GO–NO GO DIFFERENTIATION TO VISUAL STIMULI IN CATS WITH DIFFERENT EARLY VISUAL EXPERIENCES

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In a previous paper (1) it was found that in cats deprived from birth of pattern vision with hoods, simultaneous object discrimination was dramatically impaired. In this paper go–no go differentiation is studied in such cats.

The specific details of the methodology have been elaborated previously (1). The experiments were performed on 13 cats bred in the laboratory. The 8-th day after the birth the eyes of 6 kittens were hooded by double sheets of linen (H cats). The other animals served as controls (N* cats; the asterisk indicates that cats reared in the laboratory are not completely normal, see 1). After 4 or 5 weeks of permanently covered eyes with the hoods, the H cats were placed for a half an hour daily in a play-box with the hood removed. Inside either two sticks of unpainted wood (cats Hs) or two ping-pong balls (cats Hb) were present (Fig. 1). Such training in the unpainted boxes lasted for 2 months, after which animals continued to be hooded, and they were subjected to go–no go differentiation training.

Fig. 1. The objects used in the study. S, a stick; V, the angle composed of two sticks; B, a ping-pong ball; VB, two ping-pong balls in vertical position; HB, two ping-pong balls in horizontal position.
The experimental apparatus consisted of movable starting box (50×54×42 cm), with a corridor of 150 cm in length, and a goal box (70×70×42 cm) in which food was presented (Fig. 2). The starting box was separated from the corridor by an opaque door and a translucent door. In a trial, first the opaque was lifted by hand, and after 5 sec the translucent door. The corridor was separated from the goal box by a translucent door which was controlled by a photoelectrical cell. When the cat was close to door, it opened automatically in the positive trial and the animal could enter the goal box and receive a small piece of raw meat. Then the starting box was carried to the free end of the goal box, the door separating the two boxes was opened so that the cat could enter the starting box which was carried back to its proper place, and a new trial could begin.

During preliminary training the cat learned to run through the corridor to receive food. In the training proper a visual stimulus was hung in the goal box before each trial. There were two positive objects, a stick (S) or ping-pong ball (B), and two negative objects, the angle composed of two sticks (V) or two ping-pong balls close together (Fig. 1). Sessions with stick objects and ping-pong ball objects were presented in alternation. In some experimental sessions the two ping-pong balls were in a vertical position (VB), while in others they were in a horizontal position (HB). Each cat was trained with two pairs of objects: S vs. V and B vs. VB or B vs. HB. In each session 12 trials were given, 6 positive and 6 negative in random order. The intertrial intervals were about 1 min. When the negative stimulus was presented, the cat had to stay in the starting box. The goal-box door was blocked so that the cat was not allowed to enter the goal box.

At the beginning of training, all animals run until the end of the corridor immediately after the translucent door was opened, independently of the stimulus. In the negative trials the cat usually bumped their head against the closed goal-box door. Then most cats became more cautious and slowed their running speed before that door. In the

Fig. 2. A scheme of the apparatus. S, starting box; C, corridor; G, goal box; atd, automatic opened translucent door; od, opaque door opened by hand; td, translucent door opened by hand; f, photoelectric cells.
first phase of training on the negative trials, the animals tried to enter
the goal box by scrapping and hitting the plexiglass door or climbing it.
Then they retreated and later returned to reach the goal box. They were
usually very reluctant to return to the starting box and had to be encour-
gaged to do so. Gradually after a number of sessions, the cats learned to
suppress their runs in the presence of negative stimulus objects. They
entered the corridor more slowly than on positive trials, stopped half
way or a few centimeters before the plexiglass door and returned to the
starting box (such behavior was accepted as correct). Unfortunately, all
animals except one failed to stay in the start box when the negative
stimulus was presented. The criterion of training occurred when an ani-
mals made 33 correct runs during three consecutive sessions (36 trials).
When the criterion was reached on one differentiation task, the training
on this task was discontinued while training on the other task continued
every day.

Two experiments were performed. In the first, 4 hood-reared cats
and 5 control cats were trained in two tests: S vs. V test, and B vs. VB
test; while in the second experiment 2 hooded cats and 2 control cats
were trained in S vs. V test, and B vs. HB test. In the first experiment,
the control cats mastered the S vs. V task very easily but they were
quite helpless in the B vs. VB task; they were not able to reach criter-
ion even within 500 trials. The same was found for hood-reared cats.
For this reason the B vs. VB task was considered inappropriate. In the
second experiment, the control cats mastered both tasks, S vs. V and B
vs. HB, almost in the same time. Altogether 6 hooded and 7 control cats
were trained in the S vs. V and only the results of this part of the ex-
periment will be reported here.

The results of the S vs. V training in control and hooded animals
are shown in Table I. There was a great difference in the performance
of the animals in both groups. Among the control cats all but one reach-
ed criterion in less then 200 trials. Cat 43, which did not reach criterion
after 200 trials, reacted above the chance level nevertheless and solved
the task in the additional 40 trials. In contrast, all animals in the hooded
group except cat 36 failed to reach criterion after 200 trials and made
incorrect responses on all negative trials. The pretraining in the play-
boxes (with stick or ping-pong ball) did not seem to have any effect on
the differentiation training.

Three H cats were then trained in a simpler test in which the ne-
gative stimulus was removed and the object had to be discriminated
from no object (see 1). In this condition the animals were able to solve
the problem. Moreover, when we returned to S vs. V task after this
additional training, the animals were able to easily master it.
Numbers of trials and errors in differentiation training. Numbers of trials lower than 200 are trials to criterion. Hs, hood-reared group with stick pretraining; Hb, hood-reared group with ping-pong ball pretraining; N*, normal group

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<th>Group</th>
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The main result of this study is that in cats deprived of pattern vision (except time spent in the play-box), go–no go differentiation is seriously impaired. The impairment is perhaps as strong as that in the simultaneous object discrimination task described in the previous paper (1). The present results suggest that the impairment of simultaneous object discrimination cannot be explained as a result of a deficit in the spatial orientation of hood-reared animals.

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REFERENCE


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