Males and subjects of high masculine sex role identification were nearly equal in their concept attainment efficiency and ability under all experimental conditions. One hypothesis, however, tended toward significance. It was found that the male subjects had significantly ($p < .10$) greater improvement on the conceptual problems on the second half as compared to the first half than did the female subjects.

An explanation for the lack of the hypothesized differences was offered in terms of the non-quantitative aspect of the conceptual task used. It appears that the quantitative orientation of a task is the crucial variable for obtaining sex and sex role identification differences.

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APPENDIX I

Masculinity-Femininity Scales

ATTITUDE-INTEREST INVENTORY

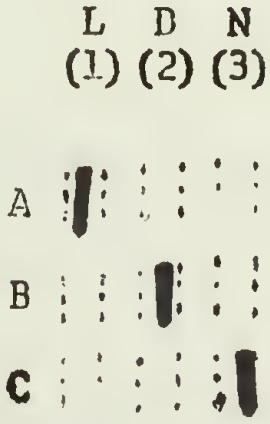
PART A

You are asked to co-operate seriously and carefully in marking your answers on the answer sheet to the questions asked in this booklet. This is not an intelligence test. We want to find out something about the attitudes and interests of college students in relation to their future job choices, their home situations and their hobbies. There will be two parts to this Attitude-Interest Inventory, Parts A and B. We will do part A first.

Part A consists of numbered items concerning occupations, hobbies and famous people. We would like to find out what your attitude is toward some of these areas of interest. If you Like what is mentioned in a particular item, you are to blacken in Column 1 on your answer sheet (i.e., the column headed L). See example A below. If you Dislike what is mentioned in an item, you are to blacken in column 2 on your answer sheet (i.e., the column headed D). See example B below. If you Neither like nor dislike what is mentioned in the item, blacken in column 3 on your answer sheet (i.e., the column headed N). See example C below.

In marking your answers on the answer sheet, be sure that the number of the item agrees with the number on the answer sheet. Mark your answers in with a heavy, black line. Erase completely any answer you wish to change. Do not make any marks on this booklet.

Examples of correct marking procedure.



NOW OPEN THE BOOKLET AND GO AHEAD

For each occupation below, ask yourself; would I like that work or not? If you would Like it, blacken in column 1 (i.e., the column headed L) on your answer sheet. If you Dislike the work, blacken in column 2 (i.e., the column headed D) on your answer sheet. If you Neither like nor dislike it, blacken in column 3 (i.e., the column headed N) on your answer sheet. In deciding on your answer, think only of the kind of work. Don't consider the pay. Imagine that you have the ability to do the work, that you are of the right age for it, and that it is equally open to men and women.

Don't stop to think long; answer fairly quickly.

1. Architect
2. Chef or cook
3. Auto racer
4. Librarian
5. Building contractor
6. Detective
7. Nurse
8. Private secretary
9. Journalist
10. Forest ranger
11. Dairyman
12. Dressmaker
13. Florist
14. Stock breeder
15. Optician
16. Social Worker
17. Music teacher
18. Clerk in a store
19. Singer
20. Preacher
21. Novelist
22. Soldier
23. Draftsman
24. Artist
25. Bookkeeper

Do you like/dislike/neither like nor dislike these?

26. Men with beards
27. Babies
28. Infidels
29. People with loud voices
30. Argumentative people
31. Very forgiving people
32. Very quiet people
33. People who spend freely
34. People with gold teeth
35. Tall women
36. Men who take the lead
37. Mannish women
38. Charlie Chaplin
39. Social problem movies
40. Movie love scenes

41. Poetry
42. Detective stories
43. Stories of home life
44. Adventure stories
45. Comic supplements
46. Radio magazines
47. Chemistry
48. Dramatics
49. Ancient languages
50. Civics
51. Spelling
52. Hunting
53. Skating
54. Horseback riding
55. Hopscotch
56. Dare base
57. Drop the handkerchief
58. Chess
59. Charades
60. Collecting flowers
61. Cooking
62. Studying lessons
63. Repairing a door latch
64. Parties and socials
65. Being with one other
66. Strict Sunday laws
67. Pet cats
68. Near-beer
69. Coca cola
70. Cheese
71. Candies

After each book you have read, indicate whether or not you Like/Dislike/Neither like nor dislike it. Skip those you have not read.

72. Robinson Crusoe, by Daniel Defoe
72. Lorna Doone, by Richard D. Blackmore
74. Through the Looking Glass, by Lewis Carroll
75. Westward Ho, by Charles Kingsley
76. Daddy Long Legs, by Jean Webster
77. Peter Pan and Wendy, by J.M. Barrie
78. Huckleberry Finn, by Mark Twain
79. Rip Van Winkle, by Washington Irving
80. The Wonder Book, by Nathaniel Hawthorne
81. Bird's Christmas Carol, by Kate Douglas Wiggin
82. Rebecca of Sunnybrook Farm, by Kate Douglas Wiggin
83. Christmas Carol, by Charles Dickens
84. The Man Without a Country, by Edward Everett Hale
85. Little Men, by Louisa Alcott
86. The Secret Garden, by Frances Hodgson Burnett
87. Captains Courageous, by Rudyard Kipling
88. Little Lord Fauntleroy, by Frances Hodgson Burnett
89. Boy's Life of Theodore Roosevelt, by Herman Hagedorn
90. Gulliver's Travels, by Jonathan Swift

91. Biography of a Grizzly, by Ernest Seton-Thompson
92. Evangeline, by Henry W. Longfellow
93. Tales from Shakespeare, by Charles Lamb
94. Adventures of Sherlock Holmes, by Conan Doyle

Suppose you were an artist, what would you Like/Dislike/ Neither like nor dislike to draw.

95. Fruits
96. Children
97. Horses
98. Clouds
99. Cats
100. Flowers
101. Tigers
102. Ships

Suppose you were a newspaper reporter, what would you Like/ Dislike/Neither like nor dislike to write about, or report?

103. Accidents
104. Sporting news
105. Musical events
106. Theatrical news
107. News oddities
108. Commercial news

If you have two years to travel, with plenty of money, what would you Like/Dislike/Neither like nor dislike to see and do?

109. Visit Holland
110. Hunt lions in Africa
111. Spend a day in Westminster Abbey
112. See London Bridge
113. Visit many famous battlegrounds
114. Visit many manufacturing plants
115. See how people prepare their food
116. Spend a year on sailing a boat
117. Study social customs
118. See how criminals are treated
119. Learn about various religions

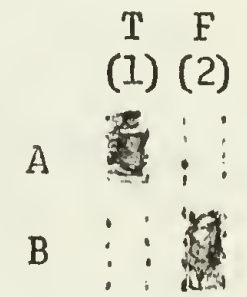
ATTITUDE-INTEREST INVENTORY

PART B

This test consists of numbered statements. Read each statement and decide whether it is <u>true as applied to you</u> or <u>false as applied to you</u>.

You are to mark your answers on the answer sheet you have. Look at the example of the answer sheet shown at the right. If a statement is TRUE or MOSTLY TRUE, as applied to you, blacken between the lines in column 1 (i.e., the column headed T). See A at the right. If a statement is FALSE or NOT USUALLY TRUE, as applied to you, blacken between the lines in column 2 (i.e., the column headed F). See B at the right. <u>Do not leave any blank spaces</u> if you can avoid it.

Examples of correct marking procedure.



In marking your answers on the answer sheet, be sure that the number of the statement agrees with the number on the answer sheet. Make your marks heavy and black. Erase completely any answer you wish to change. Do not make any marks on this booklet.

Remember, try to make <u>some</u> answer to every statement.

NOW OPEN THE BOOKLET AND GO AHEAD

DO NOT MAKE ANY MARKS ON THIS BOOKLET

1. I like mechanics magazines.

2. I think I would like the work of a librarian.

3. When I take a new job, I like to be tipped off on who should be gotten next to.

4. I would like to be a singer.

5. Once in a while I think of things too bad to talk about.

6. I feel that it is certainly best to keep my mouth shut when I'm in trouble.

7. When someone does me a wrong I feel I should pay him back if I can, just for the principle of the thing.

8. I used to like drop-the-handerchief.

9. At times I feel like swearing.

10. I have often wished I were a girl. (or if you are a girl) I have never been sorry that I am a girl.

11. I enjoy reading love stories.

12. I like poetry.

13. My feelings are not easily hurt.

14. I do not always tell the truth.

15. I sometimes tease animals.

16. I think I would like the kind of work a forest ranger does.

17. I would like to be a florist.

18. It takes a lot of argument to convince most people of the truth.

19. I do not read every editorial in the newspaper every day.

20. I would like to be a nurse.

21. I like to go to parties and other affairs where there is lots of loud noise.

22. I frequently find it necessary to stand up for what I think is right.

23. I believe in a life hereafter.

24. I sometimes get angry.

25. I enjoy a race or game better when I bet on it.

26. Most people are honest chiefly through fear of being caught.

27. My table manners are not quite as good at home as when I am out in company.

28. I like dramatics.

29. Once in a while I put off until tomorrow what I ought to do today.

20. I like collecting flowers or growing house plants.

31. At times my thoughts have raced ahead faster than I could speak them.

32. I like to cook.

33. Sometimes when I am not feeling well I am cross.

34. I would like to be a soldier.

35. I used to keep a diary.

36. I do not have a great fear of snakes.

37. If I could get into a movie without paying and be sure I was not seen I would probably do it.

38. My hands have not become clumsy or awkward.

39. I daydream very little.

40. If I were a reporter I would very much like to report news of the theater.

41. I would like to be a journalist.

42. I would rather win than lose in a game.

43. In walking I am very careful to step over sidewalk cracks.

44. I have never had any breaking out on my skin that has worried me.

45. I frequently find myself worrying about something.

46. I think I would like the work of a building contractor.

47. I like to know some important people because it makes me feel important.

48. I like Science

49. I very much like hunting

50. Some of my family have habits that bother and annoy me very much.

51. I should like to belong to several clubs or lodges.

52. I do not like everyone I know.

53. I have been disappointed in love.

54. I believe there is a devil and a hell in afterlife.

55. I like to be with a crowd who plays jokes on one another.

56. I gossip a little at times.

57. I was a slow learner in school

58. If I were an artist I would like to draw flowers.

59. It does not bother me that I am not better looking.

60. I am entirely self-confident.

61. Sometimes I get angry.

62. I have often felt that strangers were looking at me critically.

63. Most people make friends because friends are likely to be useful to them.

64. Once in a while I feel hate toward members of my family whom I usually love.

65. If I were a reporter I would very much like to report sporting news.

66. I Liked "Alice in Wonderland" by Lewis Carroll.

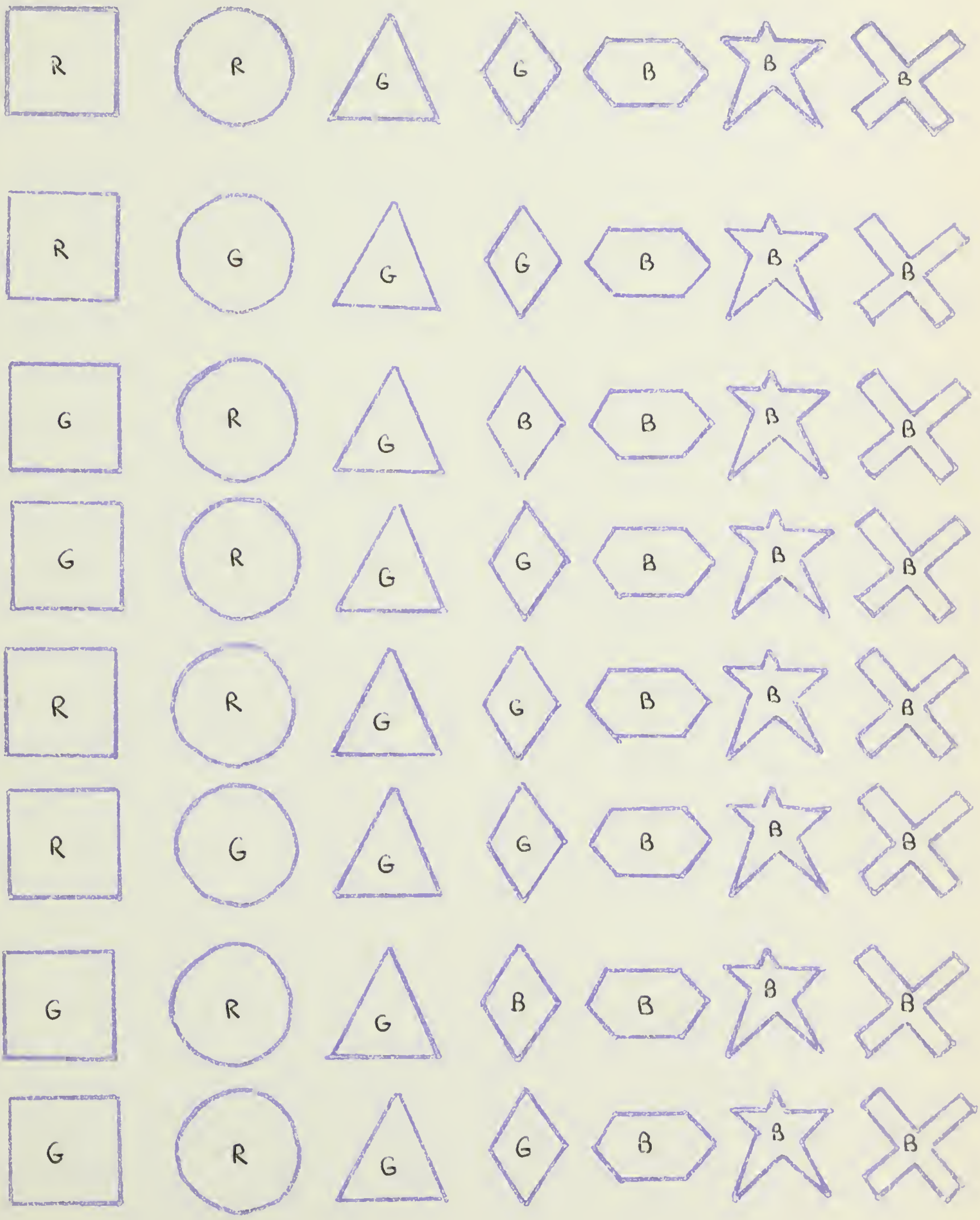
67. I think that I feel more intensely than most people do.

68. There never was a time in my life when I liked to play with dolls.

APPENDIX II

Concept Attainment Problems

PROBLEM 1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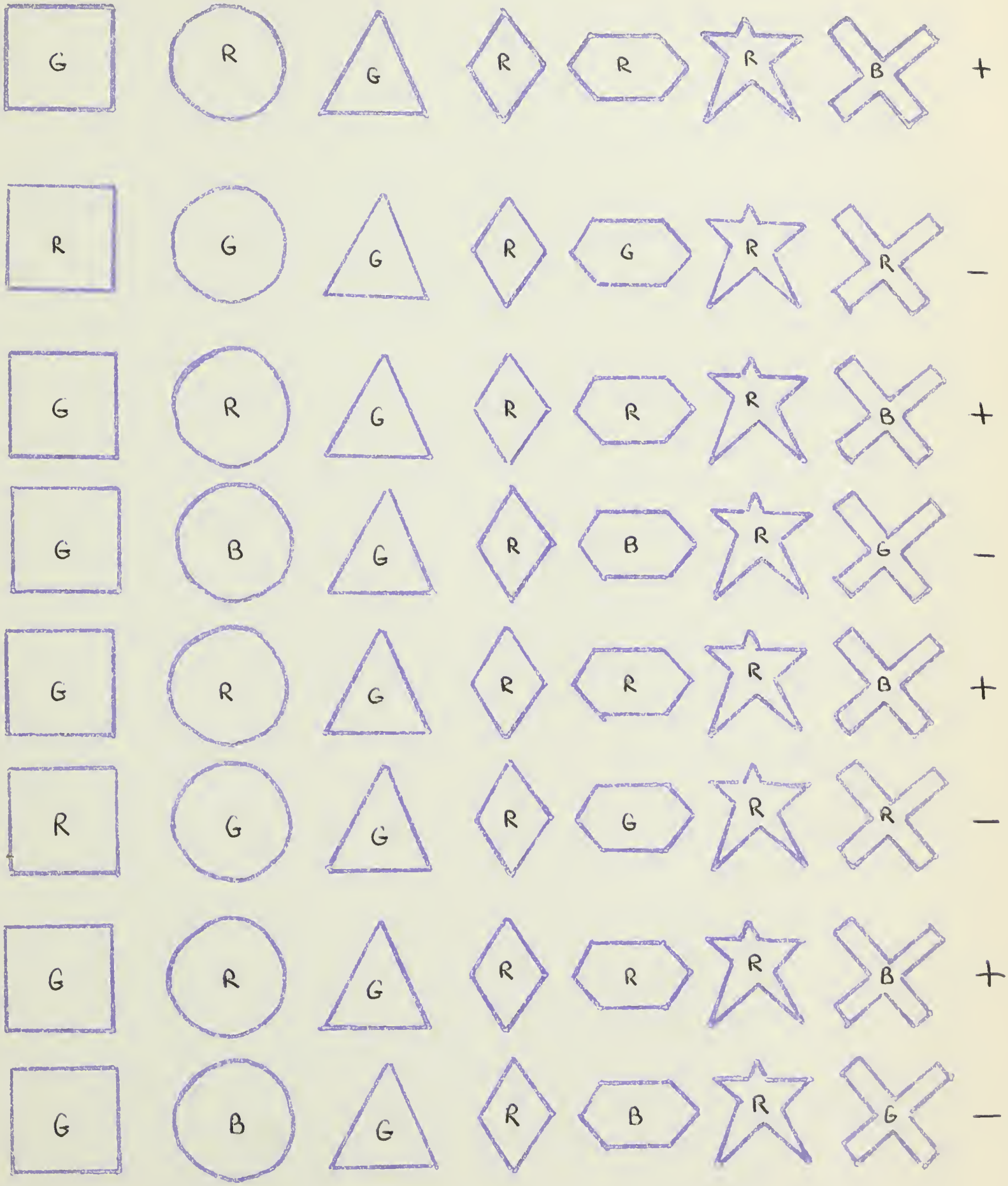
G R G G B B B +

PROBLEM 2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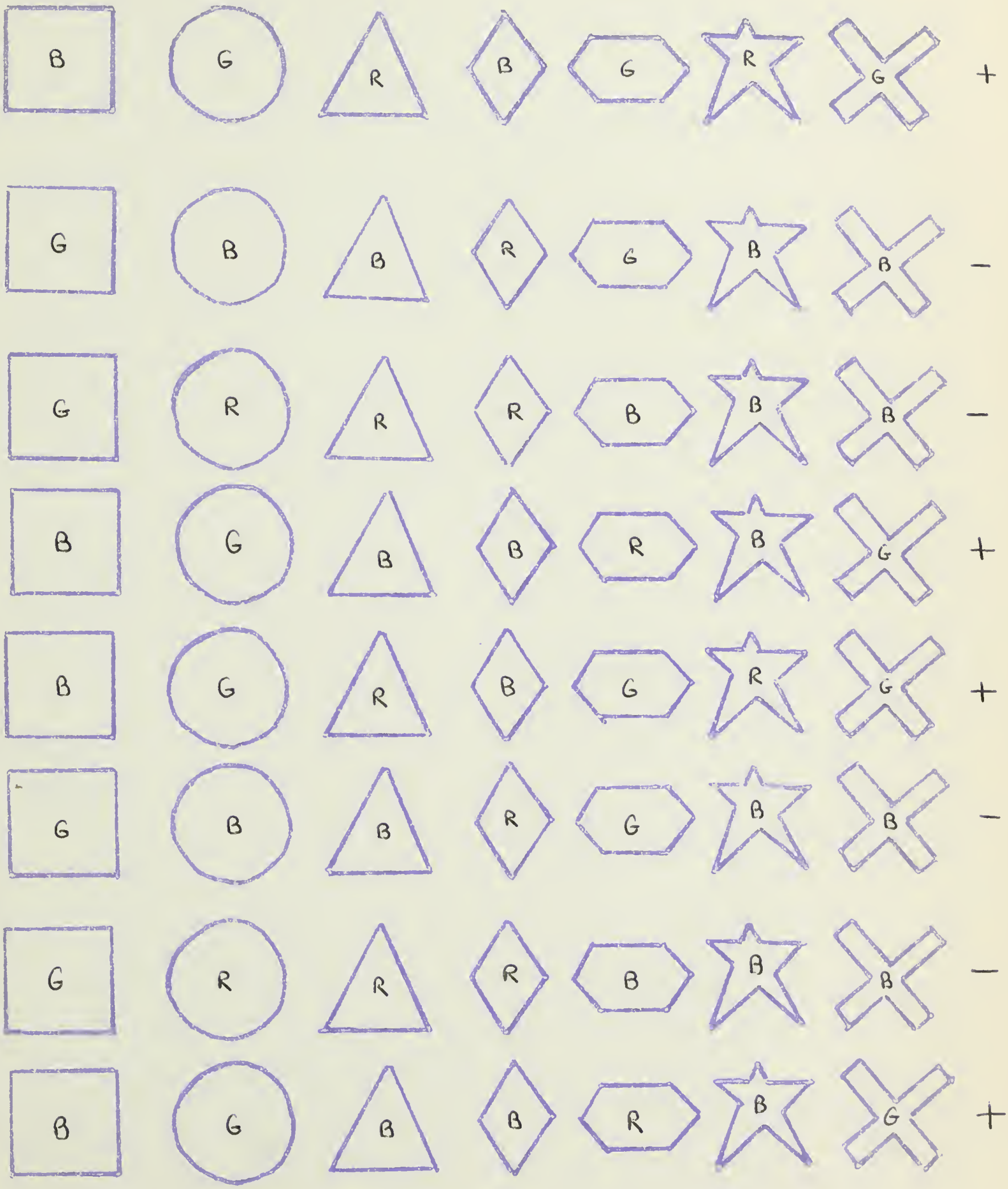
Problem 3



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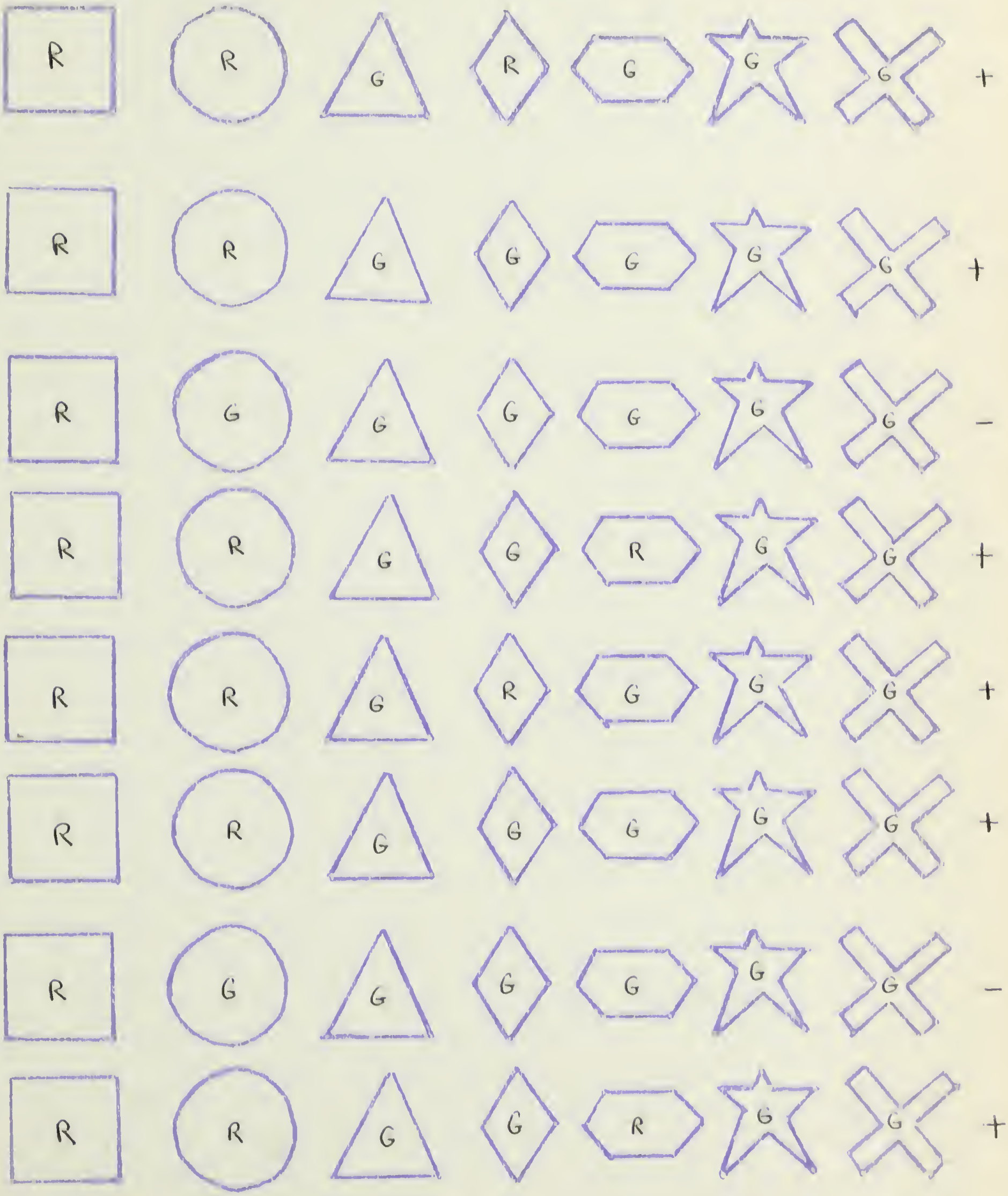

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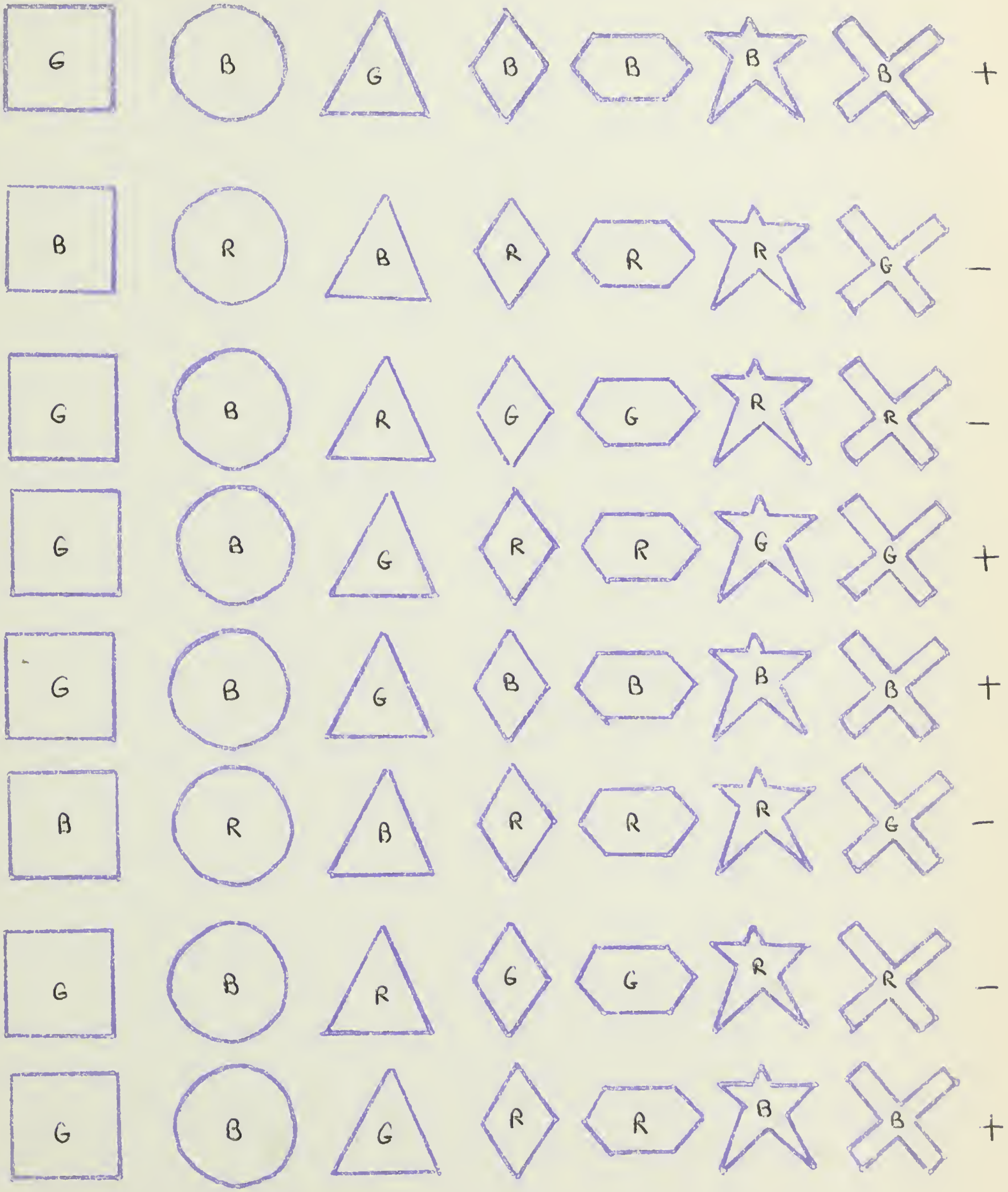
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G B R G G R R −
G B G R R G G +
G B G B B B B +
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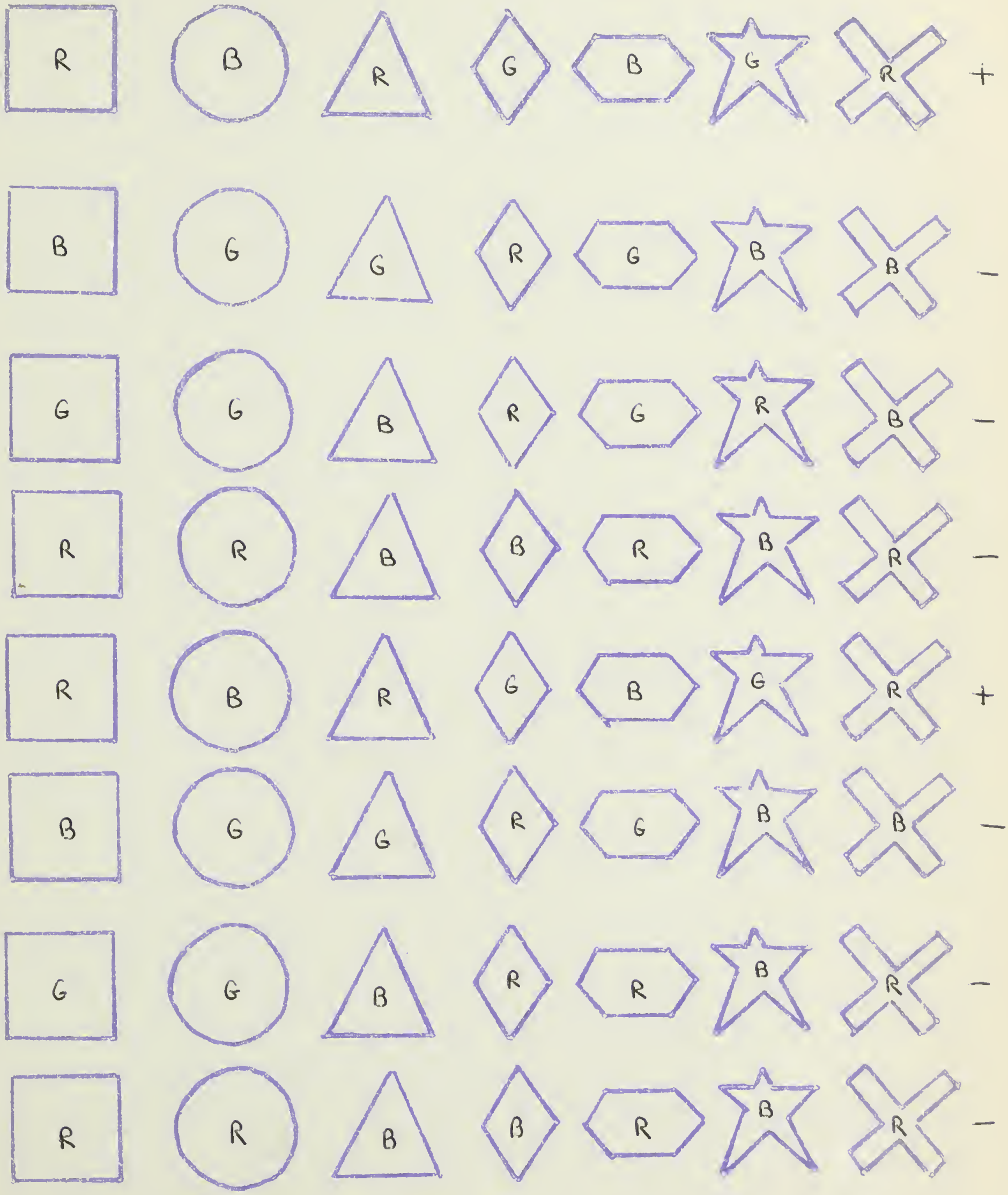
G B R G G R R −
G B G R R B B +

Problem 6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G G B R G R B −
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R B R G B G R +
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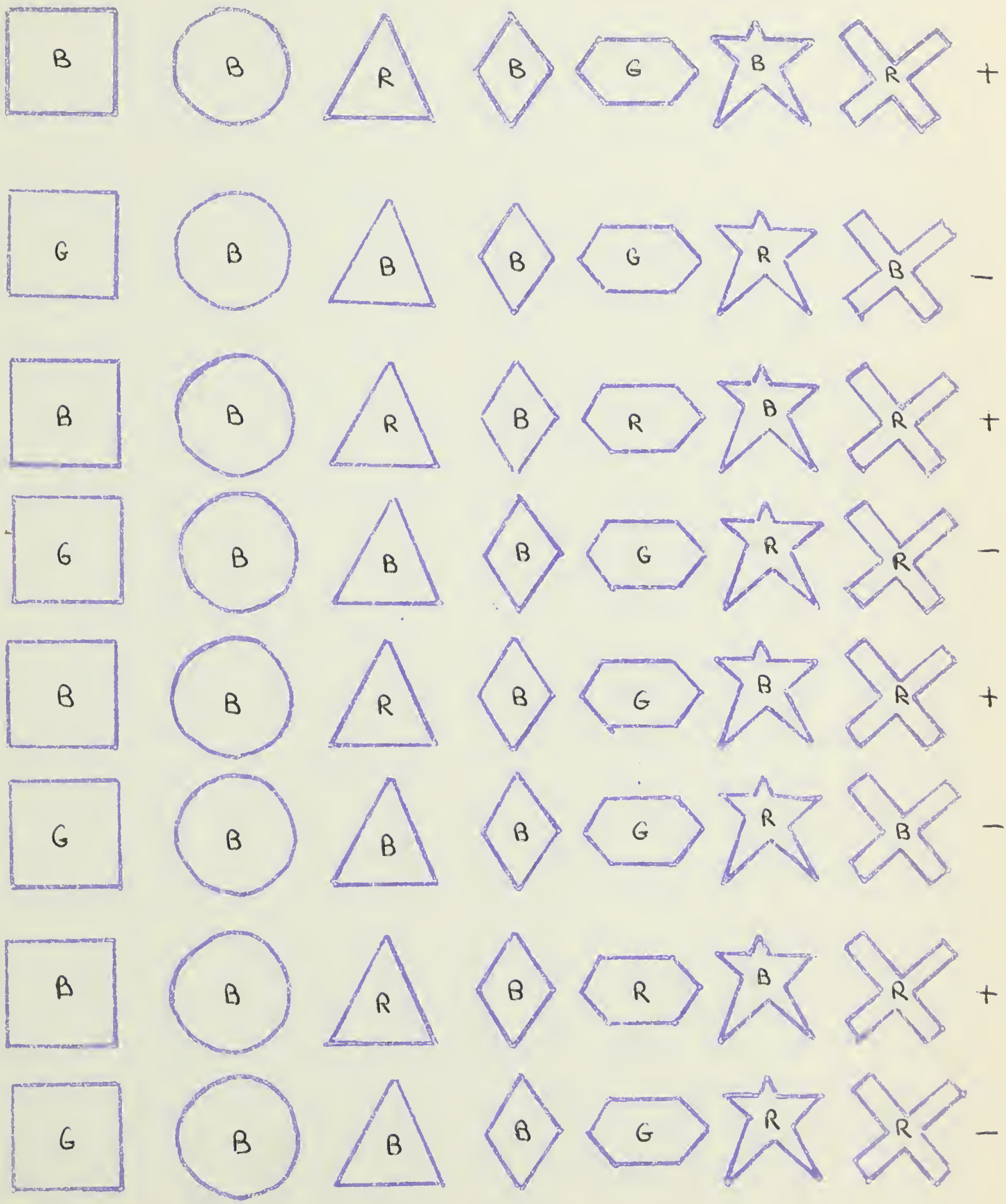
G G B R R B R −
R R B B R B R −

PROBLEM 7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G B B B G R B −
B B R B R B R +
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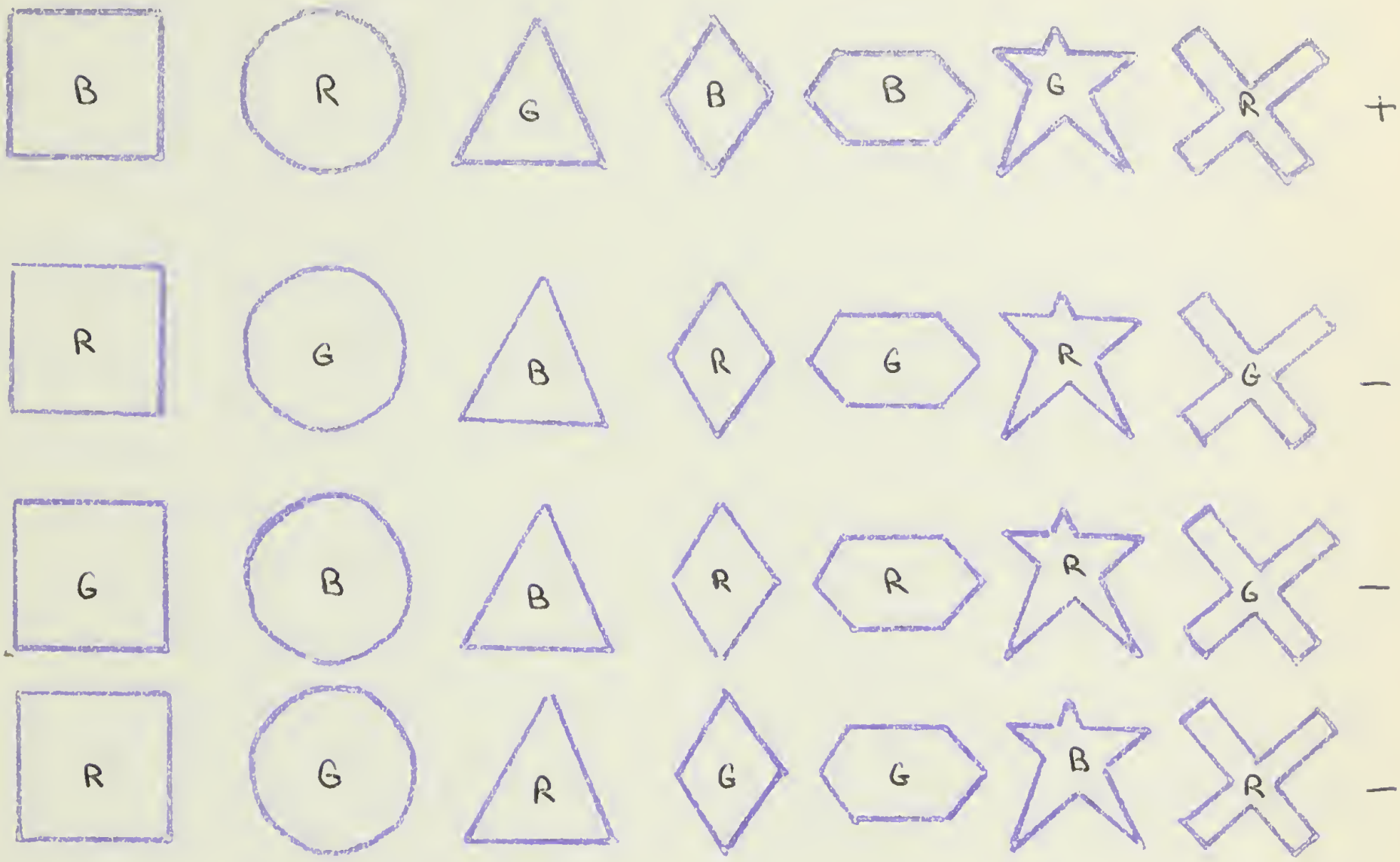
B B R B G B R +
G B B B R B B −
B B R B R B R +
G B B B G R R −

PROBLEM 8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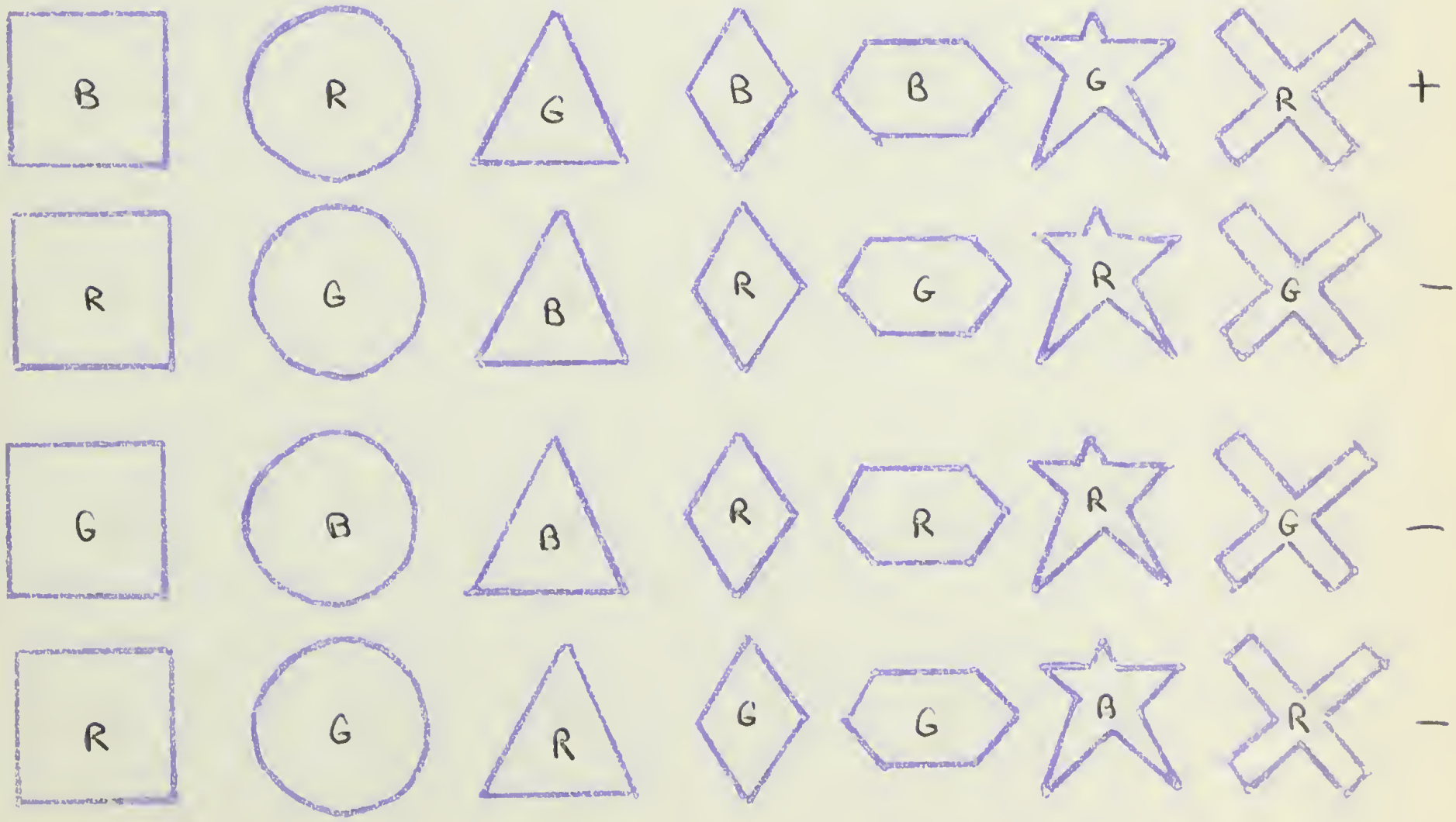
G B B R R R G −
R G R G G B R −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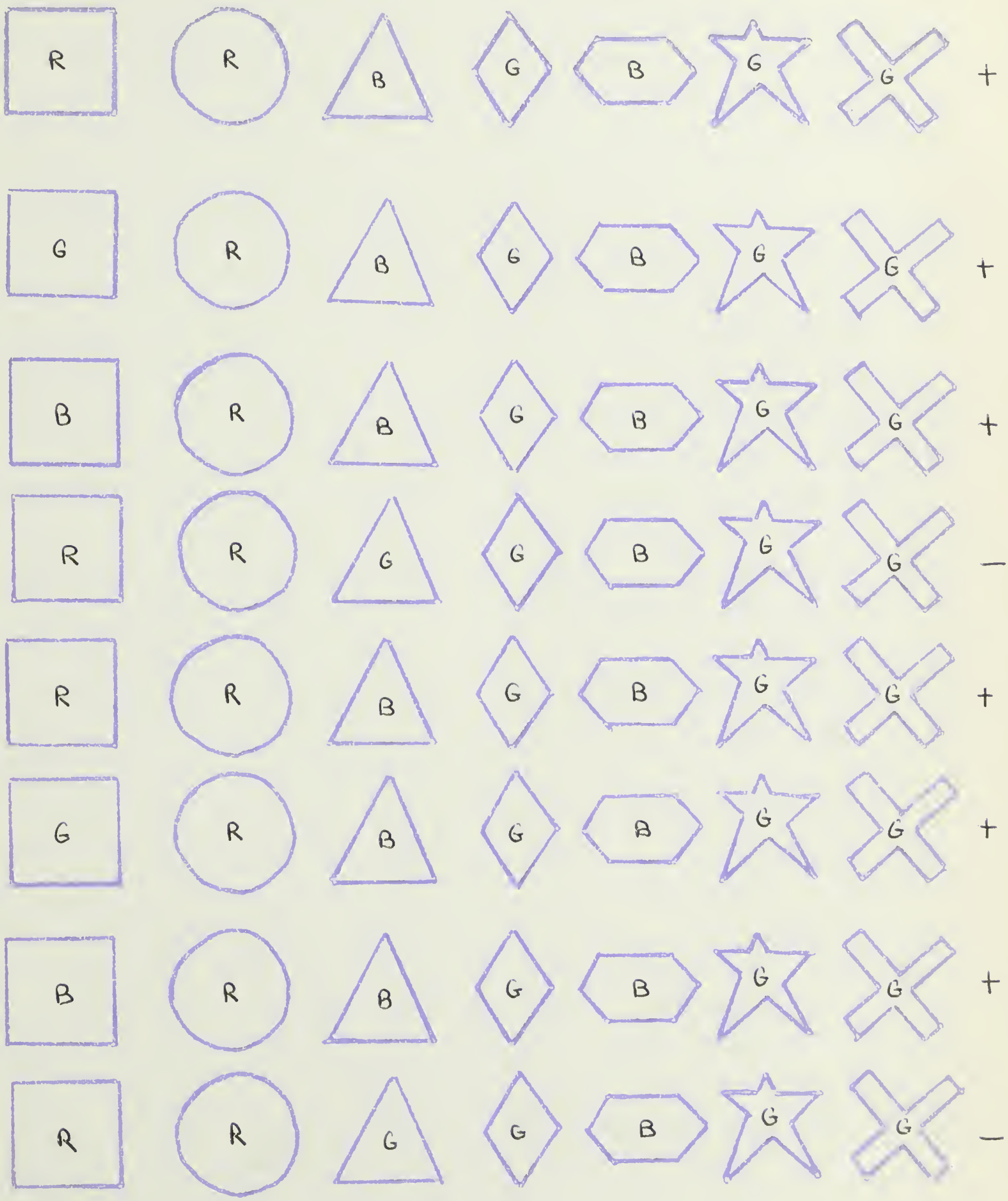
G B B R R R G −
R G R G G B R −

PROBLEM 9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G R B G B G G +
B R B G B G G +
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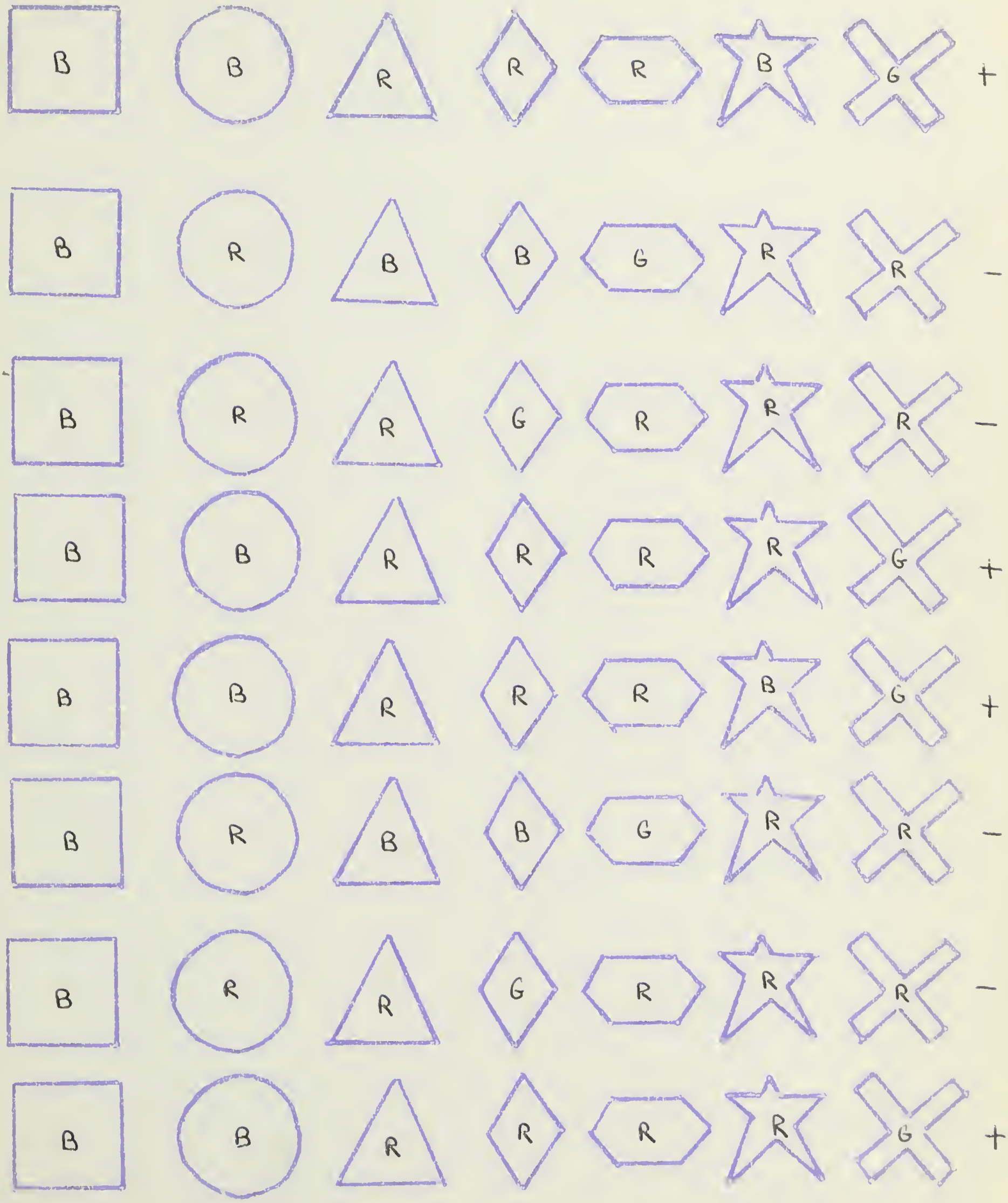
R R B G B G G +
G R B G B G G +
B R B G B G G +
R R G G B G G −

PROBLEM 10



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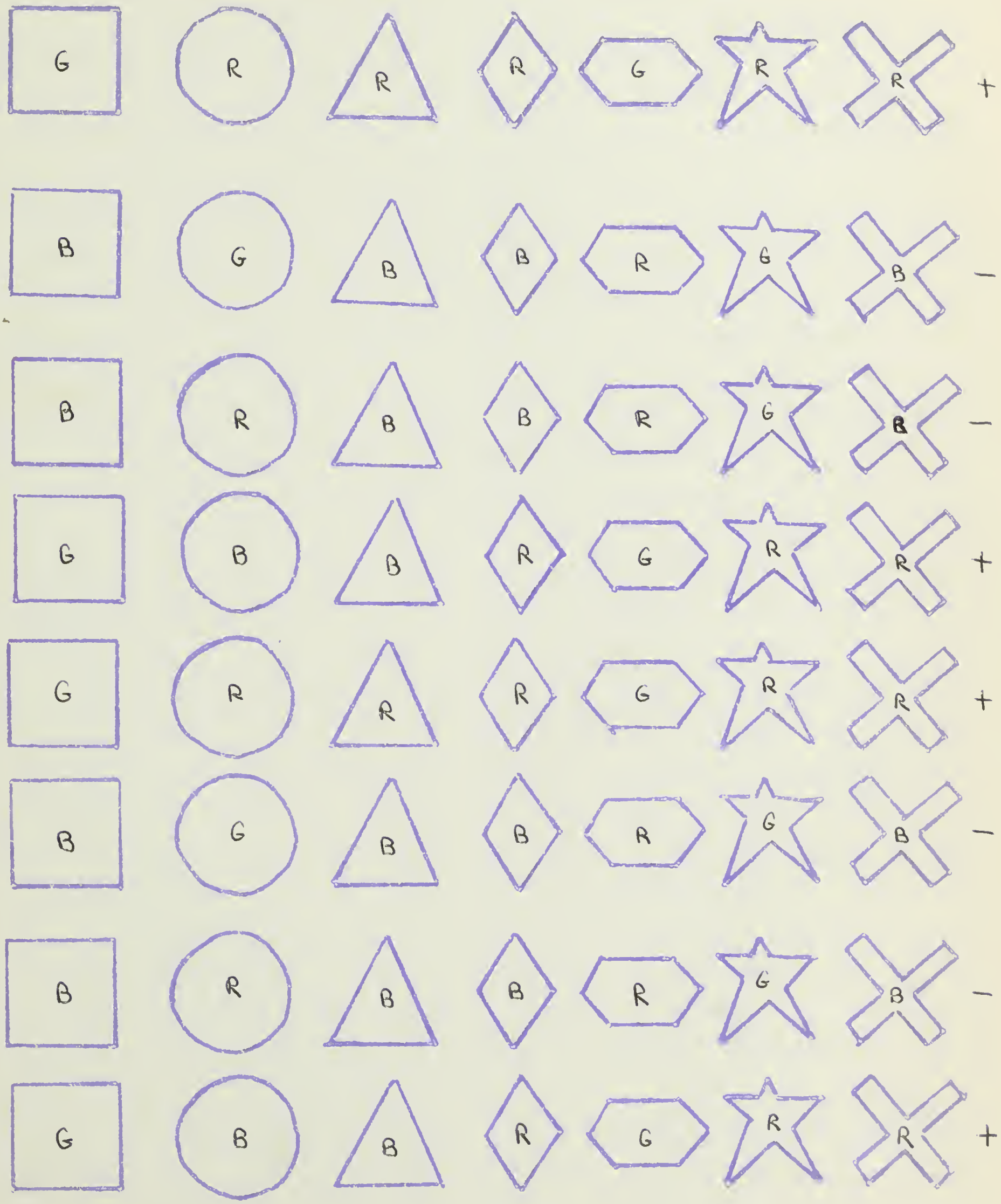
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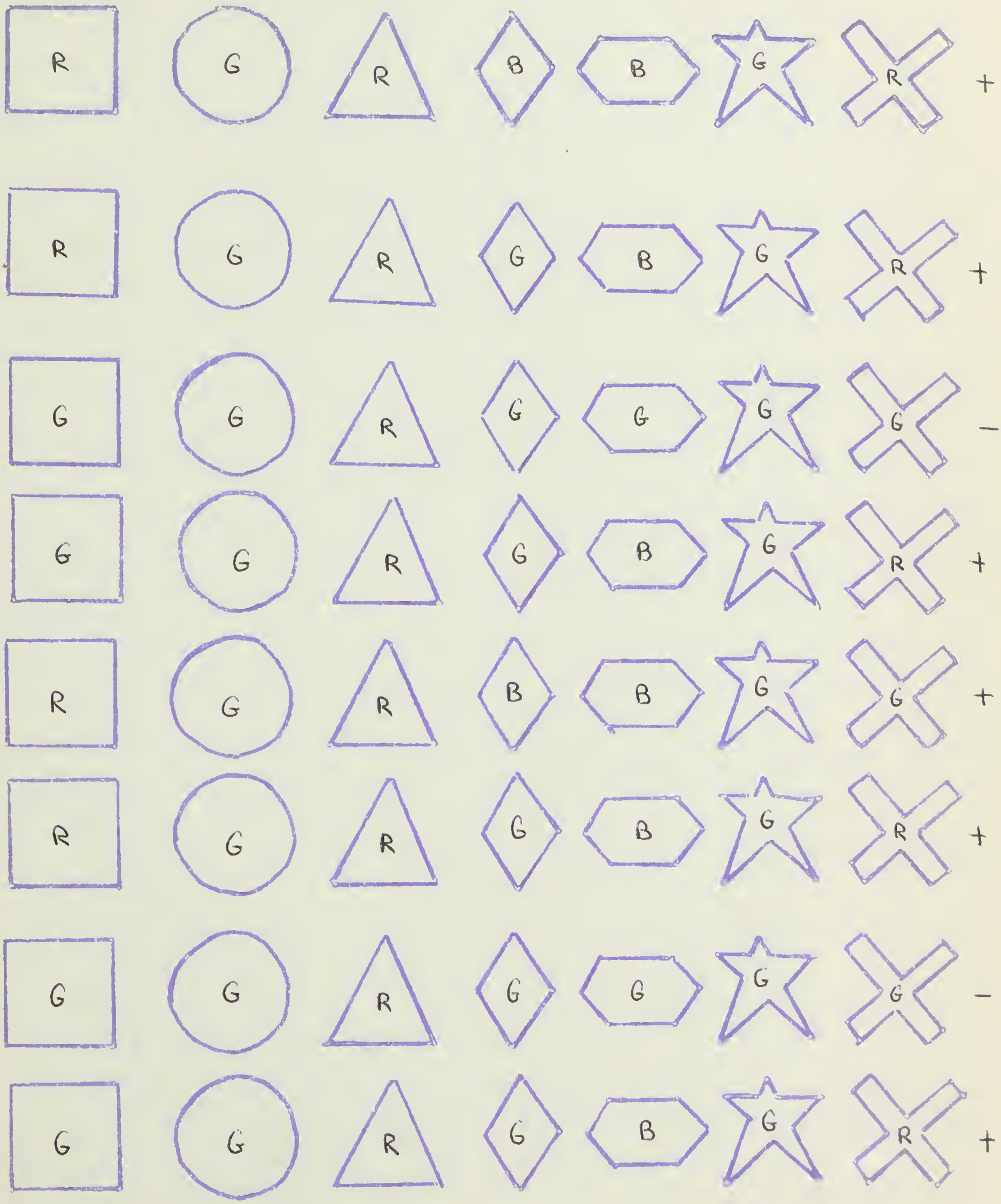
B R B B R G B −
G B B R G R R +
G R R R G R R +
B G B B R G B −
B R B B R G B −
G B B R G R R +

PROBLEM 12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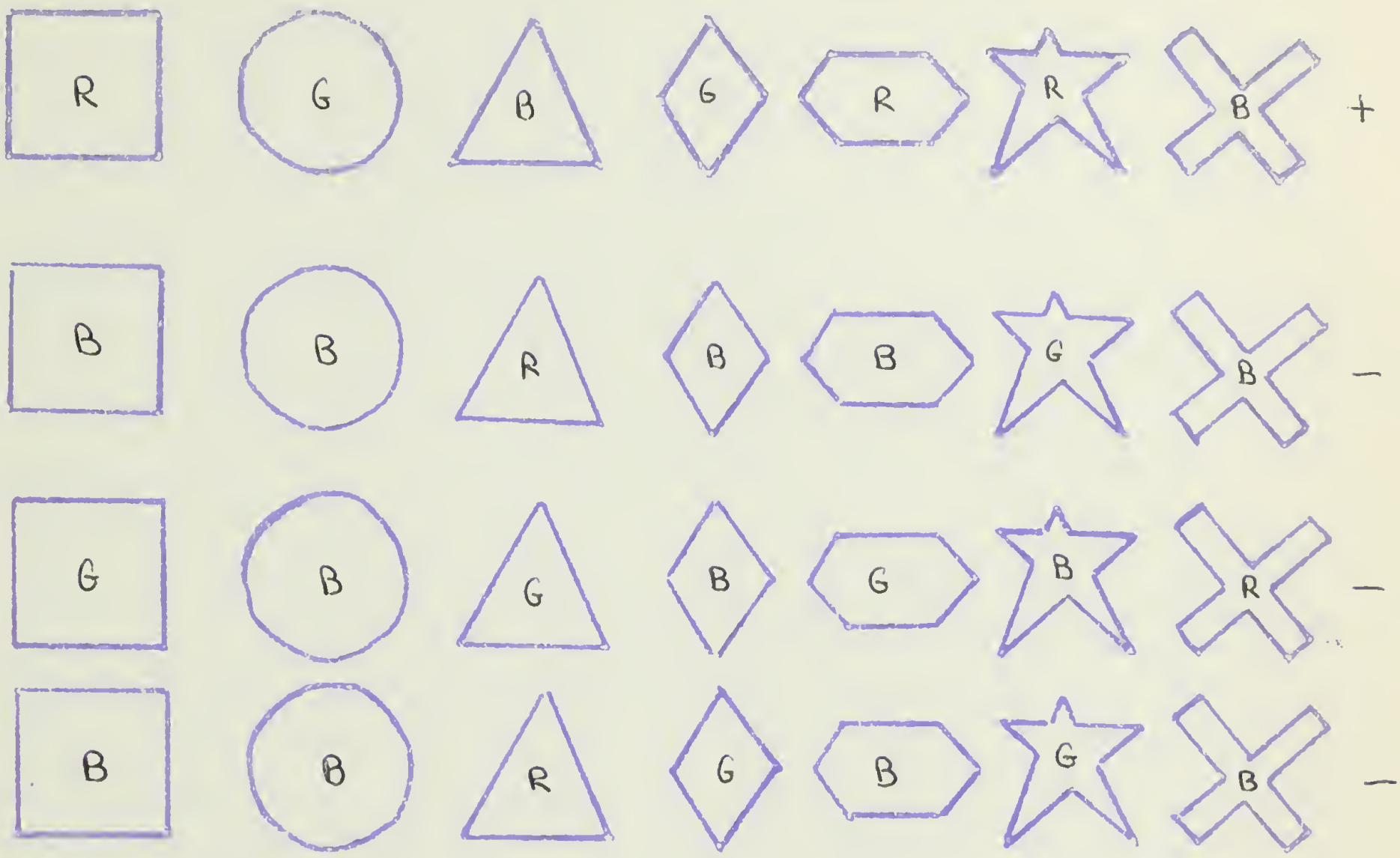
G G R G G G G −
G G R G B G R +
R G R B B G G +
R G R G B G R +
G G R G G G G −
G G R G B G R +

PROBLEM 13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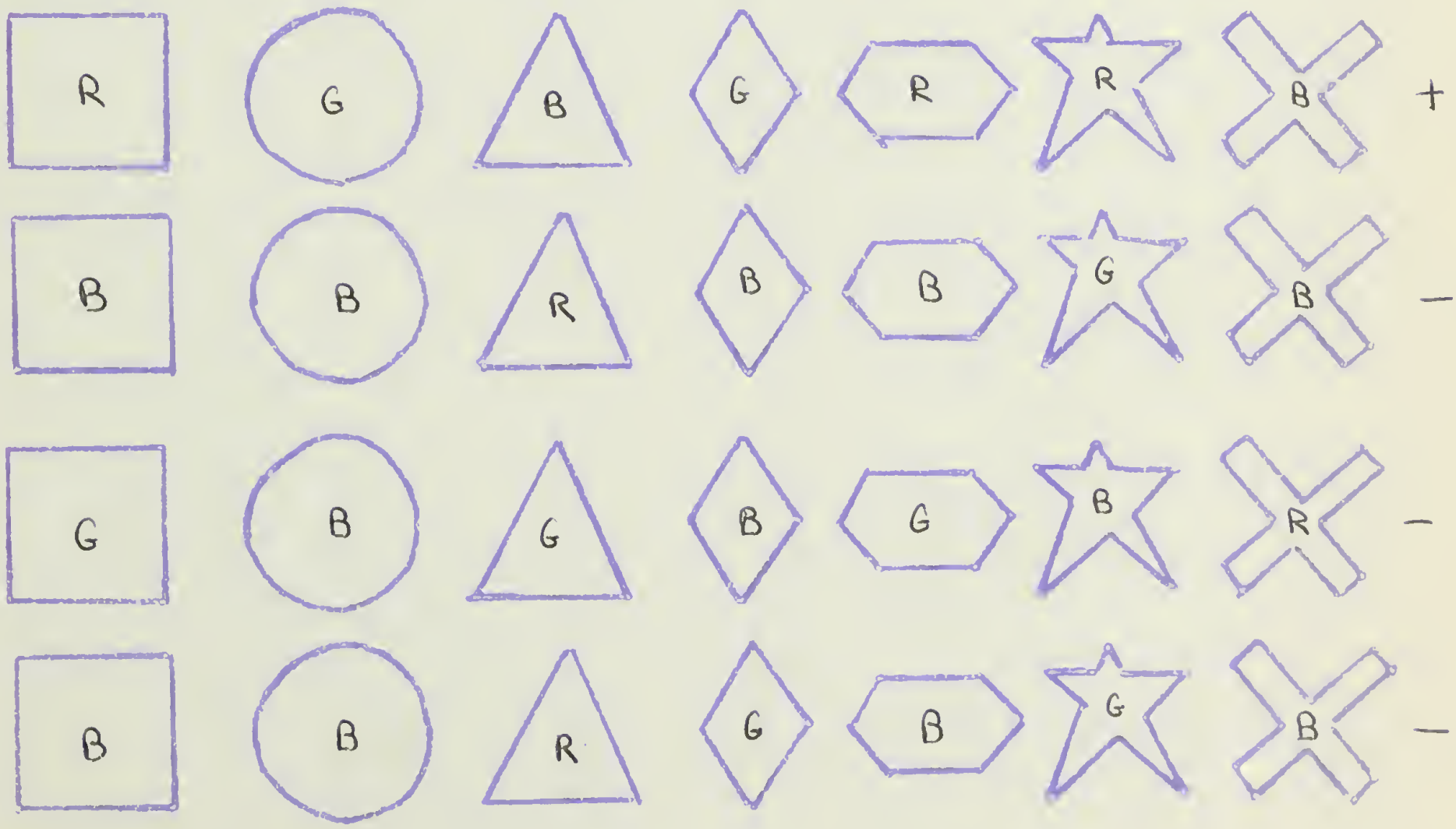
G B G B G B R −
B B R G B G B −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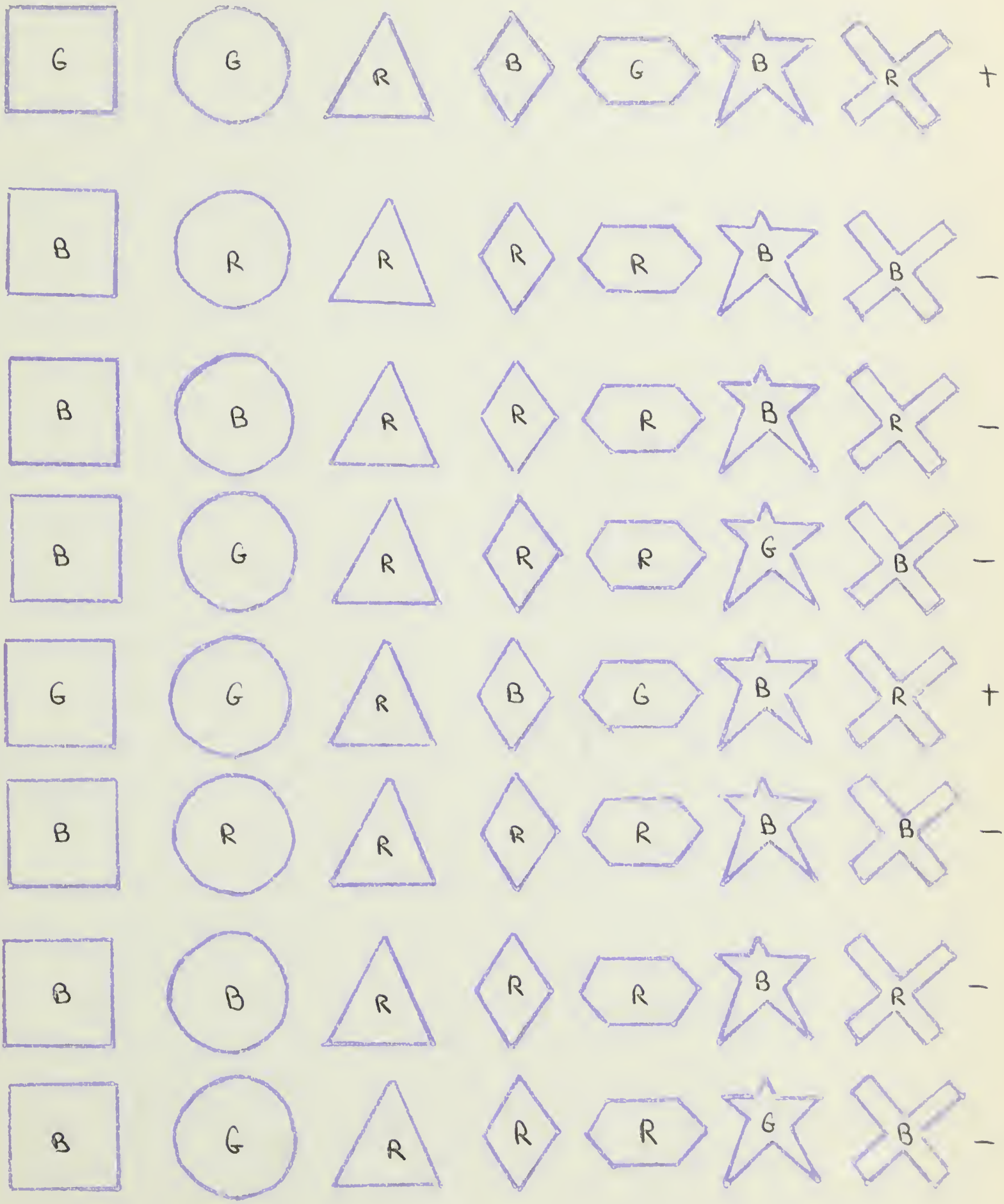
G B G B G B R −
B B R G B G B −

PROBLEM 14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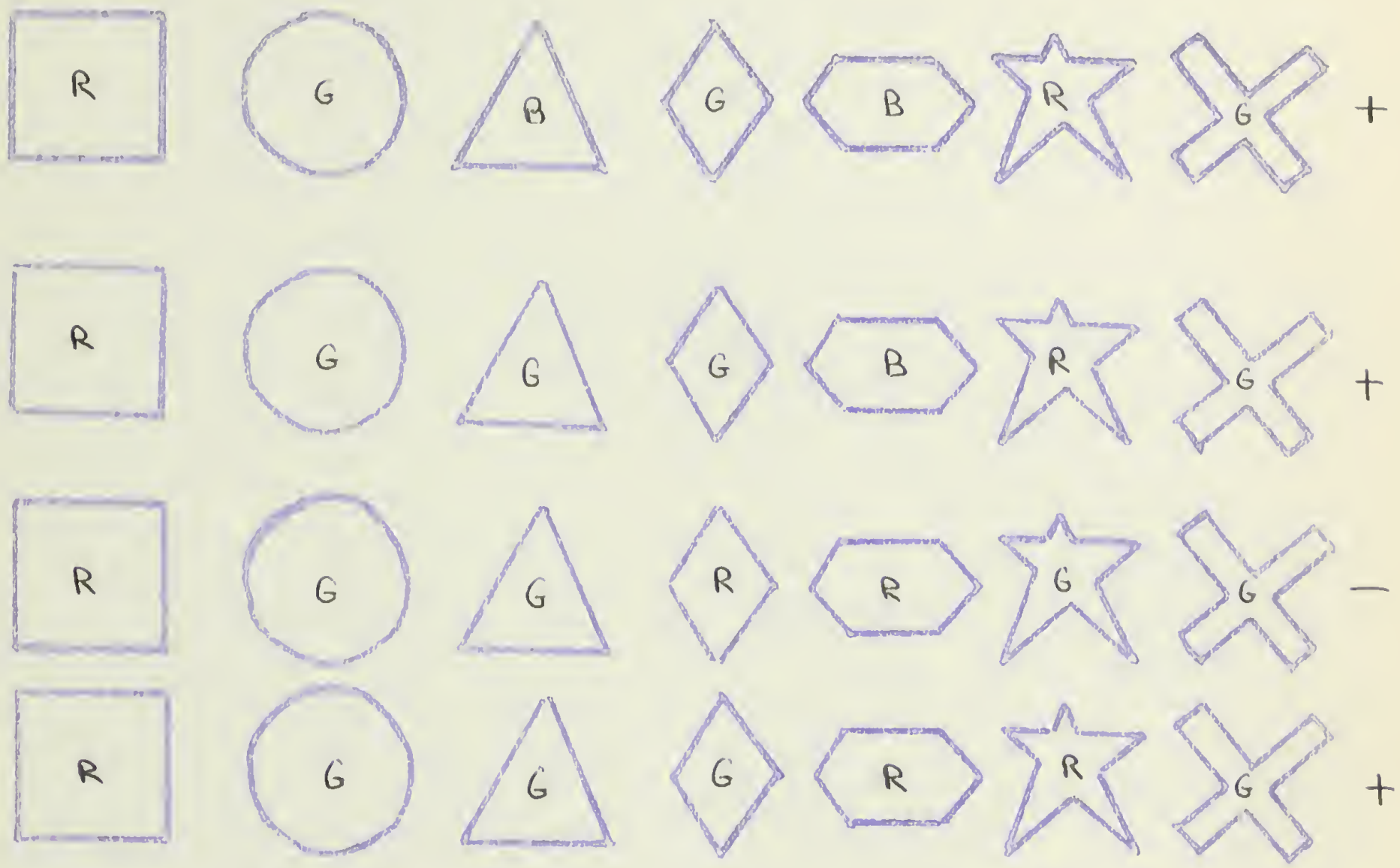
B R R R R B B −
B B R R R B R −
B G R R R G B −
G G R B G B R +
B R R R R B B −
B B R R R B R −
B G R R R G B −

PROBLEM 15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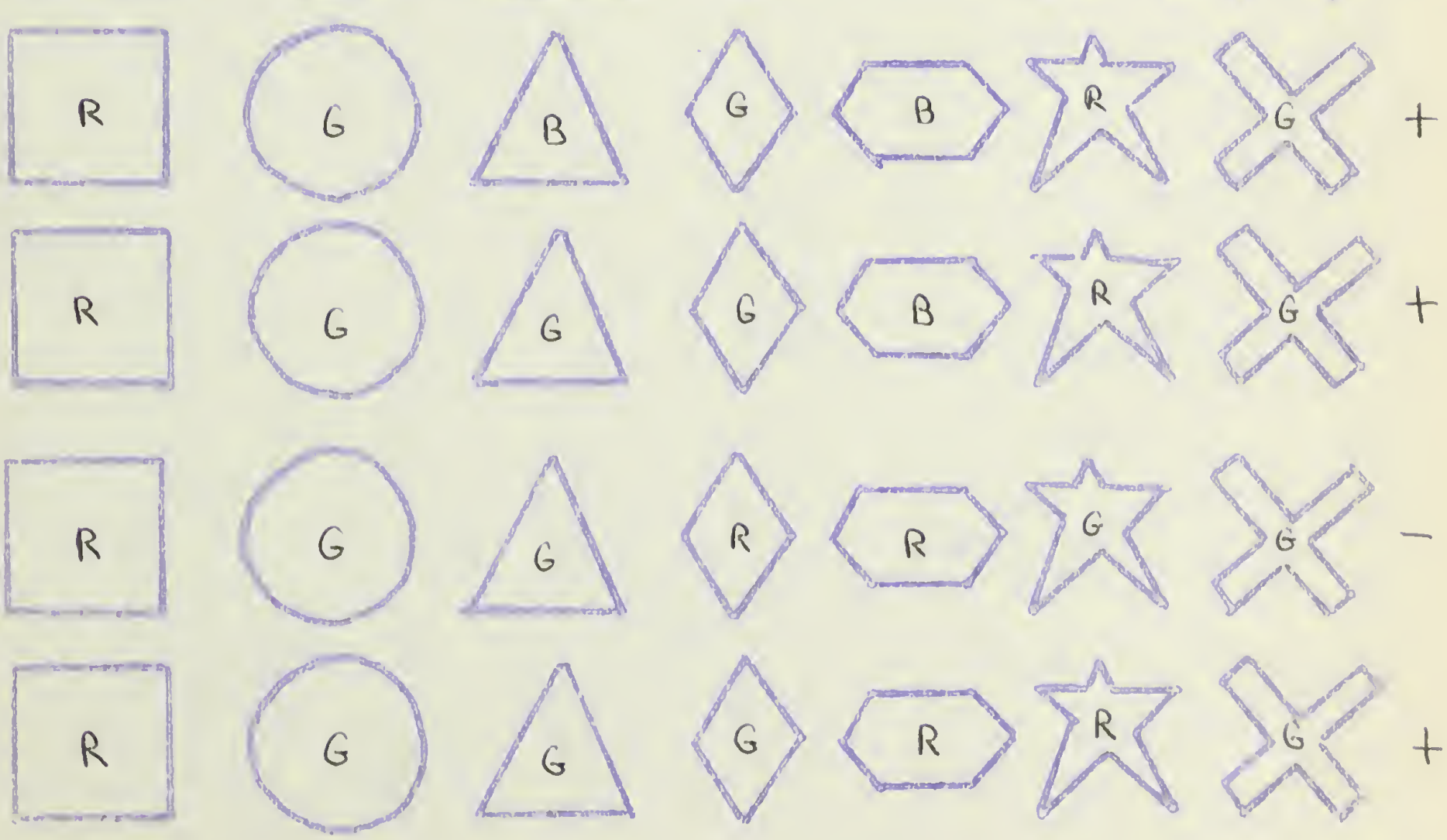
R G G G B R G +
R G G R R G G −
R G G G R R G +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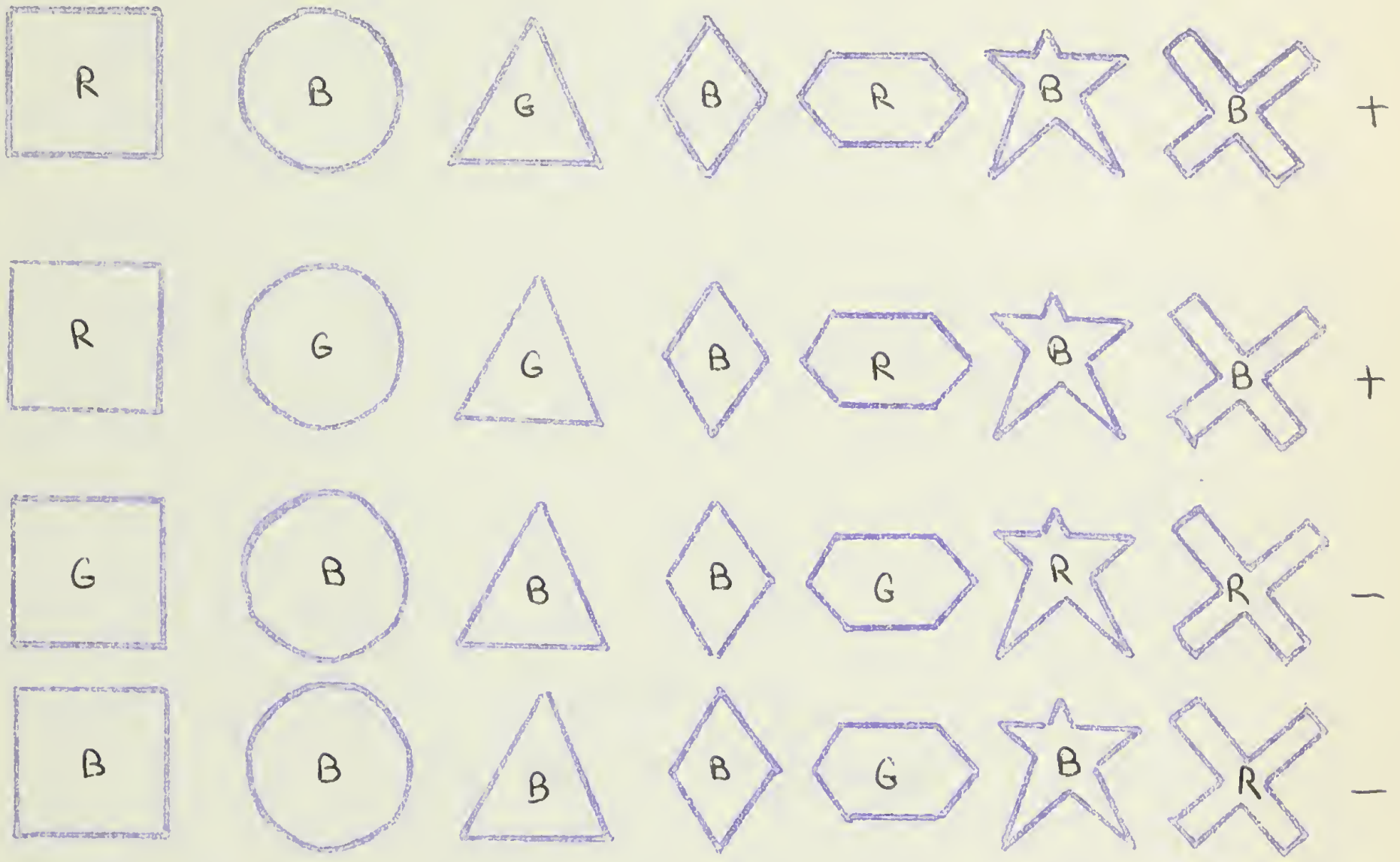
R G G R R G G −
R G G G R R G +

Problem 16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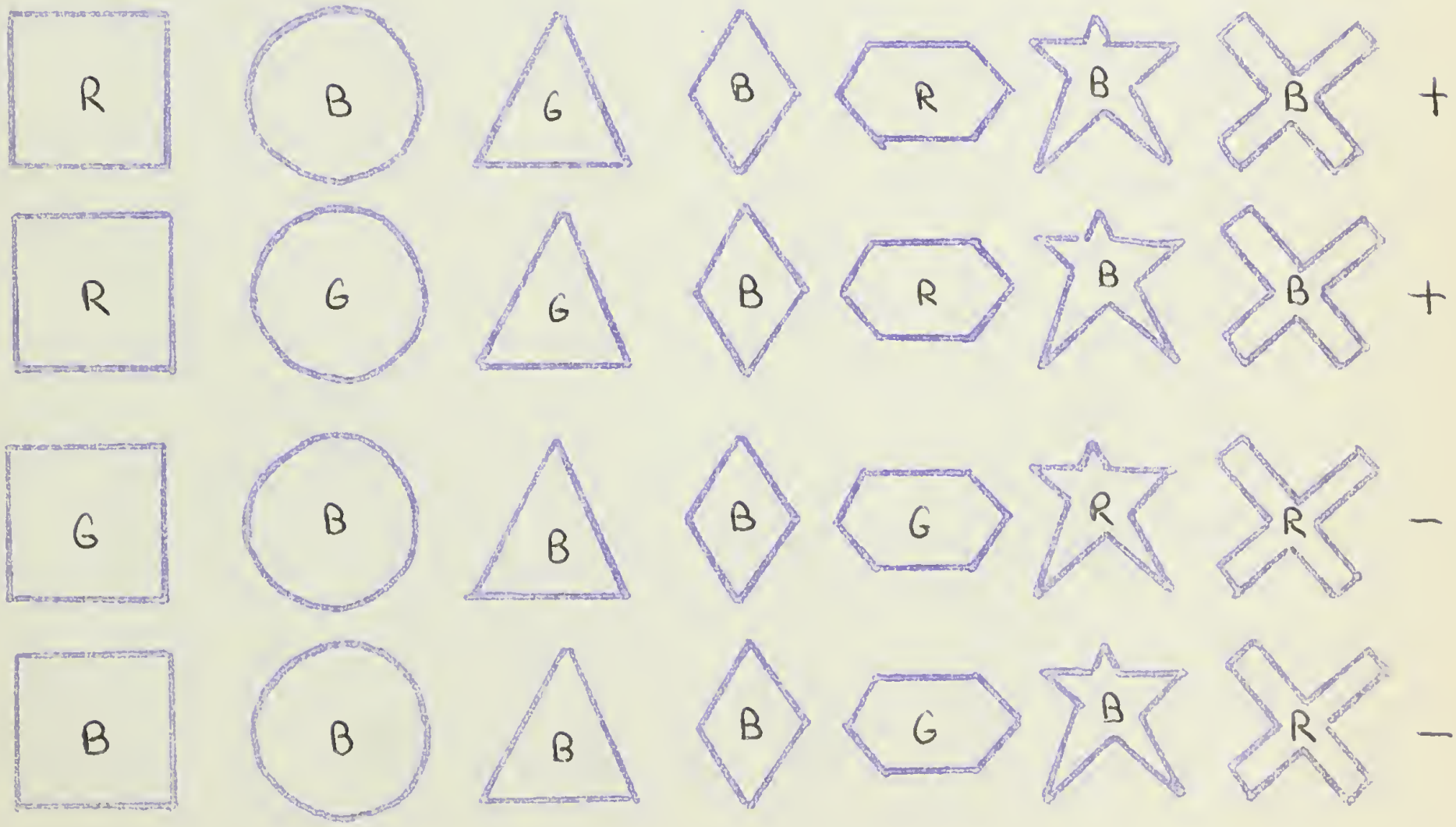
B B B B G B R −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R G G B R B B +
G B B B G R R −
B B B B G B R −

APPENDIX III

Raw Data for All Subjects

Males High Memory

S No.	Problems Solved 1st Half	Problems Solved 2nd Half	Instances to Solution 1st Half	Instances to Solution 2nd Half
1	2	2	7.75	7.75
2	2	5	8.25	7.12
3	2	1	8.12	8.37
4	2	2	7.75	7.75
5	2	2	7.75	7.75
6	2	2	7.75	7.75
7	2	2	7.75	7.75
8	2	2	7.75	7.75
9	2	4	8.50	6.87
10	2	2	7.75	7.75
11	1	3	8.75	7.12
12	1	2	8.37	7.75
13	5	6	5.87	5.25
14	2	2	7.75	7.75

Males High No Memory

15	2	3	7.75	7.62
16	3	3	7.62	7.62
17	2	2	7.75	7.75
18	4	7	7.87	6.62
19	4	8	7.50	7.00
20	3	7	7.75	7.12
21	3	8	7.25	5.87
22	2	2	7.75	7.75
23	2	2	7.75	7.75
24	5	8	5.87	4.00
25	3	3	7.62	8.12
26	6	7	7.00	4.75
27	5	5	6.87	6.00
28	7	8	4.62	4.00

Males Low Memory

S No.	Problems Solved 1st Half	Problems Solved 2nd Half	Instances to Solution 1st Half	Instances to Solution 2nd Half
29	2	5	7.75	7.87
30	2	2	7.87	8.25
31	2	1	8.62	8.37
32	2	7	7.75	7.62
33	2	2	7.75	7.75
34	2	1	7.75	8.37
35	2	4	7.75	8.00
36	2	4	7.75	6.50
37	3	6	7.75	4.62
38	5	5	6.37	5.87
39	4	4	7.12	6.50
40	4	6	7.00	5.87
41	1	3	8.37	7.37
42	2	2	7.75	7.75

Males Low No Memory

43	4	4	7.50	6.50
44	2	3	7.75	7.37
45	4	7	6.87	4.62
46	2	8	7.75	4.00
47	3	8	7.62	6.87
48	2	5	7.87	7.25
49	5	6	6.12	5.25
50	2	5	7.75	6.37
51	2	3	8.00	7.75
52	1	4	8.37	7.00
53	6	8	5.25	4.00
54	3	5	7.62	6.37
55	2	7	7.75	6.00
56	4	7	7.25	5.37

Females High Memory

S No.	Problems Solved 1st Half	Problems Solved 2nd Half	Instances to Solution 1st Half	Instances to Solution 2nd Half
57	2	3	7.75	7.12
58	3	4	6.87	7.12
59	2	4	7.75	6.50
60	3	3	7.50	7.12
61	2	2	7.75	8.00
62	1	2	8.37	7.75
63	2	2	7.75	7.75
64	0	0	9.00	9.00
65	2	1	7.75	8.37
66	2	1	7.75	8.37
67	6	6	5.50	5.25
68	2	3	8.12	6.75
69	2	0	8.12	7.75
70	2	2	7.75	7.75

Females High No Memory

71	5	6	7.37	5.25
72	4	6	6.50	5.37
73	2	5	7.75	8.00
74	7	8	6.25	4.25
75	2	6	7.75	7.50
76	2	2	7.75	7.75
77	6	7	5.62	5.12
78	4	8	6.50	4.00
79	2	1	7.75	8.37
80	3	2	7.12	8.00
81	2	4	7.00	8.25
82	5	7	6.37	5.37
83	4	6	7.50	7.25
84	3	4	7.37	7.25

Females Low Memory

S No.	Problems Solved 1st Half	Problems Solved 2nd Half	Instances to Solution 1st Half	Instances to Solution 2nd Half
85	2	1	7.75	8.37
86	2	2	7.75	7.75
87	2	1	7.75	8.37
88	2	3	7.75	7.62
89	4	6	6.50	5.75
90	2	1	7.75	8.37
91	3	3	7.12	7.12
92	2	5	7.12	6.50
93	2	2	7.75	7.75
94	3	5	8.12	7.37
95	3	3	8.12	8.12
96	2	2	7.75	7.75
97	2	2	7.75	7.75
98	1	3	8.37	7.12

Females Low No Memory

99	4	8	7.50	7.00
100	2	6	7.75	7.25
101	3	2	7.25	7.75
102	3	4	7.12	6.50
103	4	4	7.62	6.50
104	6	8	7.12	5.87
105	2	2	7.75	7.75
106	2	2	7.75	7.75
107	3	7	7.62	5.00
108	2	5	7.75	6.62
109	6	8	5.25	4.00
110	6	7	5.50	5.25
111	2	8	7.75	4.00
112	2	2	7.75	7.75

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Approved by:

Dated: 5/24/60