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Behavioral Paradigm for a Psychological Resolution of the Free Will Issue

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This study provides data for a behavioral paradigm to resolve the free will issue in psychological terms. As predicted, college students selecting among many alternative responses consistently selected according to experimental set, environmental conditions, past experiences and other unknown factors. These explained and unexplained causal factors supplement one another and make varying relative contributions to different behaviors – the Principle of Behavioral Supplementarity. The more psychologically remote the causal factors, the greater proportion of unexplained ones relative to explained ones – the Principle of Remote Antecedence. Both the causal categories can be conceptualized in the incompatible terms of reductionism or intentionality, depending upon the dissociated belief state of the observer – the Principle of Behavioral Complementarity. Ordinarily, on utilitarian grounds, behaviors with psychologically contiguous antecedents are best conceptualized in a reductionistic belief state, and behaviors with remote antecedents are best conceptualized in an intentional belief state.

The metaphysical issue of free will versus determinism in the causality of human behavior has continued to be a problem for psychologists and philosophers because presumably it cannot be resolved directly by either the empirical techniques of science alone or solely by the logical analyses of philosophy. The purpose of the present study is to provide empirical and normative arguments in the form of a behavioral paradigm or analogy. This is a combination of thought experiment and empirical study to support the metaphysical proposal of Harcum (in press), that different levels of explanations for a particular behavior can be ordered according to the degree of remoteness, primarily in time, of the antecedent causation for the behavior. These levels of empirical explanation will be analogs of different metaphysical interpretations.

This is a proposal for a psychological, not philosophical, resolution. By resolution, I mean a change from discord to concord, as in music, to find

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a way to remove the incompatibility or disagreement between the intentionality and reductionistic integrations of so-called volitional behaviors. A psychological resolution is different from a philosophical resolution because of the emphasis of the former on the empirical and practical. The contributions of the following discussion should therefore be evaluated in terms of its usefulness, rather than its logical and linguistic purity. There is probably nothing of direct value to philosophers, although some of the following discussion may prove of indirect value by suggesting some re-definitions of terms, or different philosophical attitudes. The present suggestions for a psychological resolution should moreover be considered heuristic rather than conclusive. The basic difficulty of the problem of volition means that attempts at empirical proofs of telic, or the alternative, interpretations have not provided crucial evidence. The present resolution nevertheless is consistent with known psychological principles and useful for practical applications.

There is precedent for an approach such as this. Hebb (1958), for example, used the analogy of a bridge, which manifests different realities dependent upon the appropriate level of conceptual analysis by an observer. At one (molar) level, the complete bridge is the appropriate unit for consideration, indivisible and whole. At other (more molecular) levels of analysis, the reality of the bridge is captured in spans and abutments, or in beams and piers, or in atoms and molecules. Similarly, Staats' (1981) social or paradigmatic behaviorism attempts to provide a framework for a unified theory of psychology which employs various levels of analysis of behavior. For example, conditioning principles are not considered to be sufficient to account for all levels of human behaviors. The framework, or paradigm, is to provide a general outline for a comprehensive theory which can encompass all of the phenomena of psychology, in contrast to what Staats calls "eclectic combinations" of various different theories which cannot be integrated into a unified theory.

Many writers have argued on philosophical grounds that a concept of a human will is compatible with a concept of determinism (e.g., James, 1890a, 1890b; Lehrer, 1966; Viney, 1986), and many claim to have proposed psychologically compatible mechanisms (e.g., Bandura, 1986; Dennett, 1981; Pollio, 1981; Smith, 1984). The lingering problem for an empirical resolution has been the impossibility of discounting what Lehrer (1966) calls "ancestorial" factors, the internalized results of past experiences which may determine, relatively independently of existing environmental conditions at any moment, whether or not persons will, for example, raise their arms when asked to do so. Such factors, as alternatives to the concept of intentionality, provide the core of Skinner's (1953) signal defense for the principles of strict determinism and reductionism.

The adjective "free" in the term Free Will, is troublesome. The behavior of a literally free will would be characterized by such adjectives as capricious, random, independent, and unpredictable. As Skinner (1948) has pointed out,

if behavior were controlled exclusively by a literally free will, a science of behavior would be impossible. In fact, co-existence of human beings would be impossible, because the behavior would not be influenced by (that is, it would be free of) factors external to what, following Neisser (1967), I shall for convenience call the "Executive." The Executive is that aspect of the person, either in reductionistic or intentional terms, which processes input and actively translates it into an appropriate response. Therefore, with complete freedom of will, there could be no event in the environment which would signal a particular pending response of the Executive.

The metaphysician who would demonstrate the existence of a will must, however, infer its existence through its effects on behavior, because it cannot be directly observed. To support such causation, one must be able to predict its effects, to avoid circular argument. Given a *free* will, unpredictable by its very definition, such a proof is a logical impossibility. In fact, however, many apologists for a free will do not use the term as above, but in the sense of a viable will, which has some measure of freedom, but is not completely and literally free.

The prospects for providing evidence for a viable human will which is not completely free, but responsive to the environment, are better than for a free will because such a proposition does not contain the logical contradiction mentioned above. Therefore, the present thesis is that there is a part of a person which has a capacity or will to respond to environmental conditions such that ordinarily it cannot be *empirically* distinguished as separate and different from environmentally controlled factors in the control of individual behavior. Behavior can be predicted from the actions of a responsive human will, just as easily as from habits learned from rewards based on response contingencies. In fact, Smith (1984) argues that the approach of interbehavioral psychology actually bypasses the issue of free will by subsuming it under a cognitive causal mechanism. According to this view, a response is generated within the personal cognitive field and therefore is not caused by the external environment any more than it is by some internal agent, or vice versa. In any case, following Dennett's (1984) moot question, if a person *chooses* to respond *within* the constraints posed by the environment, which has controlled the overt behavior – the willful choice or the environment? The same question pertains if the person actually chooses to respond *to* the constraints of the environment. But in either case the response can be predictable.

The fundamental issue for psychologists is whether or not all behaviors can be attributed to innate structures and reward contingencies from the environment – the ancestorial factors – or if some additional entity of voluntary personal choice is also a factor (Rogers and Skinner, 1956). Because the genetic factors can generally be experimentally controlled, usually by random assignment of subjects, the basic question concerns whether or not behaviors are created or originated by an internal operation, or are they just

the manifestation of internalized control by the external environment through reward contingencies and other known mechanisms of learning theory – i.e., the ancestorial factors.

Empirical proofs have been attempted, of course. For example, Howard and Conway (1986) instructed their subjects to eat peanuts, or to initiate social interactions, on certain days only. Because the subjects tended to comply with the instructions, showing greater frequency of instructed behaviors on instructed days, the researchers concluded that a case had been made for volitional research. Although these studies had a telic appearance, they are not crucial because of the possibility for the ancestorial causal factors mentioned by Skinner (1953) and Lehrer (1966). Because ancestorial factors are more remote, however, according to the present thesis, the more appropriate conceptualization would be in voluntaristic terms.

Slife's (1987) test of a telic theory of psychology was more convincing. He compared the retention of learned items which were liked by the subjects as compared to disliked items. The liked items were remembered better, especially when distractor tasks limited the subjects' opportunity to rehearse. The results were consistent with the telic argument that learning involves a cognitive co-temporal (logical) organization of the material rather than a sequential cause-effect relationship. The results of the study are not crucial because the possibility of cognitive mediators could not be ruled out, as Slife admits.

The present approach is to propose a heuristic paradigm for a psychological resolution of the free will problem. The approach will be to offer an empirical analogy or behavioral paradigm for a useful way, for psychologists at least, to categorize and think about the behaviors often thought of as volitional.

To demonstrate the viability of a responsive human will that reacts appropriately to environmental constraints, but nevertheless also can originate stimulus-independent behavior, one must first find a behavior which is not easily attributable completely to species-specific mechanisms or specific past experiences. One must also show that the specific behavior is partly predictable in particular environments from certain inferred properties of the human will. Thus, the present aim will be to show that the behavior of the will is not necessarily random with respect to external referents, as would be the case with a free will, but rather the will responds in a lawful manner to environmental conditions. Therefore, the lawfulness or predictability of a behavior does not necessarily indicate that it is produced by habits due to the simple interaction of innate mechanisms with experience. Telic behaviors are also predictable.

Some aspects of these data should lend themselves more easily to behavioristic interpretations, while others should be more easily put in voluntaristic terms. Because the converse interpretations are possible, the empirical

data to be presented provide a paradigm or model, rather than proof of either determinism or voluntarism. Nevertheless, the actual gathering of empirical data was judged to be more valuable than a thought experiment alone because all of the results could not be predicted in a thought experiment.

An idea for an experimental situation came out of some comments by both psychologists and students in reaction to a demonstration which I regularly use in my introductory psychology classes (Harcum, 1988). Because college students cling tenaciously to the idea that they exert ultimate voluntary control over their own actions (Harcum, Rosen, and Burijon, 1989), early in a semester I try to convince the class that each person's behavior can be predicted and controlled. I predict that almost all students will now be seated in the same general area of the room where they usually sit during class from day to day, although seating is optional. A show of hands verifies this prediction. I interpret these results to indicate at least a soft determinism, because free choices would be far more variable, although not necessarily random. The students are assured that the demonstration merely provides evidence for some degree of environmental influence on behavior, against a complete freedom or independence of will, but it does not disprove or deny some freedom to make voluntary choices.

Typically, the students protest that they chose to sit in the same area for each of the class periods. Thus, they argue, this demonstration is irrelevant to the issue of determinism of behavior from environmental influences. Some psychologists agree with them. Thus, the issue is joined: Does predictability of behavior imply environmental determinism or merely consistency of human personality and choice?

The task of seat selection is of interest only as an example of behavior; of course it is not important in itself. The causal principles should however be relevant to other behavioral situations; principles derived from this task should be at least more relevant to other human behavior than principles derived from rats in a Skinner box. It is expected that some bases of causation can be more comfortably couched in reductionistic language, and others in the language of intentionality.

There are no empirical or logical reasons to believe that men and women respond differently in the free choice situation. Nevertheless, genders were recorded and the appropriate statistical tests were performed. There was never any apparent difference, and the value of alpha for each comparison was greater than .2. Therefore, the following report ignores gender differences.

Experiment I

The behavior of taking a seat in an empty auditorium should be ideal for the purpose of providing a suitable research task which is not dependent upon

either the subjects' ability or important personality characteristics. Moreover, the choice of a seat should not evoke strong general habits or meanings, and it should not be ego-involving, because there is no way to define or distinguish between a "good" or a "poor" choice.

Although it is, of course, never possible to eliminate the possibility of carry-over effects of general habits, demand characteristics, perceived social desirability, and such, this sample of behavior should be about as non-threatening and non-demanding a task as one could reasonably find. Such factors, though certainly present and operating, would not provide strong bases for predicting which seat a student would take, because of a lack of consistency of these causal factors across subjects.

The only strong basis for an initial prediction for taking a particular seat would be knowledge of the particular seat the subject habitually took during the regular class period, because the study was done late in the semester, and all subjects were students in a class which was conducted in the same room used in the experiment. Nevertheless, it was hypothesized that selections are based both on habit and telic anticipations. Therefore, it was predicted that the students would not consistently take their usual seats – the ones occupied in class – because the context of the research task in an empty auditorium and the usual classroom milieu would be quite different. It was predicted, however, that seat selection would not be random, as would be predicted by a completely free will. Rather, the individuals would choose to respond to the realities of the environment which would be uniformly perceived, producing some consistencies in the choice of seats, including effects of the usual seating habit, but including also other effects which are not specifically predicted. Therefore, the seat selection task can be a paradigm, model, or analogy for an analysis of the causation of behavior in more general situations of life.

Method

Subjects. The subjects were 136 students in introductory psychology, serving in a study of "simple psychomotor tasks" as part of a course requirement.

Procedure. Students arriving at an appointed hour were met by an assistant outside the door of the auditorium. They read and signed a consent form and were handed a questionnaire which was to be completed in the auditorium after they were admitted and seated.

The auditorium for the research was basically a square room with 279 permanent seats in banks parallel to a diagonal line between two opposite corners. The corner nearest the entrance was cut off by a cloakroom area, permitting access to the back of the auditorium area at either end. Two aisles down to the podium separated the seats into three groups, with the center

area containing the most seats. The corner at the front of the room, opposite the cloakroom, was similarly partitioned as a preparation room.

The cover sheet of the questionnaire read as follows:

> **DO NOT LOOK AT THE QUESTIONS UNTIL INSTRUCTED TO DO SO.**
> You will take this test with only the researcher in the room. Therefore, please take any seat and wait for the instruction from the researcher to turn the page and begin answering the questions.

The auditorium was empty except for the researcher seated on a laboratory stool at the center of the front of the room. As soon as the student appeared, the researcher said, "Please take any seat." When the student had taken the seat, its location was recorded, and the student was told to complete the questionnaire. The questionnaire was as follows:

What is your gender? M _____ F _____

Do you usually sit in a particular seat during your regular Psy 201 or Psy 202 class? Yes _____ No _____

If there is a seat that you usually sit in, are you sitting in that seat now? Yes _____ No _____

If you are not sitting in the exact seat that you usually take in the Psy 201 or Psy 202 class, please go to sit in that seat now. If there is not a seat that you usually take in your class, please go sit in a seat that would best reflect where you most often sit in class. Then answer the last question.

Did you have any idea what this experiment was all about before you took the first seat? Yes _____ No _____

If your answer was "Yes," please explain below.

As soon as the students had indicated that they had indeed taken their usual seats for the class, or indicated no habitual seat, the experimenter debriefed them, and asked them not to discuss the study with other students until the following day.

To test the prediction that the students would respond selectively, and not randomly, a theoretical baseline was achieved by dividing the permanent (nonmoveable) seats in the auditorium into seven sections of 36–45 seats, using the aisles and rows as natural points of division. Several extra, moveable seats were not counted because some of them in fact were moved between testing sessions. Eleven subjects using moveable seats, either as a dependent variable or habitually, were discarded from the study. Another two were discarded for failure to take a habitual seat on the behavioral test, leaving a final N of 123 subjects.

Results

Questionnaire data. Only 28.5% of the students indicated on the questionnaire that they did not have a usual seat in class. One (.8%) failed to respond. Of the 70.7% of the respondents who reported having a usual seat, five subjects (5.7%) reported that they were currently occupying their usual seats. Only four subjects reported guessing that the dependent variable was seating choice, and one failed to answer the item. Because the four reported no prior information about the study, only hunches, they were not discarded from the study.

Behavioral data. The seating divisions are described in the first column of Table 1, with directions relative to the experimenter facing the seats. The second column in the table presents the percentages of possible seats within that section; these percentages provide theoretical expectations of choices based on the relative numbers of seats per section. The third column presents the empirical choices of seats. Clearly the subjects are selective about where they sit, preferring to sit in the three center sections, and in the upper-left section. These distributions of choices are significantly different from the theoretical expectations, χ^2 (6, N = 123) = 67.02; p <.001. Hypothetical choices generated from a table of random numbers were not significantly different from the theoretical proportions: χ^2(6, N = 130) = 5.45, p > .30.

In addition to the overall result, other specific consistencies were easily observable. For example, the subjects tended to take seats adjacent to aisles, particularly the two center aisles. Although aisle seats comprised only 23.7% of the total possible choices, they were selected by 60.2% of the subjects. These proportions are significantly different: t(122) = 9.54; p < .001.

Some aisle seats were particularly desireable. In fact, two particular aisle seats in the middle-center section were each chosen by eight students; another seat in the upper-left section was chosen by seven subjects. Although these numbers are substantially different from the only .45 persons per seat to be

Table 1

Theoretical and Obtained Percentages of Choices Within the Various Sections of the Auditorium in Experiments I and II*

Section	*Theoretical*	*Experiment I*	*Experiment II*
Upper-Left	13.98	14.63	3.39
Lower-Left	14.34	5.69	10.17
Upper-Center	16.13	24.39	9.32
Middle-Center	12.90	23.58	21.19
Lower-Center	14.34	28.46	45.76
Upper-Right	13.98	2.44	2.54
Lower-Right	14.34	0.81	7.63

*p < .001 between all conditions.

expected by chance, there are too few subjects to permit a defendable statistical argument about the significance of the effect. Nevertheless, it seems reasonable to presume that the same selection mechanism which was biased toward particular sections of the auditorium would extend toward the selection of particular seats, and there is some empirical support for this inference.

The difference between numbers of subjects indicating no habitual seat on the questionnaire (five) and on the behavioral test (seven) is probably due primarily to the more lax definition of a usual seat in the behavioral test. As would be expected, given the fact of course enrollments at or near room capacity, the habitual seats in class were rather haphazardly distributed around the room. This distribution is not significantly different from the theoretical distribution: χ^2 (6, N = 123) = 4.64, $p > .50$. It was however significantly different from the distribution of experimental choices: χ^2 (6, N = 123) = 83.75, $p < .001$. Therefore, the subject population was representative of the habitual class seat location, and the habitual seats did not completely determine the experimental choices.

The frequency of only seven subjects (5.69%) who took the same seat as their indicated habitual seat is probably significant. Presumably the null result would be for everyone to have taken the habitual seat.

Table 2 presents the distances between experimental and habitual seats in terms of seat-widths. This distance was obtained by counting the number of seats in a "squared-off" manner (up and down rows and columns as on a checkerboard) along the closest path between the two seats. An aisle was counted as a distance of two seats, which was about the equivalent in physical distance. Although the seat-width measurements could be converted to metric units, these descriptions seem more meaningful.

Because subjects under the experimental condition tended to choose seats about the center of the room, the largest disparities were often not pos-

Table 2

Percentages of Experimental and Hypothetical Subjects Indicating Various Distances Between Experimental and Habitual Seats in Experiments I and II

Number of Seats Distant	*Experiment I*		*Experiment II*	
	Random	*Experimental*#*	*Random*	*Experimental**
0–4	9.76	22.76	13.56	34.75
5–9	34.96	36.59	27.12	29.66
10–14	23.57	26.02	28.81	19.49
15–19	17.89	5.69	19.49	11.86
20–24	10.57	7.32	9.32	3.39
25–29	3.25	1.63	1.69	.85

*$p < .001$ from relevant random distribution.
#$p < .01$ from experimental distribution of Experiment II.

sible, opening the way to a potential artifact. Accordingly, random disparities were calculated using the experimental seat selection of the real subjects, and a table of random numbers to select a hypothetical habitual seat. These figures for Experiment I are given in the second column, labelled "Random." The significance of the difference between these hypothetical disparities and the empirical ones was determined by comparing these values for five different distance intervals, after combining the intervals for 20-seat disparities or greater. The empirical and random distributions are significantly different, with the empirical data showing the greater number of smaller distances: χ^2 (4, N = 123) = 34.91, $p < .001$. Therefore, there is a relationship between the seating habits of the subjects and their so-called free choices.

Incidental observations. After de-briefing, some subjects volunteered information about their reasons for taking a particular seat. For example, one student had an injured leg and reported that he would have taken a seat closer to the front except that walking was painful for him. Another reported sitting closer to the front because he thought it would be "rude" to sit very far from the experimenter. Several reported taking other courses than introductory psychology in the testing auditorium, and sitting in the habitual seat for the other course. The experimenter also observed on a few occasions that the subjects seemed to take his instructions to "take any seat" as a command to be seated quickly. On such occasions subjects immediately took a nearby seat.

Discussion

Experiment I warrants three conclusions. First, given free choices among equally effective responses, the subjects did not respond randomly. Second, a major determinant of seat selection was the location of the habitual seat in the regular instructional class. Third, other factors also influence the seat choices. Some of these factors represent general mechanisms, such as forward-going tendencies and centrifugal swings (i.e., behavioral inertia), the principle of least effort, and the principles of social interaction. These factors are inferred from respectively, the great preference for seats on the left side of the auditorium (which required no turn as the student entered from the foyer, in contrast to an immediate left turn for entering on the right), the preference for aisle seats, and the tendency to sit close to the experimenter. Other factors are more idiosyncratic, such as making a concession to a personal injury.

Many of the above factors would appear to be important as determiners of behavior only for the very reason that the experimental conditions deliberately made the behavior unimportant. The subjects, not knowing that seat selection was of interest, could be swayed in their choice by rather inconsequential factors. The results should be substantially different if the subjects

knew that the experimenter was interested in seat selection. Presumably, immediate environmental conditions would be less important, and demand characteristics more important.

Experiment II

A second experiment was identical to the first except that the subjects were first informed that the experimenter was interested in their selection of seats. The hypothesis was that the subjects' awareness of the goals of an experiment change the goals of the subject. Therefore, it was predicted that such awareness would change the relative importance of the different bases for seat selection, emphasizing choices more on the basis of demand characteristics and personal experiences. It was expected therefore that the choices would be less predictable because the choices would be less determined by the environment and more by the non-uniform past experiences of the subjects.

Method

Experiment II was identical to Experiment I except that the students were told by the research assistant before they were sent into the auditorium that the experimenter was interested in which seat they would take. The following statement was added to the cover sheet of their questionnaire.

> **SPECIAL NOTE:**
> In addition to an interest in how you answer the questionnaire, we are also interested in just where you will sit, given a free choice of any seat in the empty room. Take as long as you wish to make a selection of a seat.

Of 128 subjects, ten were discarded for taking moveable seats.

Results

Questionnaire data. On the questionnaire, 69.5% of the subjects reported habitual seats. Of those, 32.9% reported occupying that seat. The experimental manipulation obviated the question about knowledge of the seat selection variable.

Behavioral data. The percentage of choices of seats within each section are shown in the fourth column of Table 1. These values are significantly different from the theoretical percentages: χ^2 (6, N = 118) = 116.59; $p < .001$. The main effect is an increased preference for the lower-center seats.

There was a slight tendency to take the aisle seats, with 28.8% of the subjects taking such seats: $t(117) = 1.32$; $.05 < p < .10$. No aisle seat was chosen more than four times. The subjects tended to sit near a central line which

would divide the auditorium into left and right halves, thus placing themselves directly facing the experimenter, and away from the aisle seats.

As in Experiment I, the habitual choices were not significantly different from the theoretical predictions: χ^2 (6, N = 118) = 8.99, $p > .10$. The experimental choices were again significantly different from the habitual choices: $\chi^2(6, N = 118) = 118.78$; $p < .001$. Again, the subject population was representative of the classroom seating, but the habitual seat in class did not completely control the experimental choice of seat.

In this experiment, 27 subjects took the same seat as habitually occupied in class. Again, this suggests that factors other than habitual seating influence the experimental choice, but that the choice was nevertheless influenced somewhat by habitual seat. No subject failed to indicate a habitual seat.

Table 2 shows the disparities between experimental and habitual seats for the hypothetical subjects and for the subjects in Experiment II. Collapsing intervals of greater than 20-seat disparities, the numbers were significantly different for the random and the experimental subjects: χ^2 (4, N = 118) = 51.34; $p < .001$. Therefore, again, there is an effect of habitual seating.

Incidental observations. The observation that subjects tended to orient themselves toward the experimenter has been reported. Although latencies were not recorded, the subjects seemed to take longer in selecting the seats, and seemed to be more self-conscious about it. One subject had to be discarded from the study because he chose to sit on the (moveable) laboratory stool occupied by the experimenter; the experimenter himself had not even considered such a possible creative response. A strong habitual basis for it does not seem likely.

Discussion

The general conclusions from Experiment II were the same as for Experiment I, although there were obvious differences between the experiments in both Tables 1 and 2. Therefore, the same factors were operating, although the relative importance of the different factors changed as a result of the experimental manipulation.

Comparison of Experiments I and II

Because the variable of instructions about the relevance of seat choice is a major concern, the various results of Experiments I and II will be compared.

Questionnaire Data

There was no significant difference between Experiments I and II in the number of subjects reporting having habitual seats: $\chi^2(1, N = 240) = .096$;

$p > .70$. More subjects in Experiment II reported occupying their habitual seat, however: χ^2 (1, N = 169) = 35.18; $p < .001$.

Experimental Choices

The choices of seats were significantly changed by the knowledge of the purpose of the study, after collapsing the two left and two right sections because of small numbers of subjects: χ^2 (4, N = 241) = 42.13; $p < .001$. The main effect was the decrease at upper-center, and the increase at lower-center. Most likely, the subjects oriented themselves more toward the experimenter in Experimenter II.

The choice of aisle seats was significantly reduced in Experiment II from the theoretical percentage derived from Experiment I: $t(117) = 6.92$; $p < .001$. Apparently, for the same reason as above, the subjects tended to sit closer to the center line of the room, to face the experimenter squarely.

Seat Disparities

The subjects in Experiment II were significantly more likely to take their usual seats in the choice condition: χ^2 (1, N = 241) = 14.68; $p < .001$. Overall, the subjects in Experiment II tended to sit closer to their habitual seats than the subjects in Experiment I: χ^2 (4, N = 241) = 9.62; $p < .05$. Surprisingly, however, if the zero disparities are left out of the analysis, the disparities are not significantly different: χ^2 (4, N = 207) = 5.77; $p > .20$. This comparison is a questionable tactic statistically, but it may indicate that a cognitive operation is involved in the decision to take the usual seat, because there is little incremental effect which would indicate a simple summation of habits.

General Discussion

As expected, some observed bases of causation are more easily explained in S-R language, and others in terms of intentionality. Clearly, these data do not force one interpretation by positively ruling out the alternative. Whereas the psychologist would presumably prefer to call upon the psychologically respectable concept of dissociated states, the philosopher might feel more comfortable in re-defining terms or changing logical assumptions. In any case, the proposed resolution is psychological and may not provide anything of value for philosophers. These empirical results, to the extent that they may provide a mirror or paradigm of the way behaviors are generated in daily life, do suggest different approaches for different categories of causations. Interpretations in terms of biological structure, past experience, and personal choice will be discussed.

Can these experimental seat choices be attributed to species-specific mechanisms? The logical argument for a negative answer is that the specific behavior is too trivial to be related to the survival of the species. All seats were equally functional for the task of completing a questionnaire. Any survival value would be connected to a general energy-saving mandate by the response-selection mechanism. The empirical argument against an innate mechanism is the discrete variability of the subjects, as shown in Table 1. In fact, there are two modes for the areal response in the seat selection in Experiment I: the upper-left area, and the middle and lower center. In Experiment II the lower-center was most popular. A particular area of greatest survival value would presumably be consistent across subjects, regardless of the condition. For example, seats with easier access did evoke a preference, presumably because of an energy-saving advantage.

The subjects in Experiment I did not guess that seat selection was of interest, and therefore specific demand characteristics should not be a factor. General demand characteristics could be a factor in the sense that the subjects may have thought that some interaction with the researcher would be required, and thus took seats at a comfortable distance in front of him. This would account for the preference for seats in the middle-center and lower-center.

Transfer of specific seating habits did not determine the experimental choice of seat. It is not possible to determine from these data if the obtained relationship between seat of experimental choice and habitual seat is causal, of course. The habitual seating could have influenced the experimental choice, or conversely the initial choice could have led eventually to the habit. Even if the habit of taking a usual seat exerted a causal effect on the choice of seat, the effect was not exclusive, because it did not predict the exact choice. There is no reason to believe that transferred habits from other auditoriums would have produced the obtained pattern of seat choices, because there is no compelling basis to argue that general areas of seating in auditoriums are differentially reinforced. Although center-front might provide better seats at a concert or play, at other functions, such as class lectures, the seats at the back seem to be preferred. In any case, because of the relative small size and the banked seats of the particular auditorium, there were no unsuitable seats. Finally, in Experiment I the subject was led to believe that taking a seat was for the purpose of completing the questionnaire, for which any seat would suffice, not for observing a presentation from the front of the room or interacting with the researcher. Thus, the selection of a seat in the auditorium was also influenced by the voluntary choice of the subject, or by generalized response tendencies. Anyone arguing for specific experiential basis for a specific seat preference would have to advance a fortuitous "just-so" explanation, which would carry the weight merely of an article of faith.

Because the choices were not random, or even haphazard, the choice mechanisms were not free of environmental influences. Rather, subjects responded in a lawful manner to the physical nature of the environment in the context of the task at hand. Presumably, the lawful operation of the choices would have some survival value for the organism, because a mechanism for survival must be responsive to exigencies in the environment. To argue that the subject person has learned such general response tendencies is to point up the thesis of this study: this is a meaningless metaphysical argument for psychologists.

The laws to which the choice mechanism responds can generally be subsumed under general rubrics, like least effort, least delay, or least disturbance. English and English (1958) describe the Gestalt principle of least energy expenditure as follows: "the course of action taken is always that course which requires the least energy under the prevailing conditions" (p. 292). For example, why should an individual in need of a seat, and faced with many available ones, all functional, not take the aisle seat? To walk past many functional seats before selecting an essentially identical one would not be economical of either time or energy.

Some aspects of the "free" choices of seats can be explained by the above principles. First, consider the preference for the left side of the auditorium, particular in Experiment I. That can be explained by the fact that the entrance door to the auditorium faced the cloakroom exit which led to the left side of the auditorium. To exit the cloakroom area to the right side of the auditorium, the subject had to turn left after leaving the foyer, requiring a decision and a little extra effort. This is the same phenomenon referred to as "centrifugal swing" or "forward-going tendency" for rats in a maze. Presumably, for a trivial task, trivial factors can be functional. Having entered the left side, the subject took a seat on that side; only one subject, from Experiment II, ever entered on one side and crossed over to take a seat on the other side of the auditorium.

Both the evidence for the existence of habitual seats and the tendency of the "free" choices to be closer than chance to the habitual choices of seats, appears at first inspection to be evidence for an experiential effect on seating choice. But the difference in patterning of "free" choices and habitual responses indicates that the latter did not determine the former. Rather the environmental experiences generated a differential set of probabilities for taking various seats, but the ultimate choice was an interactive combination for those probabilities with the choice mechanism.

These data, nor any other, cannot provide a crucial test of humanistic versus behavioristic conceptions of causation. They do provide a basis for the utilitarian argument, however; they support the contention that some levels or kinds of behaviors lend themselves more easily to the two different inter-

pretations. For example, predictions based on seating habit are attributed in a most straightforward way to this specific experience. Therefore, a traditional deterministic interpretation seems best for this argument.

On the other hand, other data indicate effects of a responsive human will, because of the inability of the old habits to account completely for the seat choices; the patterns of responses are not predictable from a simple summation of habit strengths. For example, in Experiment I there were two modes in the attractiveness of seating areas – lower and middle center, and upper left. A non-cognitive summation of response tendencies should reasonably produce a single mode. Similarly, the awareness of instructions of Experiment II should not provide discriminative stimuli for changing the long-term seating habits. For example, how would this produce such a drastic reduction in the preference for aisle seats, if such seats were selected merely because they had been rewarded?

These arguments are not crucial, of course, but they suggest easier interpretations in terms of non-incrementally additive choices. Thus, as in peeling an onion, one can uncover layers of causality, with the outer layer contributing the greatest identifiable effect. One can attribute the seating behaviors to an influence of seating habits, and perhaps also to habits of orientation to a speaker or podium – both relatively reductionistic mechanisms. The next layer involves selection of aisle seats, which could have been rewarded in the past (reductionistic), but this behavior could also be explained just as easily by a telic law of anticipated least effort (voluntarism). In any case, we know that an awareness of the seating variable reduced the force of the habit. Similarly, behavioral inertia could be attributed to cognitive choice or to effects of past experiences. As one digs deeper into the onion, the effects of contact with the immediate environment become more difficult to justify, and thus more amenable to the telic interpretation. Ultimately, the final causes are so far removed from the immediate situation that all causes are simply butterfly effects, if indeed they are in fact determined (Gleick, 1987). Because they are unexplainable in terms of environment, at least for the present, the telic interpretation seems more appropriate.

The consistency of the choices indicates a deterministic mechanism of some sort. The choices are obviously not completely free. As both Dennett (1981) and Pollio (1981) propose, the environment generates an array of possible responses which effectively limits the possible choices. Therefore, a literally free will which is able to make unrestricted choices is, by itself, impossible. We are left with the familiar conclusion that human behaviors are both predictable and unpredictable. But the foregoing analysis does not equate predictability with reductionism and determinism, nor unpredictability with intentionality and free will, in agreement with Rychlak (1977) and others. For example, the existence of ancestorial factors is, according to Lehrer (1966),

compatible with the argument that a person could have done otherwise in a situation. That is, a soft deterministic view is possible. Similarly, arguing from the opposite direction, Davis (1971) contends that unpredictability of behavior is not incompatible with the assumption of determinism. This is also consistent with the chaos conception in physics (Gleick, 1987), which proposes that some minute physical changes have cumulative effects, and thus may later create large observable effects. Because of the smallness of the causes, and also often their remoteness from the final effects, their contributions cannot be identified. For the same reason, the causation of major effects often cannot be identified, and thus these effects, though caused, cannot be predicted. In summary, causal factors of even major effects may be so small and remote from the effects that the result may be unpredictable and unexplainable. Also, the behavior caused by a human will may be predictable because the will is responsive to the individual's perceptions of characteristics and demands of the environment.

Several suggestions about the lawful operation of a responsive will can be derived from the present data. The first is that this mechanism is at the service of an egocentric Executive, and thus dedicated to protecting the time and energy of the Executive in the most rational manner. An analogy would be a business executive who gives his chauffeur a destination, without specifying specific speeds and routes, and would expect an efficient route. Therefore, all other things equal, the responsive will would not pass satisfactory seats to reach another seat which had no appreciable advantages over the rejected ones. Thus, it is purposeful, or telic. If the will did expend the extra energy, we would look for some objective advantage of the other seat, such as perceived greater comfort, better lighting, or more convenient interaction with the researcher (vis., toward the front in the center section). Obviously, not all wills would structure the situation in the same way. This is the advantage of the trivial task, because the more meaningful task would provide more opportunities for individual differences, unless of course there were strong environmental contraints toward the same cognition. For example, a group of drowning persons would uniformly adopt oxygen-seeking, clearly telic, responses. In such a circumstance, however, it would not be possible to distinguish the telic responses from the results of experience and inheritance. Of course, the libertarian would conclude that the environment made the Executive want to secure air, whereas the determinist would say the environment controlled the behavior itself.

The same would be true for the seat selection in class. Of course, students arriving earlier for the first class of the semester would have more alternatives for seats. Having occupied a particular seat, probably the student would change only for a good reason (purpose), such as to avoid noisy neighbors, or to join friends. For one thing, the objective differences in seat desirability

are not great, and therefore there is no need to expend the energy in a daily decision about which seat to take; the automatic habit is often a great energy saver for the will because a choice is not necessary. Thus, purpose and habit would produce identical behaviors. This can be a practical problem in the case of so-called absent-mindedness, however, because the habitual response might not be most appropriate in a particular situation. Another reason (purpose) for consistently taking the same seat is to avoid a confrontation with another student, who may for some reason have a strong attachment to the particular seat. Executives presumably desire tranquility overall, because arousal costs energy.

Of course, a powerful desire for self-esteem by the Executive may take precedence, but this would be unlikely for such a trivial response as voluntary seat selection. Because the response of taking the same seat is also rewarded by the absence of confrontations, both the habit and the desire would support it. This produces the paradox of an extremely accurate prediction for a behavior such as seating in the regular class, that is admittedly quite trivial. On the basis of their own personal reports, one could accurately predict the exact seat to be taken in the regular class for about 70% of the 241 subjects in both experiments. If one were content to predict within a relatively few seats, this accuracy figure rises to *near perfection* for the prediction of habitual seats in class, although seating is optional (volitional).

Behavior controlled by a responsive will is not necessarily trivial, but in fact it may be very important to the individual. For example, persons on a hunger strike would be using their voluntary choice to overpower the insistent demands of certain strong habit systems and powerful environmental stimuli. Such behavior would not provide strong inferential proof of the action of a will because of the possibilities of compelling "ancestorial factors" (Lehrer, 1966) – namely a different strong habit system. But such behaviors can be more comfortably related to a telic system. Such a drastic switch in behaviors, as in the present responses to the awareness in Experiment II that seating was the focus of the study, presents problems to a continuity interpretation in terms of an abrupt cognitive switch, or keying (Goffman, 1974), because it produces a telic response. For example, we can ask why an obese person suddenly goes on a diet, after years of overeating.

Even if the telic laws of the responsive will were innate, a rational will would certainly profit from experience; it would learn to make the effective response that was most economical of energy, for example. Therefore, in most real situations, in an individual it would not be possible to distinguish the effects of a choice system from those of a non-specific habit system. For example, Skinner (1953) speaks of a person as controlling himself or herself by controlling one's habit system. The difference is that for Skinner the prime mover is itself merely the residue of past experiences, in contrast to the concept of the will as the prime mover of individual behavior.

The behaviors of the group of subjects have been attributed to both internal choice and environment. A critical question is whether both factors influenced each subject, or if some subjects were controlled by the one, and other subjects by the other, factor. First, it does not seem reasonable to have types with respect to which variable affects behavior. Moreover, virtually everyone showed a habitual seating response. Although variability among individuals would seem likely in terms of which variable exerted the stronger influences, it does not seem likely to be all or none – some have responsive wills and others do not. Second, the choice data in Table 2 do not indicate multimodal distributions as would be likely if different subjects were responding to different variables.

It appears that two different bases of causality of behavior are affecting each individual, and both can account for the behavior, as proposed by Harcum (in press) in three principles. The Principle of Behavioral Supplementarity states that all behaviors are caused by the summation of explained and unexplained factors. This is, of course, a trite point. In the present context it is important to distinguish between the unexplained and the unexplainable. Obviously, with an extremely large number of subjects, and more exotic statistical analyses, it would be possible to explain more of the unexplained variance. Nevertheless, the present argument is that some of the variance can never be explained, either because the very nature of human beings entails ultimate mystery, or the task of unmasking the intricate causal interactions is too difficult, regardless of the size of the sample – the butterfly effect (Gleick, 1987). This interpretaion is consistent with the proposal of Pollio (1981) that the environment produces a repertoire of possible responses, from which a viable will selects the specific response, which will never be completely predictable. The difference between the Harcum and the Pollio proposal is that the former offers consistent interpretations for each category within a given belief state, but proposes different incompatible belief states, whereas the latter proposes different mechanisms for the explainable and unexplainable behaviors.

A second principle proposed by Harcum – Remote Antecedence – states that there is a greater proportion of the unexplainable causal factor when the causation of the relevant behavior is more remote from that behavior. Remoteness is primarily controlled by the time lag between the cause and the resultant behavior, but it is also influenced by the similarity of the causal situation to the relevant behavioral situation.

Harcum's (in press) third proposal, the Principle of Complementarity, states that both of the two causal categories, explainable as well as unexplainable, can be conceptualized in either intentional or reductionistic terms. This principle is analogous to the complementary relationship in physics of the wave and corpuscular theories of light (Rogers, cited in Rogers and Skinner, 1956;

Stephenson, 1986). While the conceptions of choice and habit can be differentially attributed in the behavior of groups of persons, as in the present experimental situation, they are indistinguishable in a specific behavior of individuals. That is, we can discover meaningful empirical relationships in the data of groups, and therefore can infer causation with hopefully some degree of accuracy. We at least show that some identifiable attribute or event in the environment produced some consistencies among the subjects and therefore influenced what would otherwise be free, random, or idiosyncratic choice. On the other hand, the independent data of an isolated subject must be idiosyncratic, and unexplained, and without some converging operation, unexplainable. Therefore, even if a subject sat in his or her habitual seat, the cause could be the habit or a choice of the familiar seat. Without a convergent operation, the only practical explanation would be telic: "He or she wanted to sit there."

In the present study, the responses controlled by the immediate environment were more easily explained, whereas those less directly related to the room were less explainable. Harcum (in press) further proposed that the explainable versus unexplainable causations could be conveniently described by the supplementary terms of functional relations and residual variance, or by their complementary terms, responsive will and free will, respectively. As Harcum (in press) has argued, these different pairs of terms reflect different dissociated belief sets or states of the individual observer. Just as it is not appropriate to ask in general which is the correct perception of an ambiguous figure, it is not appropriate to ask in general which is the correct perception (belief state) of the causation of the behavior. One is just as correct (real) as the other. Which is correct is determined by the answer to the empirical question of which is more effective for the understanding of the problem at hand. For example, as Harcum, Burijon, and Watson (1989) and Harcum (1989) have proposed, for many clinical problems in which behavior therapy is used, the adoption of the intentionality (telic) attitude is essential for the success of the therapy. On the other hand, when the causal factors are contiguous or close to the behavior to be explained, the reductionistic state of belief is appropriate. For example, the application of a painful stimulus is an appropriate explanation for the scream of pain; one need not look farther for the cause. If the response is an esthetic or vocational choice it may be impossible to discover the cause, and counterproductive to even look for one beyond the telic free will of the person.

This, then, is the psychological resolution of the free will/determinism problem: these two alternative explanations are merely the manifestations of two different incompatible belief states. The incompatibility is resolved by the dissociation. Consistent with the interbehavioral view of psychology (Lichenstein, 1984; Smith, 1984), the behavior is generated within the organism as

a result of cognitive dynamics which cannot be differentially attributed to external or internal causes. The result is a telic system which can be conceptualized, as is deemed useful, in terms of habits or responsive will.

Summary

Four bases for seat selection in an empty auditorium were identified in these data: (1) proximity to a habitual seat in the classroom situation; (2) proximity to the entrance and aisles; (3) proximity to the experimenter; and (4) behavioral inertia. In addition, there is a plethora of other possible bases of explanation – handedness, visual, auditory or other physical disabilities, nuances in lighting and temperature, and so forth, if the *N* were sufficient. Presumably there are other factors which cannot be identified, primarily because the causation is so psychologically remote – the psychological equivalent of the butterfly effect in weather prediction (Gleick, 1987). These two categories, of explained and unexplained (possibly unexplainable) causation, can be conceptualized in either reductionistic or intentional (telic) terms, depending upon the prevailing belief state of the observer of the action. The most appropriate terms for a given environmental situation depend upon their relative utility in the particular situation.

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