The Protestant Ethic Effect with Children in Multi-Choice Environment

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Linda V.

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THE PROTESTANT ETHIC EFFECT
WITH CHILDREN IN A MULTI-CHOICE ENVIRONMENT

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Master of Arts

by
Linda V. Brunick
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THE PROTESTANT ETHIC EFFECT
WITH CHILDREN IN A MULTI-CHOICE ENVIRONMENT

Recommended (Date)

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Approved July 29, 1974

Dean of the Graduate College
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Nineteen first graders were placed in a four-choice situation which allowed investigation of the "Protestant ethic effect" (PEE). The S's task was to obtain tokens which could be traded for toys and candy. Tokens were available from any or all of the following quadrants (Q): (Q1) a location where the S was allowed the option to manipulate a toggle switch and/or obtain freely accessible tokens, (Q2) a location at which tokens were freely accessible, and (Q4) a work location in which the S received tokens contingent upon the operation of a toggle switch. A record of the number of tokens obtained at each of these choice locations revealed that Ss demonstrated a strong preference to obtain tokens at the work location (Q4), where 80% of all tokens were earned.

The number of manipulations of the switches was also recorded for each S. Ss had the option to manipulate two toggle switches at previously described quadrants (Q1) and (Q4) and at an additional location (Q3). Ninety-four percent of all manipulation of switches was performed at the work location. The Ss' preference to earn tokens by manipulation of toggle switches rather than obtain free tokens was explained in terms of "competency," an organism's need to actively control the environment.
Chapter 1

Review of the Literature

Researchers have coined the term "Protestant ethic effect" (PEE) to describe an organism's preference to work for reward rather than obtain the identical reward without work. Although work has been specifically defined by each of the researchers, it is typically a motor activity such as barpressing, whereby the organism may earn a reward. In addition to obtaining reward in the work situation, the organism has the option to "freeload," or receive the identical reward without work demands. Usually the reward is food, and the organism has the choice of working for food (via the barpress) or freeloading (eating from an accessible food cup).

PEE research has revealed that in many cases the organism will work for reward rather than freeload for the same reward. These findings seem contrary to logic and certainly conflict with Hull's least-effort principle. Nevertheless, the findings suggest that organisms do sometimes prefer to work when the rationale for doing so cannot be explained in terms of tangible reward. Because the PEE was an unexplored phenomenon in the study of behavior, the initial aim of investigators was to determine if findings which supported the PEE could be replicated. The first
studies reviewed in this paper are those which were fundamental in exploring the existence of the PEE.

Havelka (1956) was the first to suggest that lower animals as well as humans may prefer to "work" for reward. In his research 50 rats were trained in two situations. One situation involved a maze which was a direct route to the food-goal. The other situation was a longer, more complicated maze in which the location of the food-goal was varied from trial to trial, and the rat had to search for the food on each trial. Havelka found that one-third of the rats chose the shorter, direct route; one-third chose the longer and more complicated, variable route; and one-third showed no decided preference. He also found that the group which chose the variable route would change to the direct route only when the food was fixed in one position and was no longer varied on each trial. Havelka explained these findings in terms of an intrinsic reward found in problem solving for the rats.

Following Havelka's research (1956), Jensen (1963) also hypothesized that rats may actually prefer to work rather than freeload for food. He placed 200 food-deprived rats in a bar- press training situation and in another situation where they could eat freely from a food cup. The rats were trained on 40, 80, 160, 320, 640, or 1280 reinforced responses to the barpress. Following the training sessions the rats were placed in a two-choice situation in which they could eat freely from a food cup or obtain
identical food by barpressing. Jensen reported that there was in
general a linear trend between the amount of barpress training
and the number of barpresses that were made during the testing
situation. That is, the more barpresses the rat made in training
to receive food, the more barpresses he was likely to make to
obtain food during testing. In the test situation all rats did bar-
press for a portion of the food they ate, although the barpress
ratio was considerably greater for some than for others. The
group which received 1280 reinforced trials, barpressed for
approximately 75% of the food they ate. The explanation that
Jensen gives to account for these findings is that the barpress
had an intrinsic appeal for rats.

Leung, Jensen and Tapely (1968) used a different mode of
work in their study. Instead of defining work as barpressing,
Leung, Jensen and Tapely defined work to be running to a goal
box. They trained 120 rats to run to a goal box on a runway to
obtain a single food pellet. One-half of the rats were trained
with 75 reinforced trials and the other half were trained with
285 reinforced trials. Following this training, food pellets were
placed in the starting box for the subsequent trials. The findings
were that rats which had been reinforced more during training
would freeload more before running to the goal for food. The
researchers explained these results by saying that different
operants have different amounts of intrinsic appeal and that the
runway has less intrinsic appeal for rats than does the barpress. These findings were replicated in a follow-up study by Jensen, Leung and Hess (1970).

Based on the research with rats, Singh (1970) attempted to explore the PEE using children as Ss. In his study with 32 boys (age 66-68 months) and 28 girls (age 65-77 months) he used an apparatus and procedure similar to that used in his research with rats (Singh, 1970). A wooden box large enough to house an E was used to dispense marbles. The children received preliminary training to instruct them that marbles could be obtained either by barpressing for them or by waiting for them to be dispensed by the E. The children were then randomly assigned to two groups, half beginning on the "work" side and the other half on the "no-work" side of the apparatus. Those Ss beginning on the work side later received marbles on the no-work side at an average rate at which they had received them previously while working. The Ss beginning on the no-work side received marbles at a rate of one every three seconds. The children were then instructed to get as many marbles as possible (which they could keep or trade in on a variety of toys), and that they could do this by moving to either side of the machine whenever they preferred to do so. Singh recorded the number of marbles obtained by each child on the work and the no-work sides of the machine for 5 minutes a day for 2 days. It was found that
both boys and girls obtained significantly more marbles by "working" than by "freeloading."

As more evidence was gathered which supported the existence of the PEE (Havelka, 1956; Jensen, 1963; Singh, 1970), attention turned to the investigation of variables which influence the PEE. Prior conditioning is one of these variables. Jensen (1963) hypothesized that rats barpress for food in the presence of free food as a function of their prior conditioning to barpress. In order to further examine the effect of prior conditioning, Singh (1970) considered Hull's (1943) concept of habit strength. That is, Singh considered the possibility that animals barpress for food rather than eat free food because the habit strength for barpressing may have been higher than the habit strength for eating freely. In order to rule out this possibility, Singh devised an apparatus which was divided into two sections. In one section there was a barpress and in the other there was a free food dispenser. Each day for 10 days half of the rats were randomly selected for barpress training and half were selected to receive free food. The amount of free food (which was dispensed one pellet at a time) each rat received depended upon the amount of food previously earned on the work side. Following this training, the same apparatus was used, but the partition was removed, thus allowing the rat to move from the work to the no-work section at will. Each rat was placed in the middle of the apparatus and
a record was made as to the number of times a rat ate from each side. In this study work was defined as a barpress by a rat. The results indicated that rats tended to obtain significantly more food from the work side than from the no-work side. Thus, Singh concluded that the tendency to work rather than freeload cannot be explained by habit strength alone. A second variable explored by Singh was that rats barpressed in the previous experimental situation because they could obtain food pellets faster than they could receive free food based on a previous rate of responding. Singh used the same procedure as before but employed a fixed interval schedule in which one response was reinforced after a 30 second interval. On the free side food was dispensed at the rate of one pellet every 30 seconds. By this procedure the rats could not receive food pellets faster on the work side than on the free side. Once again, however, Singh found that when given a choice, rats showed a preference to barpress rather than to eat freely.

Another possible explanatory variable was explored by Carder and Berkowitz (1970) who hypothesized that the findings of the PEE may depend upon the intensity of the work demands. Rats were trained to barpress and then placed on a FR 2 schedule or a FR 10 schedule. Carder and Berkowitz found that on the FR 2 schedule rats would earn a significant amount of their food by barpressing even though they had not been allowed to eat freely during training.
However, when the work schedule was FR 10, the rats demonstrated a decided preference to freeload rather than work for food. Thus, the researchers concluded that "... when work demands are not too high, rats prefer earned food to free food [p. 1274]."

The effect of a conditioned reinforcer on the PEE has been investigated by Davidson (1971). In his study four rats were trained on a FR 10 schedule of reinforcement for 56 sessions. When the chamber light was on, barpressing was reinforced on a fixed ratio schedule. No reinforcement could be received when the light was off. After the training sessions, free food was placed inside the chamber, and the rats ate the free food only when the chamber light was off. However, when the light was on, the rats continued to barpress for food. Thus, Davidson concluded that barpressing in the presence of free food is not solely based on intrinsic appeal of the barpress as suggested by Jensen. Barpressing was found to be directly related to the conditioned reinforcer in this situation.

Alferink, Crossman, and Cheney (1973) have reported findings which further support Davidson's interpretation of the PEE in terms of a conditioned or secondary reinforcer. They trained two pigeons on a FR 300 schedule. After pecking a lighted key 300 times, the hopper key went dark, the light came on, and grain became accessible for 3 seconds. When free food was available to them, the pigeons would continue to peck at the
lighted key for food at a slightly lower rate. However, when the lighted key was not on, the pigeons ate the free food. Alferink, Crossman and Cheney felt that these results indicate that "... the hopper light was a potent conditioned reinforcer. ..." and it was this conditioned reinforcer which "... maintained and reestablished responding in the presence of free food [p. 39]."

The influence of deprivation on the PEE has been investigated by Tarte and Snyder (1972). They hypothesized that operant responding for food is directly related to amount of deprivation. In their study 28 rats were allowed to eat freely from a dish for 3 days and then trained to barpress for food on the following 6 days. After this initial training phase, rats were assigned to one of seven groups. Each group was deprived of food for 0, 12, 24, 36, 72, or 92 hours before they were placed in the experimental situation. Tarte and Snyder found that there is a direct relationship between the amount of deprivation and the amount of barpressing. That is, the longer a rat was deprived, the more food it obtained by barpressing.

Stephens, Metze and Craig (1974) offer "competency" rather than simply manipulation as an interpretation for the PEE. These researchers placed eight experimentally naive albino rats on a 23-hour food deprivation schedule for 2 weeks. These animals were then shaped to barpress during four 30-minute sessions, after which they were allowed to eat free food in their home cages.
for 20 minutes. Pretraining and training was succeeded by 10 days of experimental choice testing. The four choice situations were as follows: (1) a functional food bar where one barpress dispensed one food pellet, (2) a nonfunctional bar and food dish, (3) a nonfunctional bar, and (4) a free food cup. Each rat was placed equidistant from these four choice situations. After 20 minutes of choice testing, the animals were given access to free food. Stephens, et al. found that even when these rats were able to obtain free food and engage in the activity of the barpress alone, they did not choose to do so. Instead they chose to barpress for a great majority of the food pellets they ate. These researchers hypothesized that rats will barpress for food in the presence of free food because of the animal's need to actively manipulate and control the environment. This is a theoretical extension of White's (1959) concept of "competency" which deals with an organism's need to control the external world in which he lives. Stephens, et al. reason that "...Ss 'work' when given the choice between working and freeloading because by working they exercise greater control over the environment [p. 2]." In this particular study, work was defined to be the organism's control over his environment, which was obtained by manipulation of the barpress.

The concept of competency as presented by Stephens, et al. (1974) may be consistent with findings of earlier researchers. Jensen (1963) supported the existence of the PEE by finding that
rats would choose to barpress for food rather than obtain identical food from a free food cup. These results could be explained in terms of competency rather than intrinsic appeal of the barpress. By barpressing for food, a rat maintains greater control over his environment than by eating freely accessible food. Likewise, the competency hypothesis could be used to explain the results of Singh's research with children (1970). The children may have preferred to barpress for marbles instead of attaining them freely because the barpress allowed them a certain amount of control over their environment.

In conclusion, research has repeatedly supported the existence of the PEE (Havelka, 1956; Jensen, 1963; Singh, 1970; Stephens, Metze & Craig, 1974). Findings have been that under the proper conditions an organism will prefer to work for reward rather than freeload for identical reward. Various explanations have been posed for this seemingly illogical behavior, but to date there have been no widely accepted theories which explain the PEE. A recent theory set forth by Stephens, et al. (1974) explained the PEE on the basis of White's (1959) concept of competency. Their theory was supported by research (Stephens, et al., 1974), and can be used to explain earlier Protestant ethic studies such as those by Jensen (1963) and Singh (1970). At the present time, however, no further attempts have been made to explore competency as a rationale for the PEE.
Chapter 2

Statement of the Problem

The primary purpose of the present study was to determine if competency could be the rationale underlying the existence of the PEE with children. In order to investigate the competency hypothesis, a modification of the four-choice procedure designed by Stephens, et al. (1974) was employed. This procedure was used to determine if children "work" in order to manipulate or to control their environment. These two variables cannot be studied independently using the traditional two-choice situation which allows the organism only the options of working or freeloading. In studies such as these an organism can only control the environment by means of manipulation, and it is not possible to determine if control or manipulation was a factor in the organism's preference to work. By using the two-choice situation, Singh (1970) was able to conclude that children prefer to manipulate the environment via the barpress, but he was not able to draw any conclusions concerning a need to control the environment. However, by using the four-choice situation in the present study, it was possible to explore the issue of whether a child "works" to manipulate the environment or to control it. Thus, competency was utilized as a possible rationale for the PEE in children.
The four-choice situation designed by Stephens, et al. (1974) was modified in the present study for use with children. Work was defined to be the manipulation of a toggle switch, available to each S at three of the four choice locations as a means of reinforcement.

The general hypothesis under investigation in this study was that children will seek to actively manipulate and control their environment (via the "work" situation) rather than obtain identical reward without controlling the environment. More precisely, two dependent variables were examined. The first dependent variable can be defined as the number of tokens obtained from each of the three possible choice locations. It was hypothesized that the Ss would obtain significantly more tokens by working for them than by freelancing. That is, the Ss will earn more tokens at the work location than at the two alternate locations.

The second dependent variable which was studied was that of manipulation, which was defined as the child's operation of either of the two switches located at three of the four choice locations. It was expected that Ss would manipulate switches significantly more at the work location than at alternative choice locations.
Subjects

The Ss for this study were drawn from an elementary school in the South Central Kentucky area. Nineteen first graders from the Bowling Green Independent School District were selected to participate. These children range in age from 76 months to 92 months and there were nine males and ten females. The majority of these children were from a low income, inner city environment.

Apparatus

The apparatus was a 43'' x 48'' space. This space was constructed from a piece of plywood which was mounted in a vertical position. The plywood was divided into quadrants (Q) with each Q containing one of four choices. The choices were as follows:

1. In approximately the center of Q, a 2'' x 2 1/2'' rectangular opening was cut in the plywood. Behind this opening an aluminum tray was secured to the back of the plywood, and the tray was filled with 50 plastic tokens. Centered 2 inches below the tray of tokens were two single pole, double-throw and center-off toggle switches. The bases for the two switches were mounted on the plywood approximately 3 inches apart.

2. A tray of
50 tokens identical to that in Q₁ was located in Q₂. The location for both trays within their respective quadrants was the same.

(3) Two toggle switches (identical to those described in Q₁) were mounted in Q₃. The location of the switches of Q₃ was comparable to those described in Q₁. (4) Q₄ contained an aluminum tray (without tokens) and two toggle switches, all mounted in a similar manner to the identical pieces found in Q₁. A token dispenser mounted to the back of the apparatus allowed tokens to be dispensed contingent upon operation of either of the two switches within Q₄. (See Figure 1.)

Procedure

The nineteen Ss were selected in a random order to undergo an individual training session which was followed by individual choice testing. The E escorted each S in turn into a room which contained the four-choice apparatus to be used in choice testing. A standard set of instructions were then read to the child.

See what I have here? It is a big board, and on it I have some things for you to do. Will you please come over here and kneel beside me? (The S was situated so that his eyes were approximately focused on the center of the board.) First, I want you to look here (E pointing to switches at Q₁) at these two switches. See this switch moves up and down (E demonstrating) and this switch moves sideways (E demonstrating). Now I would like you to move both of these switches for me. Next I would like for you to look over here (E pointing to Q₂). There are no switches. Now look here (E pointing to switches at Q₃). There are two switches. Can you move both of them with your fingers as you did before? Look (E pointing to Q₄), here are two switches that you can move with your fingers. When you move this switch up and down a token will come out (E demonstrating) and when
FIGURE 1

Apparatus for Choice Testing

Q₁  Q₂
  xx

Q₄  Q₃
  xx  xx
you move this switch sideways a token will come out (E demonstrating). Will you now try these two switches for me? (E then held out tokens for S to examine them.) See, we call these tokens. You may get tokens here (E pointing to Q₁) or here (E pointing to tray at Q₂) or here (E pointing to tray at Q₂).

After this demonstration the S was taken into an adjoining room. On a table in this room there was a variety of toys and candy on display. The S was allowed to view this assortment for 30 seconds and then instructions were continued as follows:

Sometimes we let children trade in tokens that they get from the board in the next room for a prize from this table. Would you like to try that?

The S was then taken back to the apparatus and asked to kneel in front of the board as he had previously in training. Then the following instructions were given:

I would like for you to kneel here and use any part of this board that you like. I will be right outside in the hallway for two minutes, and when two minutes is up, I will come back to get you. Then I want you to show me how many tokens you have gotten from the board, and we will trade them in for a prize from the table in the next room. Now, do you understand? I will be back in just a little while to get you. Go ahead now.

The S was left alone for a two-minute period in the choice testing situation. The number of tokens obtained at each location and the number of times each switch was moved was recorded for each S.
Chapter 4

Results

During choice testing the 19 Ss earned 80% of their tokens at Q₄ and the remaining 20% at Q₁ and Q₂. Sixteen of the 19 Ss obtained at least 90% of their tokens from Q₄, and 14 of these Ss obtained tokens exclusively from this work location. Table 1 shows the preference demonstrated by each of the Ss for choosing tokens from the work location rather than alternative locations Q₁ or Q₂.

There was also a decided preference for Ss to manipulate switches at Q₄ rather than at the other locations. Ninety-four percent of all manipulations were performed at the work location, while only 6% of the manipulations were performed at Q₁ and Q₂. Ten Ss chose to manipulate switches only at the work location. The overall preference for the Ss to manipulate the switches at the work location can be seen in Table 2.
<table>
<thead>
<tr>
<th>S</th>
<th>No. of tokens obtained at choice location Q₁</th>
<th>No. of tokens obtained at choice location Q₂</th>
<th>No. of tokens obtained at choice location Q₄</th>
<th>% of tokens obtained at work location Q₄</th>
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**TABLE 2**

Manipulation of Switches

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<th>S</th>
<th>No. of Manipulations at choice location Q₁</th>
<th>No. of Manipulations at choice location Q₂</th>
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<th>% of Manipulations at work location Q₄</th>
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<td>11</td>
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Total % 4 2 94
Chapter 5
Discussion

The findings of the present study indicate that children prefer to earn tokens rather than obtain free tokens. Thus, the results of this study are consistent with Singh's (1970) postulation of the PEE with children and animal research which supports the existence of the PEE (Havelka, 1956; Jensen, 1963).

By employing the four-choice paradigm utilized by Stephens, et al. (1974) it was possible to determine that manipulation of toggle switches was preferred at the work location, although identical means of manipulation was available to Ss at two other choice locations. The results demonstrate that the Ss did not chose to manipulate the switches just for the sake of manipulation, but that Ss apparently chose manipulation as a means of environmental control. Similar findings were obtained by Stephens, et al. using rats in the four-choice situation. The competency hypothesis utilized by these researchers to explain their findings offers the most reasonable explanation for interpretation of the present findings. That is, the children's preference to manipulate switches at the work location could be based on a need to control the environment. The work location afforded each child the opportunity to control
his environment by allowing him to obtain reward contingent upon his own behavior. The two other manipulation alternatives allowed (1) only manipulation, or (2) manipulation and non-contingent reward, neither allowing the child control of his world. Therefore, it may be that the children's preference to manipulate switches at the work location is based on their need for competency.

The present study is consistent with previously cited PEE research which has demonstrated that an organism's preference to work rather than freeload cannot be explained in terms of tangible reward contingencies. However, the competency hypothesis suggests that the work situation in PEE research does have a rewarding aspect which has been overlooked in the past. That is, the work situation allows the organism to actively control his environment. It is proposed that it is this reward which can be used to explain the PEE.

The PEE is a phenomenon which is relatively unexplored, especially as it exists with children. If it is a behavior which can be understood in terms of competency, it would seem that it is a most critical concept for future research.

The possibilities for extending the findings of the present study are without limitation. However, the study of the PEE across various socio-economic classes appears to be one of the most valuable in terms of practical application. It may be that
the PEE does not generalize across socio-economic levels.

Research which would explore this idea would yield insight into the study of individual differences in children as well as further extend PEE research.

If the procedure of this study is employed in future research, certain factors should be considered. In this study, the quadrant position for each of the four choice locations was assigned at random preceding choice testing for all Ss. Better control would be obtained if the four choice locations were positioned at random prior to choice testing for each S. Another means of improvement would be to design the apparatus used in choice testing in such a manner that the S could not gain access to the rear of it. Mounting the apparatus on a wall would be one method of eliminating this potential problem. Due to certain practical limitations in the present study, Ss who had undergone choice testing were free to associate with those yet to undergo the test. This is a probable source of contamination which should be avoided in future research.
References


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