INCOME AND CHOICE BETWEEN DIFFERENT GOODS

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In Experiment 1, 3 rats chose between two simultaneously operating variable-interval schedules, one of which provided saccharin water and the other, food. In five conditions, the absolute (and equal) reinforcement rates provided by the pair of equal-valued schedules were manipulated in the range of 36 to 240 per hour. Experiment 2 was identical to Experiment 1 except that these schedules operated successively, arranged by requiring the rat to stand on the side of the chamber correlated with each schedule. Food/saccharin choice ratios were inversely related to reinforcement rate in both experiments, although this effect was stronger in Experiment 2. When delivery rates were high, preference for food over saccharin often reversed as the session progressed. The results were interpretable in terms of economic accounts of choice (e.g., the minimum-needs hypothesis), as well as in terms of traditional psychological accounts (e.g., matching theory).

Key words: matching law, choice, variable-interval schedules, eating, rats

A common finding in the human economy is that changes in income level often alter the relative amounts of different goods consumed. For example, one might assume that the poor purchase more food than insurance. Yet, were their incomes to rise, the added income might be spent more on insurance than on food. Economists often measure the effect of income on choice in terms of *income elasticity*, the percentage of change in the amount of a good chosen when income increases 1%. As the above example suggests, different goods often have unequal income elasticities. And although economic theory does not predict this outcome, its data base has already established that between-good differences in income elasticity are commonplace (Deaton & Muellbauer, 1980; Prais & Houthakker, 1955).

Between-good differences in income elasticity have also been demonstrated in income tests with animals (Elsmore, Fletcher, Conrad, & Sodetz, 1980; Hursh & Natelson, 1981; Kagel, Dwyer, & Battalio, 1985). To illustrate how these income tests work, consider the experiment by Elsmore et al., in which baboons chose, in successive trials, between food pellets and heroin infusions. When income was low, a

condition produced by a long interval between successive choices, the baboons preferred food to heroin. However, when income was high, this preference was reversed. This example shows that animals' choice ratios change with income level, as is seen in human consumers. This finding provides an interesting challenge to alternative operant conditioning interpretations, such as the matching law (Herrnstein, 1961, 1970). The problem with matching theory is that it predicts that choice ratios do not change with changes in absolute reinforcement level. Yet this is the very outcome that income tests produce.

Herrnstein (1981) reconciled this income effect with matching theory by arguing that drives for different goods satiate at different rates. In his view, high-income baboons in the Elsmore et al. (1980) study preferred heroin to food because the high rate of reinforcement ensured that the hunger drive was satiated early in the session. Hence, early in the session, baboons might actually have preferred food to heroin, but by session's end, this preference reversed because the baboons were no longer hungry. At all income levels, baboons could have matched choice ratios to reinforcer-value ratios, with the changes in choice that attended the income manipulation indexing how long in a session, or to what degree, baboons were hungry.

By clarifying the boundary conditions of the matching outcome, Herrnstein's reinterpret-

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tation of the income-test result illustrates the importance of determining the factors that influence reinforcer value. An economic approach to choice might be useful in such an enterprise. Yet there is a cost in that the methods suggested by an economic approach are often different from those traditionally used by operant-oriented researchers in studying choice. As a consequence, one might prudently ask whether a particular result of an economic manipulation, which seems to strain interpretation in terms of a particular psychological account such as matching, might reflect between-discipline differences in methods more than between-discipline differences in prediction. Indeed, each of the income tests run to date differs from conventional psychological choice studies in ways that have no bearing on identifying predictive differences between psychological and economic accounts of choice.

Among these differences, we view session length as potentially important. For example, in experiments that address matching, session length seldom exceeds a few hours; but in the income studies cited above, sessions lasted between 16 and 24 hr. In such long sessions, there may be differences between reinforcers not only in terms of their satiety rates (a local process), but also in terms of their circadian rhythms (an extensive process). Returning to the comparison between food and heroin, baboons might demonstrate two feeding rhythms: a local rhythm relating to satiety induced by prior meals, and a longer term rhythm based on eating during the day but not during the night. In terms of this longer term rhythm, heroin might have a different time course of action, resulting in its being an equally effective reinforcer both day and night. As a consequence, matching might fail, but its failure could be due to averaging periods of time when one good is preferred (e.g., food over heroin during daylight hours) with periods when these preferences are reversed (heroin over food at night).

The present report describes income tests with rats choosing between food and saccharin water. To ensure procedural similarity with matching-type choice studies, these goods were made available through variable-interval (VI) schedules. To assess within-session changes in choice with increases in the animal's income (or satiety), we segregated choice in successive 6-min periods throughout each session. Fi-

nally, to minimize the effects of time of day on choice, we reduced session length from the day-long standard used in other income tests to 3 hr.

EXPERIMENT 1

METHOD

Subjects

Three experimentally naive, male Long-Evans rats, 90 days old at the start of the experiment, served as subjects.

Apparatus

A sound-attenuated chamber, measuring 31.5 by 24 by 31.5 cm, and composed of white Plexiglas except for the wire mesh floor, served as the experimental space. The chamber contained four response levers, 4 cm wide, positioned 2 cm above the floor, that required forces in excess of 15 N to operate. Two food trays were centered 3 cm above Levers 2 and 3 (see Figure 1), two 0.4-cc fluid reservoirs were centered 3 cm above Levers 1 and 4, and a Sonalert® and a 24-vdc houselight were located at the top corners of opposite side walls. Also located in each side wall, adjacent to each lever, were two stimulus lights, positioned 3.5 cm above the floor with each displaced 7 cm from the middle of the wall. Two drinking tubes were located 3 cm above the side-wall stimulus lights beside Levers 1 and 2. A microswitch beneath the saccharin and the food sides of the wire mesh floor enabled detection of an animal's proximity to either side wall.

A PDP-8E® minicomputer with Supersked® software controlled all experimental conditions and data collection.

Procedure

Following the shaping of pressing on Levers 1 and 2, rats that had been food deprived for 21 hr (but were not water deprived) were exposed to equal, independent, concurrently operating variable-interval, variable-interval (VI VI) schedules, the values of which were generated according to Fleshler and Hoffman's (1962) formulation. Presses on Lever 1 occasionally delivered 0.2 cc of 0.1% saccharin water in the adjacent fluid reservoir according to one schedule, and presses on Lever 2 produced six 45-mg food pellets in the adjacent food tray according to the other schedule. Water was

Fig. 1. Top view of the experimental chamber. Only Levers 1 and 2 were operational.

freely available from the drinking tube located in each side wall.

If the stimulus light adjacent to a lever was illuminated, a single lever press on that side delivered any reinforcer assigned by its associated schedule. Otherwise, lever presses had no scheduled consequence. Illumination of a stimulus light required that a VI schedule assignment had occurred and that the animal was standing on that side of the chamber. Standing on the food side of the chamber was accompanied by a continuous sound from the Sonalert, whereas standing on the saccharin side had no auditory consequence. Operation of both the food and saccharin sides of the floor, which only occurred when a rat stood in the middle of the chamber, stopped the operation of both VI schedules.

There was no supplemental feeding after each daily 3-hr session, although water was freely available in the home cage. Each subject was exposed to five different pairs of equal-valued VI schedules in the order listed in Table 1. Experimental conditions lasted until at least 10 sessions had passed and food/saccharin choice ratios appeared stable, based on experimenter judgment, for three consecutive sessions. All data presented in the Results section are based on these last three sessions.

RESULTS

Table 2 presents summary data, averaged over the last three sessions, for each subject and condition of Experiment 1. Included in the table are times allocated to food and saccharin, the reinforcer deliveries these allocations produced, the changeovers between the

Table 1
Order and duration of conditions in Experiment 1.

Subject	Condition	Value in seconds of each VI schedule	Number of sessions
1	1	60	43
	2	90	10
	3	120	30
	4	30	11
	5	200	17
2	1	60	43
	2	120	10
	3	30	43
	4	90	11
	5	200	11
3	1	60	43
	2	30	11
	3	90	35
	4	120	10
	5	200	10

Table 2

Summary data: means computed over the last three sessions of each condition for each rat (Experiment 1).

Condition	Time allocation (minutes)		Deliveries of		Water consumption (mL)	Changeovers
	Food	Saccharin	Food	Saccharin		
VI-30						
R1	72	108	96	134	9.5	524
R2	79	101	76	59	16.0	186
R3	73	107	93	149	8.5	617
VI-60						
R1	92	88	112	120	14.7	1,385
R2	104	76	96	77	16.7	553
R3	113	67	111	116	17.0	1,338
VI-90						
R1	128	52	104	88	26.3	1,392
R2	117	63	75	52	16.8	494
R3	131	49	100	88	26.2	1,222
VI-120						
R1	148	32	86	72	29.3	1,773
R2	153	27	83	67	17.2	1,186
R3	150	30	84	71	18.7	1,279
VI-200						
R1	146	34	52	48	27.7	1,901
R2	172	8	53	43	18.7	881
R3	158	22	52	49	16.7	1,940

two sides, and the total water consumed from the water spouts that were freely available in the chamber.

Figure 2 presents for each subject the cumulative session time allocated to the food side of the chamber as a function of the cumulative time allocated to the saccharin side for each of the five different pairs of VI schedules. Each point shown is based on a 6-min period during the 3-hr session. With only one exception for Rat 1, all slopes for all subjects were inversely related to reinforcement rate. In other words, on lean schedules in which income was low, rats showed higher food/saccharin choice ratios than when income was higher; the greater the income, the greater the tendency to choose saccharin relative to food. A second effect, evident to some degree in all subjects in high-income conditions, was that choice ratios changed as a function of time in a session (i.e., for the functions to be nonlinear).

Figure 3 is the reinforcement analogue of Figure 2; it presents the cumulative number of food deliveries as a function of the cumulative number of saccharin deliveries, recorded every 6 min throughout the session. For all

subjects, the differences between these two measures were small, with many data points from different functions overlapping. For Rat 2, these differences bore no consistent relation to schedule value. For Rats 1 and 3, there appeared to be some dispersal of slopes, with a slight tendency for slopes to be inversely related to schedule value, but these emerged only after 45 min had elapsed in the session.

Figure 4 combines the data from Figures 2 and 3 to present the time-allocation and reinforcer-ratio data from this experiment. This graph shows an effect apparent in the two prior figures: Manipulation of reinforcement density had a strong and consistent effect on time allocation, but not on the reinforcer ratios they produced.

DISCUSSION

The present report differs from prior income tests in that differences between its procedures and those typically used in operant choice experiments were minimized. Excepting the use of qualitatively different reinforcers and the manipulation of absolute reinforcement rates, our procedures are representative

of those that have been shown to produce matching, the typical outcome when VI schedules are used in studies of choice.

As noted earlier, Herrnstein (1981) attributed income-test results to between-good differences in satiation rates. Evidence consistent with such an interpretation is apparent in Figure 2, where we see that in the higher income conditions rats allocated most of their time to the food schedule early in the session, with preferences shifting toward the saccharin schedule before session's end. These within-session changes suggest that the rats valued food early in sessions because they were hungry and saccharin late in the sessions because they were not; the changing choice ratios apparent in Figure 4 appear to result from blending periods of a session when animals were food deprived with periods when they were sated. Thus, the inverse relation between the food/saccharin choice ratio and the absolute reinforcement rate seen in this figure may only index the portion of session time the animal was effectively food deprived.

The adequacy of a motivational-matching interpretation of these results weakens any rationale for using this procedure to compare psychological with economic models of choice. Indeed, in terms of both predictions and data, these two approaches seem to overlap. At the same time, a benefit of an economic approach can be noted: It emphasizes the importance of motivational level to the matching phenomenon.

The adequacy of an account based on economic concepts like income depends on the specific decision rule assumed to govern choice. One that seems quite descriptive of the results obtained in the present experiment is the minimum-needs hypothesis (Kagel et al., 1985). According to this rule, animals rank goods in terms of how essential they are to meeting bodily needs, and this ranking imposes a sequence on choice. In the case of saccharin water versus food, choice must first be allocated to the necessity, food. Thereafter, both food and saccharin are consumed in a fixed ratio

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Fig. 2. Cumulative session time allocated to food as a function of cumulative session time allocated to saccharin, measured in consecutive 6-min within-session periods. Each point represents a mean computed over the last 3 days in a given condition.

Fig. 3. Cumulative food deliveries as a function of cumulative saccharin deliveries, measured in consecutive 6-min within-session periods. Each point represents a mean computed over the last 3 days in a given condition.

Fig. 4. Ratios of time allocations and reinforcers obtained (food vs. saccharin), computed across the last 3 days of each condition. Data are shown individually for each rat in addition to the group means.

Table 3

Order and duration of conditions in Experiment 2.

Subject	Condition	Value in seconds of each VI schedule	Number of sessions
1	1	60	25
	2	90	13
	3	120	11
	4	30	27
	5	200	17
2	1	60	19
	2	120	11
	3	30	23
	4	90	28
	5	200	10
3	1	60	28
	2	30	25
	3	120	12
	4	90	21
	5	200	13

throughout the rest of the session. Despite its apparent relevance, the minimum-needs hypothesis cannot be tested in terms of the results of Experiment 1 because our measures are based on time allocation, whereas those of Ka-

gel et al. (1985) were based on reinforcers obtained. To test this hypothesis the procedure of Experiment 1 must be altered so that, like all other income tests, the number of reinforcers obtained covaries with the measure of choice. This was done in the next experiment.

EXPERIMENT 2

In terms of economic theory, concurrent VI VI schedules are undesirable in an income test because any change in choice produced by variation in income must be tempered by an opposed change in the price (time on a side per reinforcer) of one good relative to the other. This outcome follows from the fact that concurrent VI VI schedules operate simultaneously, whereas the animal chooses successively. As a consequence, changes in choice ratios produce less-than-proportional changes in reinforcement ratios. This difference between choice ratios and reinforcement ratios raises the marginal price for the reinforcer now more frequently chosen and lowers the price for the good that is now chosen less often. In this regard, measuring the income effect in

Table 4

Summary data: means computed over the last three sessions of each condition for each rat (Experiment 2).

Condition	Time allocation (minutes)		Deliveries of		Water consumption (mL)	Change-overs
	Food	Saccharin	Food	Saccharin		
VI-30						
R1	79	101	100	70	30.3	189
R2	80	100	96	54	33.2	75
R3	69	111	86	98	23.3	139
VI-60						
R1	111	69	92	46	28.7	302
R2	105	75	77	20	31.3	109
R3	139	41	94	28	39.3	312
VI-90						
R1	142	38	85	16	39.7	400
R2	149	31	77	7	39.3	85
R3	138	42	81	14	33.3	190
VI-120						
R1	154	26	71	13	33.3	461
R2	163	17	72	3	37.0	149
R3	167	13	77	6	39.7	220
VI-200						
R1	167	11	49	3	40.5	429
R2	175	5	49	1	38.3	298
R3	176	4	50	0	40.0	183

Experiment 1 solely in terms of changes in choice may understate the true impact of the income manipulation.

As an alternative, we might follow the tradition in economics of basing an income test on the amounts purchased instead of the amounts spent. As applied to our procedure, this test measures reinforcers obtained rather than subjects' time allocation. But because reinforcers in the present procedure are available on concurrent VI VI schedules, they are not an acceptable index of the effects of income change. The problem with this dependent variable is that the reinforcement feedback functions that concurrent VI VI schedules produce ensure insensitivity to changes in the distribution of choices. In this regard they are even less sensitive than choice ratios as measures of the full impact of the income manipulation.

One solution to this problem is to eliminate the countervailing price effect that attends concurrent VI VI schedules by running the timer for each schedule only when the given schedule is chosen. Then choice and reinforcement would be highly correlated, and choice would not affect relative price. One benefit of this change is that we can see whether the countervailing effect of price predicted in theory appears in practice. Another is that we are able to make an income test in terms of the typical economic measure of choice—the number of each commodity chosen—and relate these data to those of Kagel *et al.* (1985).

METHOD

Subjects and Apparatus

The rats and the experimental chamber were identical to those used in Experiment 1.

Procedure

The procedure was identical to that of Experiment 1 except that each of the VI schedules operated only when the rat stood on the half of the floor associated with that schedule (see Findley, 1958). The order of conditions and

Fig. 5. Cumulative session time allocated to food as a function of cumulative session time allocated to saccharin during successive 6-min periods of each session. Each point represents a mean computed over the last 3 days in a given condition.

the number of sessions they were in effect are presented in Table 3.

RESULTS

Table 4 presents the mean summary data from the last three sessions of each condition for each subject. Figure 5 presents for each rat the cumulative time allocated to food as a function of cumulative time allocated to saccharin for each of the five schedule pairs. As in Experiment 1, two effects are evident: (a) A slope change often occurred in the high-income conditions, indicating an abrupt decrease in the food/saccharin choice ratio as the session progressed; and (b) there was an inverse relation between schedule density and the food/saccharin choice ratio.

Figure 6 provides a means of comparing dispersion of functions from Figure 5 of Experiment 2 with that from Figure 2 of Experiment 1. Linear regressions for each function in Figure 2 plus the pooled data are presented in the left-column panels, and the comparable regressions for data from Figure 5 are presented on the right. The variance for the distribution of slopes across the five conditions is presented in each panel. Although this variance statistic is based on linear regressions through nonlinear data, its values are valid for indicating that for all rats, the dispersion of slopes was greater for Experiment 2 than for Experiment 1.

Figure 7 presents the relation between food and saccharin reinforcement as a function of time in a session. Except for the VI 60-s condition for Rat 1, food-reinforced responding predominated almost exclusively during the first hour or so of the session. In the low-income conditions (VI 90 to VI 200 s), this preference continued until session's end. For all subjects, in the high-income conditions (VI 30 to VI 60 s), saccharin-reinforced responding occurred at substantial rates by the session's end, at which point there was a clear tendency for the food/saccharin choice ratio to be inversely related to income level.

Figure 8 presents a plot of saccharin reinforcers as a function of food reinforcers for each rat in Experiment 2. In general, these functions indicate that at low-income levels nearly all reinforcement is from food, and that increases in income level lead to sharp marginal increases in saccharin consumption and little or no increase in food consumption.

DISCUSSION

In the present experiment, each VI schedule operated only when chosen. As a consequence, the relation between choice and price was altered from that in Experiment 1: No longer was the effect on choice of manipulating income damped by an opposed relative price change; rather, relative price was defined solely by the underlying schedule.

The damping effect predicted by economic theory can be seen in Figure 5, in which the slopes of the functions for Experiment 2 were more dispersed than those for Experiment 1. This outcome is consistent with economic expectation because changing the difference in time allocation between food and saccharin, which defines the income effect, also changes the size of the opposed price effect. That is, choosing a good more often than before raises its price, whereas the good now chosen less becomes cheaper. These opposed processes, which operated only in Experiment 1, assure that its slopes were less dispersed than those from Experiment 2.

An analytic benefit of removing a relative price effect is that plots of food versus saccharin consumption will closely conform with analogous plots of time allocation for food versus time allocation for saccharin. Therefore, we can now define choice and the effects of our income manipulation in terms of reinforcers. Once done, our income test becomes directly comparable to data from prior income tests and to the methods generally adopted by economists. Thus, the present income test is closely related to that of Kagel et al. (1985). In their report, two rats chose in 24-hr sessions between food and saccharin water. Across conditions, the amount of saccharin water produced by each lever press was manipulated, as were the number of effective lever presses per day. These manipulations were viewed, respectively, as changing the relative prices of the two goods and as changing the subjects' income levels. In order to show how choice changes with income level at each relative price, data were first segregated according to the price manipulation. Then, within each of these data sets, saccharin deliveries were plotted as a function of pellet deliveries at each income level. They found (a) a linear relation between food and saccharin consumption as income was manipulated in each of the three relative-price

Fig. 6. Individual-subject and pooled-data regressions of time allocated to food as a function of time allocated to saccharin under all schedule conditions in Experiments 1 and 2. The variance given in each panel represents the dispersion in slopes among regression lines for each rat and for the pooled data.

Fig. 7. Food deliveries as a function of saccharin deliveries cumulated in successive 6-min periods throughout a session. Each point is based on means taken over the last 3 days in each condition.

Fig. 8. Saccharin deliveries as a function of food deliveries for each rat in each of the five conditions of Experiment 2. All data points are based on the last three sessions of each condition.

conditions; (b) the lower the relative price of saccharin, the greater the saccharin/food choice ratio; and (c) regardless of relative price, a bias for food over saccharin.

The expansion paths of the income consumption curves provide a useful basis for comparing the results of Kagel et al. (1985) with those of the present report. As shown in Figure 8, the expansion paths of these curves appear curvilinear, and excepting the highest income condition for Rat 3, are of positive slope in all segments of their functions. The data from Kagel et al., however, show no hint of curvature (see Figure 2 from their report). Because their model, the minimum-needs hypothesis, requires linear expansion paths such as those they obtained, it might seem that the present results are inconsistent with this account. However, the expansion path of this model is linear only for consumption in excess of minimum needs. Prior to reaching this level, exclusive consumption of the more essential good is assumed. Thus, the true expansion path of this model is along the x -axis until minimum needs are met, and thereafter, consumption of both commodities in some ratio throughout the rest of the session is predicted. This prediction seems consistent with the data from Figure 8.

Still unanswered, however, is why our data show curvature and those of Kagel et al. (1985)

do not. In our study, saccharin was truly inessential in that unlimited access to tap water was provided by spouts on each side of the chamber. Because of saccharin's luxury status, the minimum-needs hypothesis predicts that its consumption should be at near-zero levels, except when rats are in the high-income conditions that ensure minimum needs are met. The resulting pattern of choice should result in a function intersecting the x -axis in (food, saccharin) space, which was the result obtained. And to accommodate curvature as well as x -axis intersection, one need only assume a variable threshold in the time when an animal's minimum needs have been met.

In the Kagel *et al.* (1985) study, saccharin water was the only source of water available to subjects. Therefore, it was valued not simply for its taste but also for its fluid content. Because animals were obliged to drink as well as eat even when income was low, their functions never intersected the x -axis as happened in the present study. Also, the linearity of their functions, which indicates that saccharin water and food were consumed in fixed proportions, may represent a natural complementarity between food and water consumption. This interpretation could be evaluated by repeating their study, this time with saccharin water as an inessential good, and assessing whether consumption ratios are invariant as income is raised beyond minimum needs.

GENERAL DISCUSSION

From the perspective of the matching theorist, two features of earlier income tests are unusual: (a) Sessions were often continuous over 24 hr, and (b) deprivation level was neither defined nor evaluated. These features would be of little concern if the results of these income tests had been the same as those obtained with the procedures typically used to study matching. But because they were not, attention focuses on these procedural differences. Do the unusual features of an income test preclude its use in establishing the predictive superiority of an economic approach to choice?

In the experiments reported here, we attempted to see if the income effect could be obtained under conditions more typical of research on matching. First, we eliminated continuous sessions because they are not required

for an income test. Second, we assessed how changes in deprivation affected choice throughout a session as animals earned their daily food ration. Third, we used concurrent VI VI schedules, but in two different ways: In Experiment 1, they operated concurrently so that our income test would be similar to most experiments addressing the matching law; and in Experiment 2, they operated successively so that our income test could define choice in terms of reinforcers obtained, the tradition in economics.

The major findings of these two experiments were that (a) food/saccharin choice ratios were inversely related to income level; (b) in high-income conditions, this ratio dropped, sometimes abruptly, as the session progressed; and (c) these results were obtained whether choice ratios were defined in terms of time allocation (Experiment 1) or reinforcers obtained (Experiment 2).

In both experiments, choice ratios changed systematically over the session, and the course of this change in choice varied with income level. Such results would be hard to reconcile with matching theory if the relative potencies of the two kinds of reinforcers could be assumed to remain constant. However, based on many of the functions from Figures 2 and 5, it appears that food and saccharin sat at different rates. Hence, the failure to observe constant choice ratios may reflect within-session changes in reinforcer value due to change in deprivation or other, unspecified establishing operations, rather than a predictive failure of matching theory.

Even though attributing change in choice to motivational factors reconciles the results with matching theory, we endorse an economic characterization of choice to explain the results of the present study because economic models naturally anticipate the kinds of results the matching law must be supplemented to accommodate. This claim is well illustrated by the minimum-needs hypothesis, which not only accommodates how income affected each function's average slope, but is also consistent with the pattern of slope change: choice of food first (to meet minimum needs), and then food and saccharin in some ratio.

The large data base that economists have developed regarding the effects of income level on choice can be useful as a guide in developing microeconomic models of animal choice be-

havior. Inspection of this data base raises doubts that the successes of the minimum-needs hypothesis will prove durable. To offer one illustration of the problem, over some range of income, commodities such as margarine tend to be purchased less often as income rises (Prais & Houthakker, 1955). That is, as consumers get richer, they buy more butter instead of margarine. Such a demonstration of an inferior good is incompatible with the requirement of the minimum-needs hypothesis that increases in income not result in an actual reduction in the consumption of a good.

While this speculation awaits empirical demonstration, the speculation itself demonstrates that the methods and data base of economics can be usefully applied to the study of choice in lower animals. This cross-species and cross-situational generality of economic theory argues that a unified account of choice may be at hand, and that the behavior analyst and the microeconomist may share a common discipline.

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