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AUTHOR	Keislar, Evan R.; Phinney, Jean
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ABSTRACT

A total of 24 four-year-old children were posed with the paired-associate task of learning where 9 different animals lived, using apparatus designed for self instruction through picture matching. In Experiment I, children, who were taught to prompt themselves as needed by referring to a picture book, attained almost perfect scores, significantly more than a group who learned through trial and error without the information source. To reduce errors of over- and under-prompting, an incentive was introduced in Experiment II. One group was differentially reinforced for correct responses only when made on the first attempt without prompting. A second group was reinforced for each correct response regardless of amount of self-prompting or previous errors. The unexpected finding that the indiscriminately reinforced group performed significantly better on the posttest, coupled with the significantly greater variability in book use by the differentially reinforced group, was interpreted as reflecting the heightened anxiety which this risk-taking situation involved for many youngsters. (Author)

YOUNG CHILDREN'S USE OF AN INFORMATION SOURCE IN SELF-INSTRUCTION

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Evan R. Keislar and Jean Phinney

University of California, Los Angeles

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ABSTRACT

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Evan R. Keislar and Jean Phinney
University of California, Los Angeles

A total of 24 four-year-old children were posed with the paired-associate task of learning where 9 different animals lived, using apparatus designed for self-instruction through picture-matching. In Experiment I, children, who were taught to prompt themselves as needed by referring to a picture book, attained almost perfect scores, significantly more than a group who learned through trial-and-error without the information source. To reduce errors of over- and under-prompting, an incentive was introduced in Experiment II. One group was differentially reinforced for correct responses only when made on the first attempt without prompting. A second group was reinforced for each correct response regardless of amount of self-prompting or previous errors. The unexpected finding that the indiscriminately reinforced group performed significantly better on the posttest, coupled with the significantly greater variability in book use by the differentially reinforced group, was interpreted as reflecting the heightened anxiety which this risk-taking situation involved for many youngsters.

YOUNG CHILDREN'S USE OF AN INFORMATION SOURCE IN SELF-INSTRUCTION

Evan R. Keislar and Jean Phinney

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An important part of becoming an independent learner in school is the development of self-instructional behaviors. In this task of "learning to learn" the child relates to his environment in a variety of ways ranging from covert attentional habits to more deliberative self-management skills. One critical aspect of this development in self-instruction is the growth of information-seeking activities. The child learns to recognize that he needs information, he learns to seek and to use it, and hopefully discards the information source when he feels enough confidence to require it no longer.

The experiments in this paper constitute two of a series of formative evaluation studies designed to develop educational materials where young children must seek and use information. In dealing with these materials the child is expected to assess his own competencies and to seek from the resources whatever information he decides he needs. Informal observations suggested early that children make two types of errors in this self-instructional activity. First, some children adopt a trial-and-error strategy with little use of the available information; they act as if they hope to win by luck. A second type of error seems to be made by others who appear to lean too heavily on the information source; they appear to be overcautious.

Similar observations of children in a self-instructional setting were made by the senior author in an earlier study (Bland & Keislar, 1966), where kindergarten children sought and used information in teaching themselves to speak French. The subjects learned to describe pictures drawn separately on Language Master cards by saying the appropriate French sentence (formed by using one each of five nouns, five adjectives, and five predicates). Each child was expected to decide on his own when he needed to prompt himself by playing the card on the Language Master and thus to hear the correct sentence for the picture on that card. Although most children showed that they could indeed learn to speak many French sentences in this fashion, wide individual differences were found in the way they prompted themselves.

Although both information seeking, as considered in this paper, and curiosity are related to the competence motive described by White (1959), a distinction needs to be made. As Berlyne (1960) has suggested, a critical feature of curiosity is that the exploratory behavior involved appears to be "unrelated to any goal or condition of reinforcement" (Fowler, 1965, p. 24). On the other hand, the information seeking activity in the present study clearly involved a purpose, the goal of obtaining certain specific information.

Information seeking may be viewed within the framework of prompting as used by instructional programmers (cf. Markle, 1969). It has been generally advocated that for teaching factual information, the most effective instructional program would avoid both underprompting and overprompting. For example, Anderson, Faust, and Roderick (1968) found college students learned far less from a heavily prompted program than one in which prompts

were used more sparingly and removed more rapidly. In a classic study, Gates (1917) showed the value of a high proportion of recitation (practice without looking at the textbook) in learning factual information. In the present self-instructional context, where the child makes the decision and not the programmer, information seeking is a form of self-prompting. The two errors in the use of an information source noted earlier are forms of under- and over-prompting, respectively.

It is not surprising that young children, far more than their older colleagues, adopt a direct trial-and-error approach (Munn, 1954) and thus fail to make use of available information. In fact, Weir (1964) found that for certain problems where a systematic approach was irrelevant, young children did better than older; the search for a more complex strategy, which developed with age, proved to be an interference.

However, there are wide individual differences in the way in which children seek information from their environment. Kagan, Rosman, Kay, Albert, & Phillips (1964) have identified a dimension of impulsivity-reflectivity in children. The impulsive child, "who does not reflect upon the differential validity of several solution possibilities is apt to implement mentally the first idea that occurs to him. This strategy is more likely to end up in failure than one that is characterized by reflection" (p.24). Repucci (1970) found that young children who become less involved with a toy, as measured by the time spent with it, are likely to be impulsive rather than reflective. He concluded that the critical variable is not whether the child has information but whether he is inclined to use it.

On the other hand, over-reliance on an information source, or over-promtping of oneself, may be related to an unwillingness to take risks. If a child fears failure, he will be less likely to take risks and

consequently may be expected to rely heavily on the information source. Gratch (1964), for example, studied the relation between the child's degree of independence, as measured by teachers' ratings, and the extent to which a child was willing to wager on his guesses in a card guessing task. There was no difference between the independent and the dependent children in the guesses they made, but the dependent children were much less likely to wager on their guesses.

In the first of the following studies, an effort was made to determine, for the particular task and materials selected, whether young preschool children would indeed learn more effectively by using an information source than by adopting a simple trial-and-error approach. In the second study, in order to reduce errors of over- and underprompting, the value of increasing the incentives was assessed. It seemed plausible that if children are rewarded for using the information source appropriately (i.e., only when they needed it), they would learn more effectively.

The Apparatus and Materials

For these two formative evaluation studies, a paired-associate task was involved; the child learned where each of nine different animals lived. A youngster met the instructional goal if he selected the appropriate picture of a natural habitat for each one of the animals. For example, for the picture of a seal he chose the picture of a rocky ocean coastline; for a monkey, he picked a jungle scene. Since the activity had the elements of a puzzle or a game, it was called "The Animal Game."

The apparatus consisted of a set of nine animal picture cards, a wooden box with a sloping top, and a reference book. Each of the animal

cards was laminated on a wood rectangle a quarter-inch thick, 3 x 4 inches in size. The nine pictures of the corresponding habitats, 4 x 6 inches each, were mounted on the top of the box in three rows, three pictures per row. At the bottom of each habitat picture was a keyed slot into which could be inserted for a quarter of an inch any of the nine cards. However, keyed strips on the back of the cards permitted only the correct one to pass through the slot into the box. When the child had "put all of the animals where they lived," he could retrieve the cards by pulling open a door at the front of the box and play the game again.

To permit the child to seek and obtain the information he needed for this activity, a picture reference book was placed on a stand beside the game box. Nine reference tabs at the side of the book, each one showing a picture of one of the animals, permitted the child to "look up" the habitat of any animal he wished. When he pulled a tab to open the book, he found the corresponding picture of a habitat. Thus, by simply matching he could place each animal card in the proper habitat slot.

To teach the child how to use this information resource, a separate orientation game was played. Here the child was given a simpler problem of finding the sleeping places of three different cats, each pictured on a card. Pictures of three baskets, colored red, yellow, and green, respectively, were placed along the bottom row on the box panel. The child looked up the proper basket for each cat by using another reference book with only three tabs. After the child mastered the task of locating and using this information, he was introduced to the more complex Animal Game.

Experiment I

Problem

A major problem for the first experiment of the study was to determine whether four-year-old children could use these materials to learn effectively within a reasonable time. While pretest information indicated that children of this age performed at almost a chance level, it was hoped that children who were taught to use the reference book appropriately would reach a 90% criterion (one error or less) on the posttest. It was also hoped that the game would be of sufficient interest to young children that they would frequently select this activity.

A second question in the study concerned alternative learning strategies. A child could, theoretically at least, master this task without using the reference book; since he always received immediate feedback for each card placement, he might adopt a simpler trial-and-error strategy and learn just as well. Consequently, the hypothesis was tested that, for these young children, a careful information-seeking strategy was more effective than a trial-and-error procedure, assuming that total time taken was the same. It was also hypothesized that the information-seeking group would prefer the activity more than the trial-and-error group.

Criterion tests

The performance test used for the pre- and posttest of this study was a multiple choice nine-item test. On each item, one animal picture was shown to the child along with three habitat pictures as choices. He was asked to point to the picture which showed where a particular animal lives. To maximize the difficulty of the test, the two distractors were the pictures judged to look most like the right answer. The use of this

test format, quite unlike the instructional setting, ruled out the effect of position learning; a child could not get the correct answer on the test simply because he remembered, for example, that "the giraffe goes in the middle picture."

To obtain information regarding preference for playing the game, a pictorial paired-comparison test procedure, previously developed by the project, was employed. This instrument consists of a series of pairs of pictures, portraying the experimental activity along with five activities commonly found in preschool settings. For each item on the test, the child chooses the one of two pictures which portrays the activity he prefers. If the experimental activity is preferred every time, the preference rank is 1; if all other activities are chosen instead, the rank is 6. A rank of 3 indicates that the child preferred the experimental activity to more than half of the regular school activities presented. In a previous study (Keislar, 1971), data from 28 four-year-old children revealed that the test has validity since there was a reliable correspondence between the child's choices of pictured activities and choices in real life of the same pursuits.

Subjects

Fourteen children drawn from two different Head Start classes were used as subjects. Eight of these youngsters were black and six were Mexican-American. Children were assigned at random to one of two treatment groups, a trial-and-error and an information-seeking group, with seven subjects in each.

Instructional Treatments

All testing and instruction was carried out on an individual basis in either a separate room next to the regular Head Start classroom or in a van just outside. With a few exceptions, children came for a session of 12 to 15 minutes each day over a four-day period.

Following the pretest, the children assigned to the information-seeking group were given the orientation game to teach the "look-up" strategy. The Animal Game was played nine times in all, three times per day for each of the three days prior to the posttest. During this nine-round series, the use of the reference book was gradually "faded." For the first four rounds, the children were expected to look up each animal in the reference book. For the next four rounds, the use of the book was optional; they were told that they could "use the book if they wanted to." On the last round, the book was removed and the game played with no help.

For the children in the trial-and-error group, the reference book was neither introduced for the orientation game nor for the Animal Game. During the first session with half of the subjects of this group, it was found that playing with nine cards at a time was entirely too difficult a task; it took too long for the child to find out where a particular card belonged. Consequently, the procedure was modified by limiting the number of cards to six at one time. This was done by covering up one of the rows on the panel and having the child find the habitats of only six animals for each round. A set of three of these abbreviated rounds, in which each of the three rows was covered for six trials, constituted the equivalent of two rounds played with nine cards. With this compromise, children in the trial-and-error group were still presented with every

alternative on the board. They thus had the same opportunity as the information-seeking group to learn the selection responses called for on the posttest. Since it took less time to place a card appropriately (defined as a trial) when the shortened form of the game was used, children in the trial-and-error group played their abbreviated version six times each on two days, a total of 72 trials, in comparison with the 54 trials of the information-seeking group. On the third day the trial-and-error group played the game three times, with six cards each time, and once with nine cards, for a total of 27 trials. Thus, for the last round, when some competence had presumably been acquired, the conditions were the same for both groups.

Observational Data

The children's behavior was observed during each instructional session. It was apparent that some children in the experimental group did not need to use the book for all four rounds. Two youngsters scoffed because they could already remember the habitat called for. "I don't want to look at that picture," said Kimberly. Sandy put it more explicitly, "I know where he lives; I can do it without the book." In such instances, of course, the experimenter allowed the children to make this decision for themselves. However, it is likely that many of the less expressive or more docile children dutifully used the book when they would have preferred not to.

Many children in the information-seeking group spontaneously verbalized their judgment about their own knowledge. Charles, one of the more verbal children, made frequent comments as he worked on the task: "I just know where the monkey lives," "I know where the alligator lives." And

(after an unsuccessful trial), "No." Derek verbalized the entire procedure himself by saying, "If you know where he lives, you don't need to use the book. But if you don't know, look it up."

While children generally seemed interested in coming and playing the game, there were exceptions. One youngster in particular never seemed to enjoy the task and found it hard to pay attention. Occasionally, nine games in a three-day period were too many for some children. For example, on the third day, Derek said to the assistant, "You really love these animals, don't you? Why do you keep playing this game so many times?"

Children in the trial-and-error group frequently paid no attention to the pictures being matched. Their concern, understandably fostered by the nature of the task, seemed to be primarily to find the correct slot. On the other hand, the information-seeking group seemed to spend more time looking at pictures, an act of observation which was necessary in order to locate and use the information available in the reference book.

Results and Conclusions

It should be noted first that the information-seeking procedure was fairly successful with these subjects. Although their pretest scores were at a chance level, five out of seven children using the book achieved at or above the 90% criterion on the posttest. The other two subjects made only two errors, just below the desired standard.

Although the trial-and-error group started out with a higher pretest mean than did the information-seeking group, as shown in Table 1, this initial difference between them is not significant and may be attributed to chance. On the posttest, however, the mean for the information-seeking

group was 8.3 as compared to 5.7 for the trial-and-error group. An analysis of covariance showed that the posttest difference in favor of the information-seeking group is highly significant ($F=15.6$, $p < .01$). The adjusted post-test means are 8.8 and 5.2, respectively. We may conclude that this group learned more than the trial-and-error group.

The results of the preference test revealed that over half of the youngsters in the information-seeking group gave the Habitat Game either first or second place in their choice of school activities; the mean rating was 2.4. Only one member of this group showed a low preference (a rank of 4) for the game. The findings suggest that the game, after three days of playing, holds the interest of the group as well or better than most of the other regular activities offered as alternatives.

While the trial-and-error group did not rate their preference for the game as high as the information-seeking group, the differences were not statistically significant. Although two of the youngsters in this control group gave the game a low rating, several others rated it high, bringing the mean to 3.2. On the average, even this group indicated a preference for the activity fully equal to other choices generally available in school.

Experiment II

Problem

In the second experiment, all subjects, after the initial orientation round, were given freedom to use the information source as they chose. To facilitate optimum use of the reference book, an incentive system was created in hopes that children would be encouraged to avoid wild guessing

and yet to make a try when reasonable mastery had been attained. The same criterion tests for performance and preference were used as in Experiment I.

The specific problem of this experiment was to evaluate the effect of a differential reinforcement system. The experimental subjects were reinforced only when they demonstrated learning, that is, when they made a correct response on the first attempt without using the reference book. For the control group, an indiscriminate reinforcement procedure was used; subjects were reinforced for completion of the task regardless of the number of attempts made or use of the resources.

Subjects

The children in this study were 10 Mexican-American youngsters, all four years of age, enrolled in Head Start classes. Five of these children were assigned at random to the differential reinforcement or experimental group and the other five to the indiscriminate reinforcement or control group.

Instructional Treatments

All children were tested in a van which was parked just outside the door of the Head Start classrooms. They came each day, one at a time, for a total of three days for the entire experiment. On the first day they were given a pretest, the orientation game, one introductory round of the Animal Game, and a second round of the game played under the treatment conditions. On the second day, the children played three more rounds of the game. The concluding session, on the third day, consisted of a final round followed by the posttest and the preference test. Each child therefore, after one introductory round, played the game a total of five

times under treatment conditions. Most children spent from 12 to 15 minutes per session.

During the treatment conditions, marbles were used as reinforcements; however, to avoid the policy of "giving prizes" to children, the subjects were not permitted to take the marbles home. As each marble was earned, it was dropped by the assistant through a tube into a box. The child picked it up and placed it in one of the hollow spaces on a wooden tray beside him. The spaces were arranged in rows so that, as he played, the row of marbles formed a bar graph to show continuously the amount of marbles he had earned (cf. Keislar, 1960; Lipe and Jung, 1971)

Children in the experimental group were reinforced only when they placed the card in the correct slot on the first try without using the reference book. This was exactly the performance called for on the criterion test. Every child earned at least one marble during the first treatment round and several per round during the rest of the sessions. The child was reinforced here for learning; he was highly unlikely to make the correct response unless he had learned. On the other hand, children in the control group were reinforced indiscriminately. Every time a child put a card in the correct slot, regardless of whether he prompted himself with the reference book or whether he had previously guessed wrongly, he received a marble. This meant that every control child received nine reinforcements per round. Theoretically, any child in this group could receive all of these reinforcements without learning any of the paired associates.

Results

In Table 2 are presented the means and standard deviations for the pretest, posttest, and preference ranks for the two groups. It will be noted that the performance of the differential reinforcement group was surprisingly low, a posttest mean of 4.6, as compared to a mean of 8.0 for the indiscriminate reinforcement group. An analysis of covariance, carried out to adjust for initial differences in the pretest, showed the difference to be significant at the .05 level (F=8.16) in favor of the control group. The use of special incentives appears to have failed in speeding better learning.

One purpose of the incentive system was to encourage the children to discard the use of the book more quickly. In Figure 1 are presented the graphs showing the average number of look-ups for each group for each of the six rounds of the game. During the last five rounds of the game, under the treatment conditions, the experimental group averaged 16.0 look-ups as compared to 13.4 for the control. It will be noted that the control group used the book consistently less than the experimental for the last four rounds. Although the reliability of the difference on this variable was not significant, there certainly was no evidence that placing a premium on becoming independent of the information source weaned these youngsters from the reference book any faster. If anything, it was the children with nothing at stake who appeared to become more willing to abandon the reference book.

Additional insights are found in the effects of such an incentive system when attention is given to the variance. The standard deviation of the number of times the reference book was used during the last five rounds

is 12.6 for the experimental group and 3.9 for the control. In the experimental group, the use of the book ranged from 1 to 35 times while in the control, scores ranged from 9 to 20. The difference between these variances is significant at the .05 level using a two-tailed test (F=10.3). Apparently the incentive system affected different children in different ways with respect to how much they used the reference book.

Discussion

The evidence gathered by these two experimental studies indicates that the self-instructional procedures devised for this game are not too difficult for these four-year-old children to follow on their own. The subjects readily used the information source to learn these paired associates when they were posed with this task. Furthermore, on the basis of results from a picture preference test, even after three days of experience they preferred the activity to most of the alternatives which are commonly found in their classrooms.

Results of the first experiment showed that, compared with the information-seeking strategy, a trial-and-error approach to the game constitutes an ineffective alternative. It seems important to consider what children are led to attend to and how they are reinforced for such attention. Children using the information source had to look carefully at the pictures in order to find the appropriate page; those in the trial-and-error group were able to obtain immediate reinforcement without such attention to the relevant cues.

The second experiment provides no support for the hypothesis that better learning results by reinforcing youngsters to avoid the two types

of errors: relying too much or too little on the reference book. The posttest results clearly favored the indiscriminate reinforcement group which was reinforced regardless of how many errors were made in reaching the correct answer.

In interpreting these findings, one might consider the possibility that the reinforcing event, receiving a marble, was ineffective for many children. This view, however, fails to account first, for the significant difference in a direction opposite to that hypothesized and, second, for the significant difference in the variation in the use of the reference book. A more plausible explanation of the results assumes that the incentives were, in fact, effective not necessarily because of the rewards in and of themselves but because they established a condition of social expectation. Children in the differential reinforcement group were clearly under social pressure to learn rapidly and do well; risks were involved. The challenge affected different children differently leading to a greater reliance on the reference book by some and less by others. For the group as a whole the interfering effects of the risk situation may have been relatively large. On the other hand, the children in the indiscriminate reinforcement group, in a more secure though less exciting atmosphere, may have been better able to attend to the task For most children such as those involved in this experiment, the best procedure may be simply to allow the information source to be used as often as the youngster wishes. The child may be the best judge of how much to rely on the book to accomplish the necessary learning.

In these two experiments, contrary to general practice in preschools, children were given no options as to how many times, if at all, they

played the game. Such an assessment of interest must await the introduction of the game into a classroom. However, the results of the picture preference tests in both experiments indicate that most of the youngsters, after three days of experience, prefer the activity to most of the alternatives which are commonly found in their classrooms. While a novelty effect undoubtedly inflated and the lack of free choice depressed these ratings, this information about the children's preferences for the game is reassuring.

BIBLIOGRAPHY

Anderson, R.C.; Faust, G.W.; & Roderick, M.C. "Overprompting" in programmed instruction. Journal of Educational Psychology, 1968, 59, 88-93.

Berlyne, D.E. Conflict, arousal and curiosity. New York: McGraw Hill, 1960.

Bland, M.; Keislar, E.R. A self-controlled audio-lingual program for children. The French Review, 1960, 2, 266-276.

Fowler, H. Curiosity and explanatory behavior. New York: MacMillan, 1965.

Gates, A.I. Recitation as a factor in memorizing. Archives of Psychology, New York, 1917, 6, No. 40.

Gratch, G. Response alternation in children: a developmental study of orientations to uncertainty. Vita Humana, 1964, 7, 49-60.

Kagan, J.; Rosman, B.L.; Kay, D.; Albert, J; & Phillips, W. Information processing in the child: Significance of analytic and reflective attitudes. Psychological Monographs, 1964, 78. (Whole No. 578).

Keislar, E.R. A descriptive approach to classroom motivation. Journal of Teacher Education, June, 1960, XI, No. 2, 310-315.

Keislar, E.R. Assessment of the four-year-old's preferences for school activities. Paper presented at NCME, February 5, 1971, New York City.

Lipe, D.; Jung, S.M. Manipulating incentives to enhance school learning. Review of Educational Research, October, 1971, 41, 249-280.

Markle, S.M. Good frames and bad. New York: Whiley, 1969.

Munn, N.L. Learning in children. Manual of Child Psychology (L. Carmichael, Ed.). New York: Whiley, 1954, 374-458.

Repucci, N.D. Individual differences in the consideration of information among two-year-old children. Developmental Psychology, 1970, 2, 240-246.

Weir, M.W. Developmental changes in problem-solving strategies. Psychological Review, 1964, 71, 473-490.

White, R.W. Motivation reconsidered: The concept of competence. Psychological Review, 1959, 66, 297-333.

TABLE 1

Pretest, Posttest, and Preference Score Means and Standard Deviations

Group [a]	Pretest		Posttest		Preference	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Information-seeking	2.6	1.4	8.4	0.9	2.4	0.9
Trial and error	4.0	1.8	5.6	2.1	3.1	1.5

[a] There were 7 children in each group.

TABLE 2

Pretest, Posttest, and Preference Score Means and Standard Deviations

Group [a]	Pretest		Posttest		Preference	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Differential Reinforcement	3.4	2.4	4.6	1.5	2.2	1.2
Indiscriminate Reinforcement	4.2	1.5	8.0	1.6	2.4	1.4

[a] There were 7 children in each group.

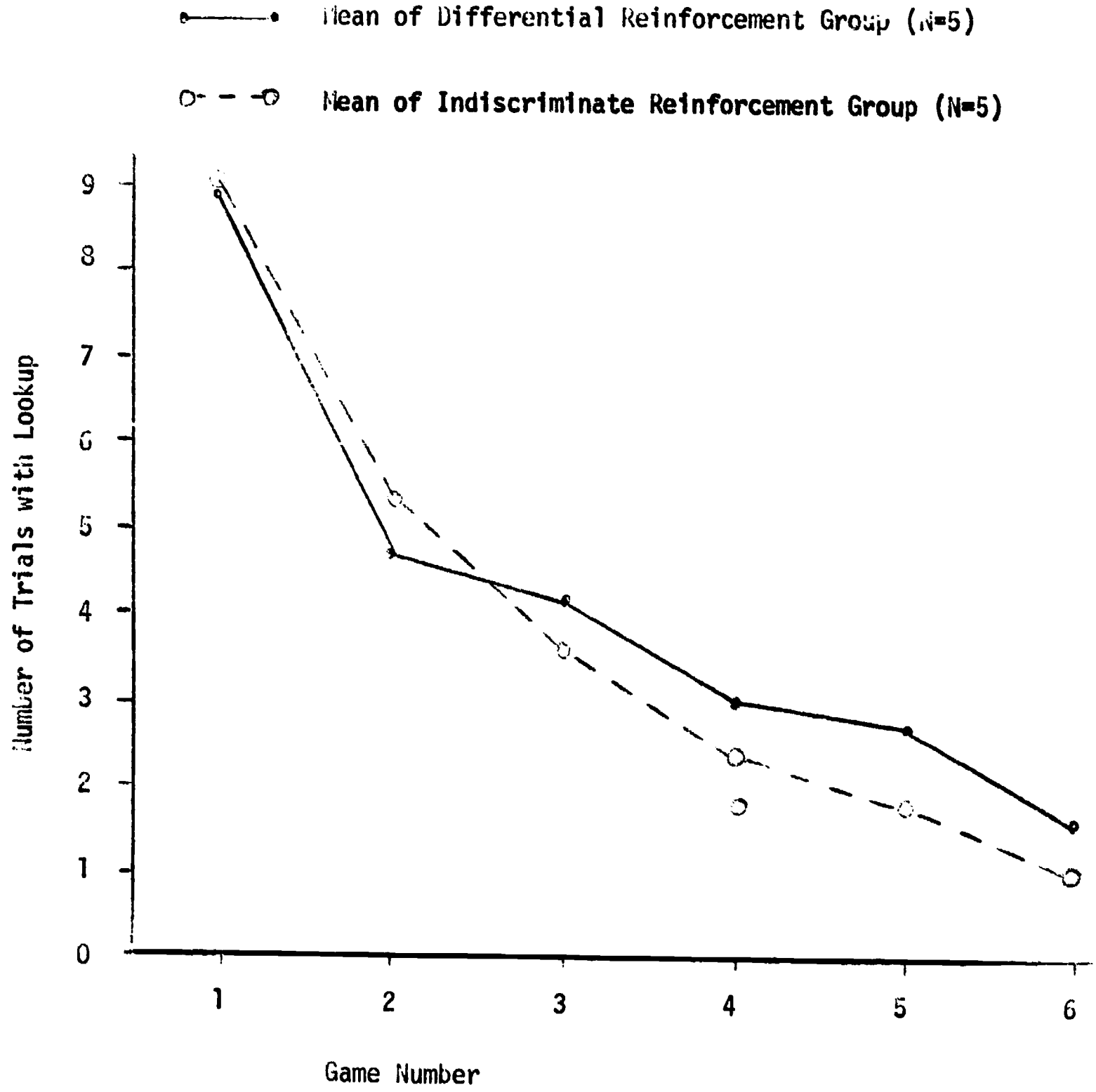


Figure 1. Mean Number of Trials Per Game where Reference was looked up for two groups.

General Instructions: Building the Equipment

The Box

The support of the box is made of 3/8" plywood, the top and sliding tray of 1/8" masonite.

Cut from plywood, according to specifications, A, B, C, D, G, J, & P.

In Panel A, cut a space for Door G and secure door in place with hinges. Glue together Panels A, B, C, & D. Then secure with small nails. Nail Supports J and P above Panels B and C.

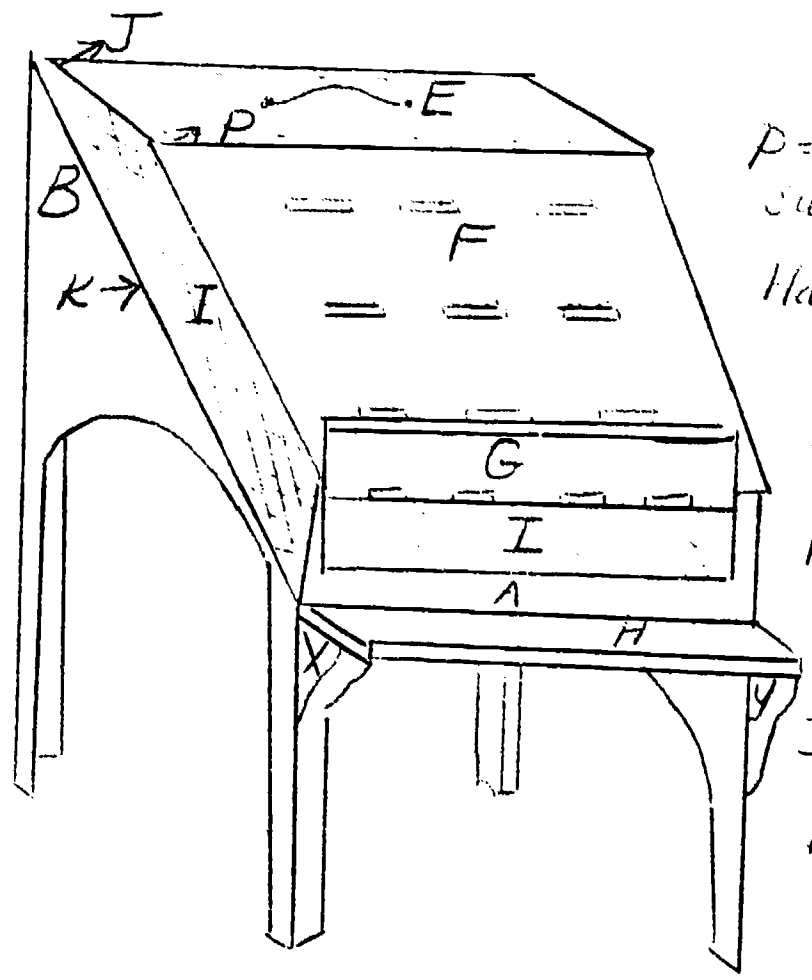
Cut from masonite parts E & F. Cut slots in F varying the 1/8" projections on each slot according to Card Key Chart. Glue E & F on basic structure and secure with small nails.

Cut from masonite part I. It should lie flush against Panels B & C and should fit through Door G.

Glue Panel I onto bottom of door opening and against Support J.

On the inside of Panels B & C glue cleats K. This will strengthen the support of Panel I.

Attach Braces X & Y to front legs of Panels B & C. Glue Shelf H onto Braces X & Y and secure with small nails. Place a small railing around Shelf H of masonite (1 1/2" x 21" and 1 1/2" x 2 1/4").



P = 1"x2" x 20"
supports E & F

Handle screwed to P through E

J = 1"x2" x 20"

K = cleat to support board I

I = Board - 20" x 20" rests 4" beneath F

Fig. 1 Cutaway & Open Door

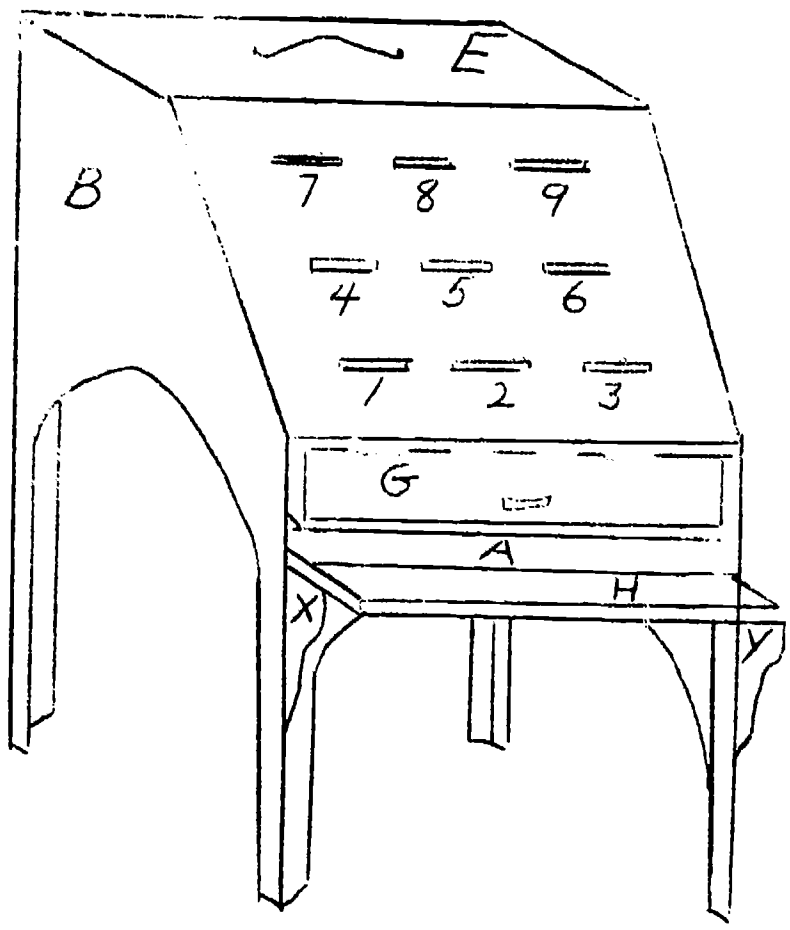


Fig. 2

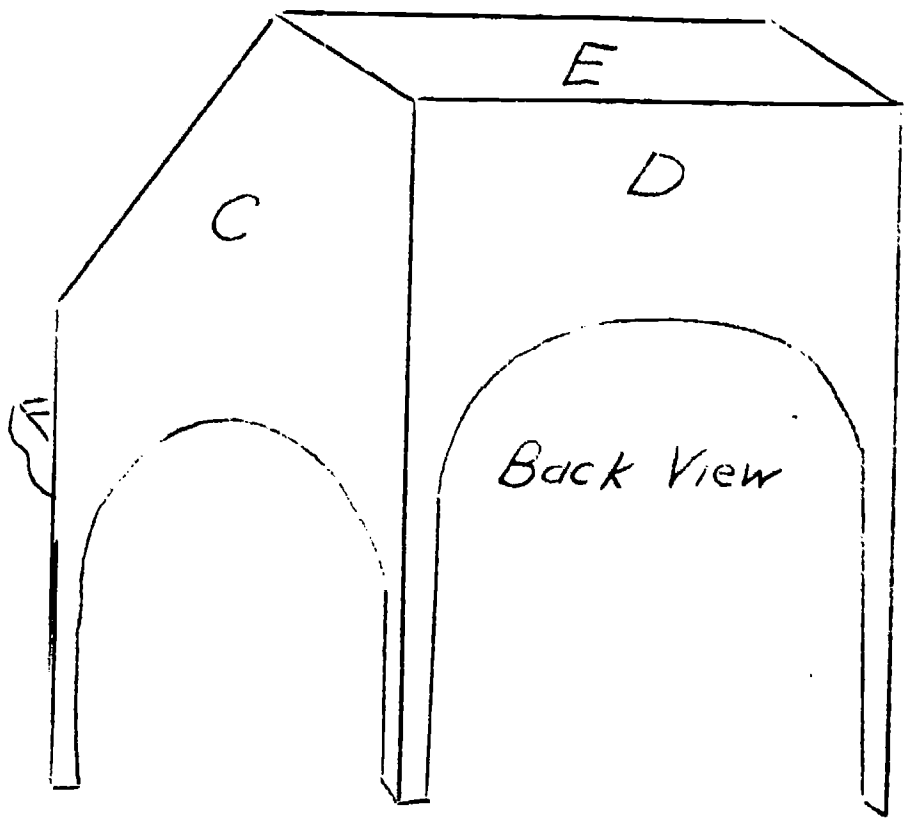


Fig. 3

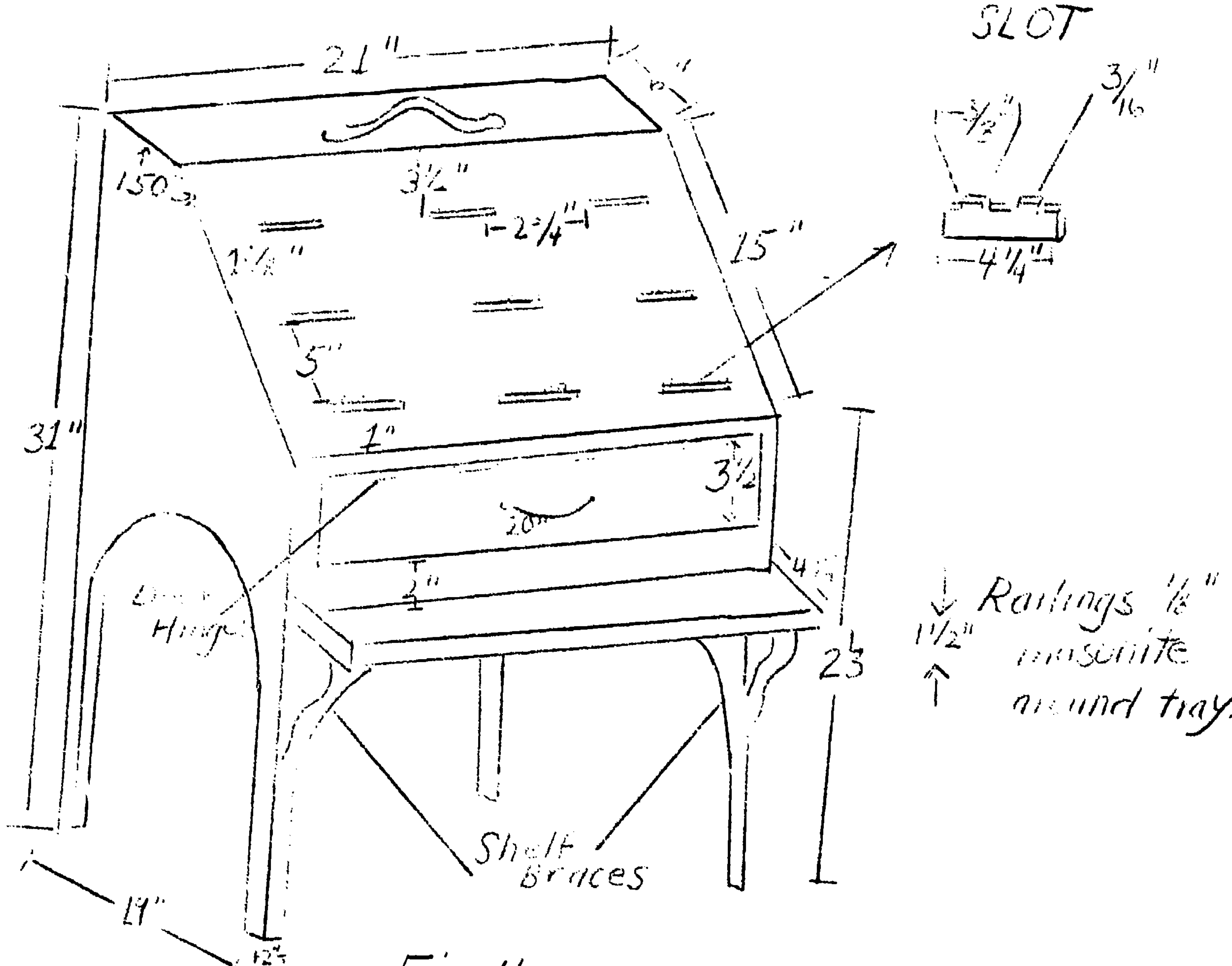

SLOT
21"
15"
31"
Shelf Braces
Railings 1/8" masonite around tray
23

Fig. 4

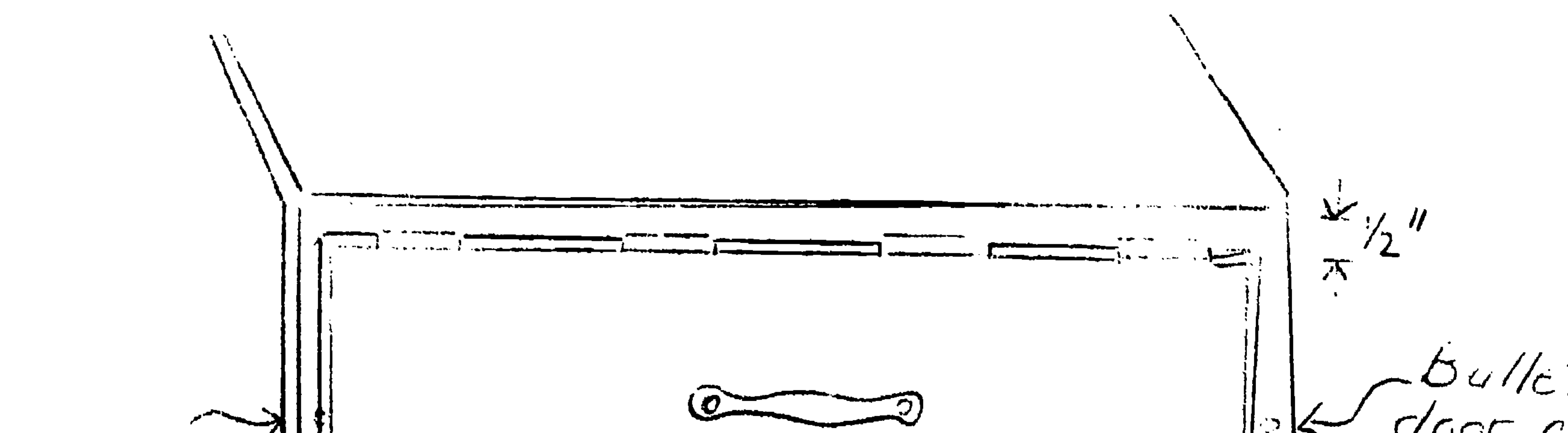

1/2"
Bullet door catch
3/8"

Fig. 5

The Cards

The cards are made of masonite.

Cut 18 masonite strips 1/4" x 2 3/4" and 9 cards. (9 strips will be called X and 9 called Y). Glue strips to cards according to dimensions on the Card Key Chart. The strips are glued flush with the top and 1/4" above the bottom of the card.

Cut 3 more cards and 6 more strips. Glue strips in the same positions as the first three cards on the Card Key Chart.

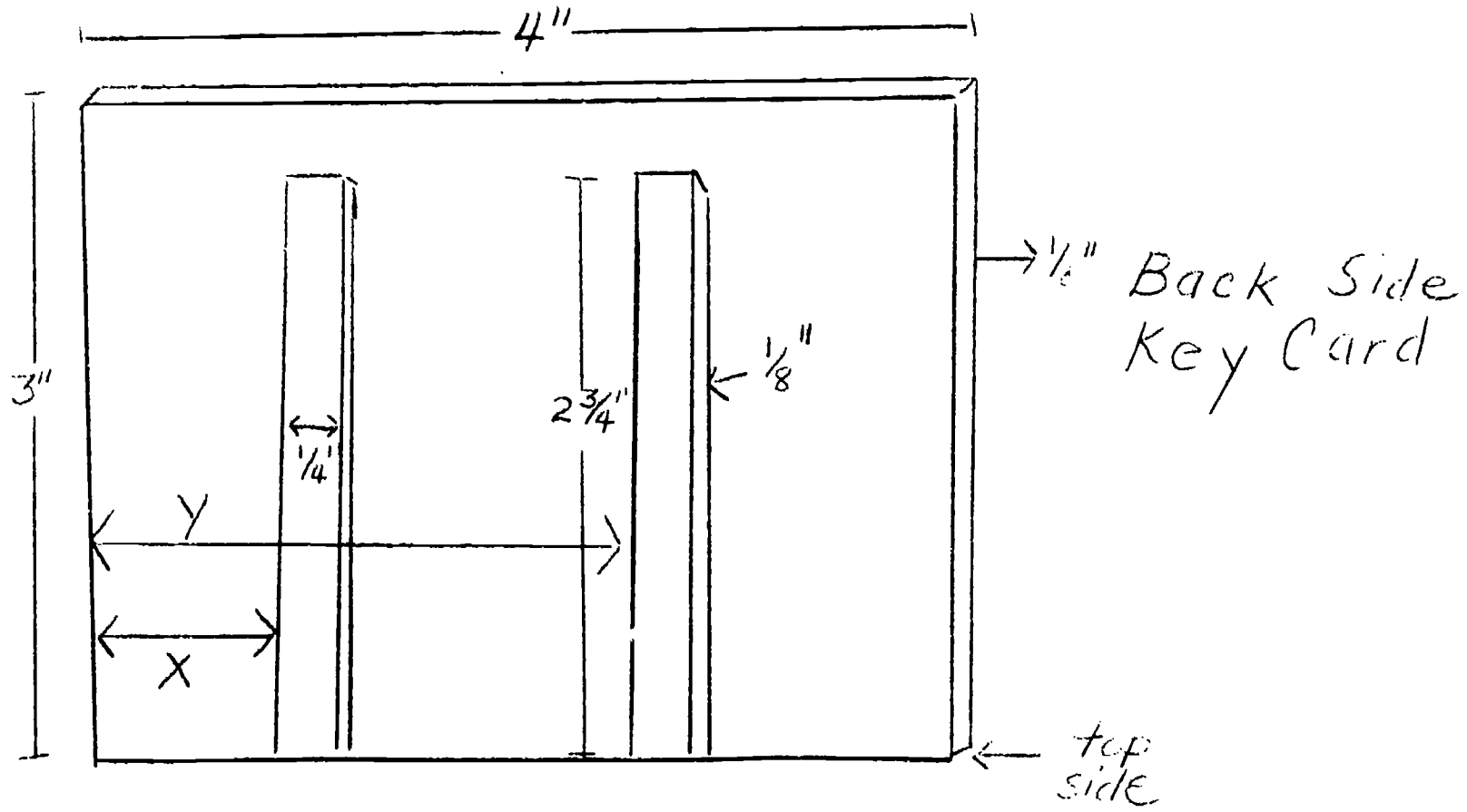


Fig: 6

Card Key Chart

number code	animal	x	y	number of cards	habitat
1	monkey	5/8"	2 1/2"	2	jungle
2	seal	3/4"	2 1/8"	2	rocky coast
3	beaver	1 3/4"	3 1/8"	2	beaver dam
4	giraffe	1/4"	2 1/8"	1	veldt
5	polar bear	1/4"	2 7/8"	1	arctic ocean
6	crocodile	1 3/4"	1 7/8"	1	swamp
7	deer	1 7/8"	2 1/2"	1	open forest
8	camel	1/4"	2 3/8"	1	desert
9	mountain goat	1"	2 1/8"	1	mountain scene

The slots in Figure 2 are numbered. They should be cut to allow the respective cards to pass through easily. Cards are keyed in such a way that the cards will not go in if they are reversed, anywhere on the top.

Habitat Pictures

Orientation Game:

Make 3 cat pictures to fit the 3" x 4" cards. Make 3 copies of each picture, then 2 copies of each reduced to 1 1/2" x 2".
Make a basket picture for the sloping top (4" x 6"). Make 9 copies.
Color a red stripe on 3 copies, a blue stripe on 3 and a green on the remaining 3.

Cover the sloping top with a sheet of thin cardboard. This may be colored railroad board. Center one copy of each basket picture over the 3 bottom slots (1, 2, and 3), so that the slot is 1/8" above the bottom of the picture.
Cut slots through the pictures and cardboard, carefully removing the notches.
Remove the cardboard from the box top. Cover the cardboard and pictures with a sheet of clear contact paper. Slice the length of the slots through the contact paper and fold in the excess to keep the layers together.
Cover one set of cards 1, 2, and 3 with one copy of each cat picture. Cut 3 pieces of contact paper 4" x 5". Cover the card and picture with the contact paper, cutting away the excess at the corners.

The Game:

Make 9 habitat pictures (where the animals will live) and 9 animal pictures. The habitat pictures should be 4" x 6" and the animals 3" x 4". Make 3 copies of each picture, plus 2 reduced copies of each animal picture (1 1/2" x 2"). Color the habitat pictures for clarity lightly with water colors, making the copies of each picture as uniform as possible.

Make another cardboard cover for the sloping top. Center one copy of each picture above the 9 slots on the coarboard cover so that the slot is 1/8" above the bottom of the picture and cut away slots with notches. Remove from box top and cover with a sheet of clear contact paper. Slice through the length of the slots and fold in the excess. Cover the 9 cards with a copy of each animal picture making sure that the animal will match the proper habitat. Cut 9 pieces of contact paper 4" x 5" and cover the cards and animal pictures, removing excess at the corners.

The Reference Book

Open 12 plastic document protectors. On both sides of each inside sheet of paper place a copy of the animal in his habitat (put the animal pictures on top of the habitat pictures, the cats on their baskets). Tape the protectors closed. Assemble the protectors into 2 looseleaf notebooks, the animals in one, the cats in another, with a sheet of paper between each protector.
Cut apart another plastic protector to make index tabs, using the reduced animal pictures on each side of the tab. Tape tab to the outside edge of the corresponding protector, each one 1 1/2" lower than the one before so that all 9 will be visible when the book is open to the first page. Cover the edges of the tabs with tape so the pictures will not fall out.