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Characteristic Filtering:
Towards a Behavioural Theory
of Individual Choice

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CHARACTERISTIC FILTERING: TOWARDS A BEHAVIOURAL
THEORY OF INDIVIDUAL CHOICE

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Recognizing that behavioural theories of the firm lack well-established microfoundations at the level of the individual this paper attempts to present a theory of forward-looking choice applicable to conventional and bargaining situations as well as explaining hierarchical consumer budgeting processes. Choices are seen as being between alternative schemes of action whose possible outcomes are construed in terms of spatial and temporal configurations of characteristic locations on bi-polar construct axes. Agents have priority rankings over characteristics and each has a pair of gambler aspiration targets attached. These filter out unsatisfactory schemes until a single plan remains.

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I am indebted to Roland Clarke of Robinson College, Cambridge and Brian Loasby for fruitful discussions and for introducing me, respectively to the work of John Steinbruner and George Kelly. Had I not thus discovered these authors this paper would not have been possible. However, I alone am responsible for any errors.

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1. Introduction

Perhaps one of the main reasons for the relative lack of success of behavioural approaches to the theory of the firm is that although they focus attention on bargaining and conflicts of interest within organizations, and the problems of coping with complexity and uncertainty they lack an acceptable theory of how individual members of firms take decisions in such circumstances. Being reductionist in nature neo-classical theory has by contrast concentrated on the choices of individual economic entities called firms and households, neglecting the fact that multiperson households and organizations are coalitions of individuals caught between the need to integrate with each other and the desire to be self-assertive. But, even ignoring its rather different assumptions about the availability of knowledge and the computational powers of economic actors, it too is rather weak when there is scope for bargaining. It can only suggest that an outcome will be attained somewhere along the contract curve locus of points representing Pareto optimal states. Assuming that traders will not willingly make themselves worse off in free exchange it narrows down possible outcomes along a range of the contract curve without indicating how any particular point might come to be selected. There thus seems to be little point in spoiling the pedigree of behavioural theories of the firm by joining them at the micro-micro level (c.f. Leibenstein, 1979) with neoclassical theory. Mindful of these problems the present paper attempts to construct a theory of how individuals make choices under uncertainty applicable both to conventional and bargaining decision situations while being entirely compatible with the behaviouralist research program

The theory that is to be proposed synthesises aspects of theories of choice suggested previously by Strotz (1957), Lancaster (1966) Kornai (1971) and Shackle (1961, 1979) in economics; Kelly (1955, 1963)

in psychology and Steinbruner (1976) in political science. Taken separately each theory has defects of internal consistency, incompleteness or unrealism but combining elements from each one permits the creation of a very simple and seemingly general theory of choice rather than a Frankenstein-like horror of a theory. Limitations of space mean that these contributing theories cannot be discussed in detail. It will be possible only to describe the parts that are to be used in the proposed theory, referring briefly to the defects of the theories from whence they come in the concluding section.

The rest of the paper is structured as follows. In section two the suggestion is made that men should be seen as generalised scientists forming and testing hypotheses which they find especially interesting in an attempt to understand the world. They theorise about events as being possible configurations of characteristics with varying degrees of attention arresting power. Section three considers Shackle's work on potential surprise in relation to the process of hypothesis testing where gambling and uncertainty are inherent features. Arguing as though choices are made between competing all-embracing plans of action section four suggests that agents have priority rankings over interesting constructs and possess for each interesting construct a pair of gambler aspiration levels. It is then shown how a single plan of action will be selected. Section five expands the theory to cope with the fact that agents usually decompose plans into budget categories and take decisions with regard to individual transactions in a sequential manner. Finally, section six presents a summary and conclusion.

2. Inquiring Man

In conventional theories of choice it is often assumed that agents are fully informed about the nature of goods and uncertain only about which environmental states will occur at any point. Given an environmental state this is the same as saying that an agent can experience every event in advance of it happening in complete vividness in his imagination. He never forgets what things are like. But if he can do this he appears to have no need actually to experience any event in the flesh. A world of complete information would seem rather more akin to a state of stupifying boredom than, given constrained endowments, a state of bliss. Differences between imagined and actual experiences would result only from incorrect guesses being made concerning which environmental state would actually come about. In theories of choice characteristic of modern general equilibrium theory, guessing environmental states is the only real outlet for choice in Shackle's (1979) sense: i.e., choice that is creative and anticipatory, choice that gives an agent a chance to test how well he understands the ways of the world.

At the other extreme in terms of knowledge is a world that is completely unpredictable. Such a world would be completely terrifying for, as Hutchison notes,

"(V)irtually any economic or social life or cooperation, other than the most 'nasty, brutish and short', would be impossible if all human behaviour, individually and in aggregates, was completely unpredictable."
(1977, p.10); emphasis in the original)

Faced with a raging sea of kaleidoscopic changes any random action would seem to an agent to be as good as the next. Fortunately men do not lead such a nightmarish existence. As Popper (1976, p.48) observes, from birth they seek to discern patterns, relationships between things and events giving the impression of order and often they are fairly

successful at doing this. They become bored if they grow to understand a restricted area of reality in great detail while frustrated in their ambitions to see whether or not their theories about the nature of other events are correct. The 'things' that they seek to relate are themselves merely configurations of characteristics, never truly isolable from each other (c.f. Weiss (1969) pp.5-6). Things can only be described with the aid of analogies and metaphors and a feeling that it is safe to presume separability as an approximation.

Viewing the human predicament in a similar way to Popper and Weiss the psychologist George Kelly suggested that men might best be seen as generalised forms of scientists, seeking to predict and control the complex world in which they find themselves. Although his theory of personality has made no impact amongst economists as an alternative to hedonistic approaches to consumer behaviour it has been used by organizational researchers (Eden, Sims and Jones, 1979) and has greatly influenced consumer lifestyle research over the past decade (Engel et al., 1978). Kelly's theory of man the scientist also has quite remarkable parallels with the ideas of Kuhn (1970) on scientific paradigms and Lakatos (1970) on scientific research programmes. Man the scientist can only find the time and resources to conceive of and test a limited number of hypotheses about the nature of the world. He will not lightly accept the destruction of knowledge that he has acquired through his previous search activities. He finds some hypotheses more interesting than others (in Shackle's (1961) terminology, more attention arresting) and he chooses that scheme of action which he finds most interesting.

According to Kelly, the inquiring man theorises about what he will discover about the nature of the world as a result of executing a scheme of action by construing events in terms of bi-polar construct relationships. This is, in a sense, rather a similar view to those of Lancaster

(1966), who argues that agents have preferences pertaining to characteristics of goods rather than the goods themselves, and Shackle (1979), who uses the term elements, suggesting that these fundamentals form a codal alphabet that can be used to describe a multitude of situations. Usually to say that a man finds certain characteristics attractive (e.g. speed, safety, chicness) means that he is interested in discovering by experience the actual temporal and spatial locations of events that he construes as being located towards particular ends of various bi-polar construct scales, recognising that any absolute extreme is something that he is most unlikely to find. A particular characteristic can, in fact, only be described with reference to both poles of a construct and some initial point of reference which is itself a particular configuration of characteristics. An intelligent person, for example, is not just an intelligent person and

"a person cannot be seen as intelligent without implying some construed similarity between this person and others who show similar characteristics and some contrast with characteristics shown by stupid people."
 (Bannister and Mair (1968) p.14; emphasis in the original)

Constructs that an agent cannot use to describe more than a relatively restricted set of events Kelly describes as being relatively impermeable. A person interested in eating things will not usually regard a car as being able to permeate the construct edible versus inedible. If an object or event is able to permeate a particular set of constructs (at least, in the mind of the agent) this does not mean that it will continue to occupy the same position on each or any of these scales as more information becomes available through time. For example, the person who buys a foreign car construing it to be more reliable than his neighbour's British model may come to believe his theory about their relative degrees of reliability is incorrect in the light of his own and his neighbour's experiences.

Before hypothesis comparison and screening can be discussed a brief comment on habitual behaviour by inquiring men is in order. Repetitive behaviour may either be a manifestation of an ongoing process of hypothesis testing where repeated trials are necessary to convince an agent that his theory is not obviously false, or an investment necessary for the process of testing other interesting ideas, an investment made in a cybernetic way according to some procedural rule. To give an example: cans of baked beans may be bought because larder stocks are low and more interesting matters distract the attention from considering whether a cheaper and equally effective and predictable alternative foodstuff is available or a more interesting, less well-explored one is on the market at the same price. If aspirations are expected to be met by the schemes of action presently engaging the attention then hard core aspects of behaviour will not be questioned by the agent, he will prefer to get out of the super-market as quickly as possible and back to more interesting matters. To create the possibility of brand-switching in favour of his product the marketing manager must strive to make it seem in prospect more interesting than its rivals, however mundane it might actually turn out to be.

3. Potential Surprise

At any moment an agent will be committed to a particular course of action which he construes as likely to lead to a certain outcome configuration and will possess, in addition to his resource endowment, his accumulated stock of knowledge about the locations of characteristic configurations, interesting or otherwise. He has to decide whether or not to commit himself to an alternative course of action. In this section and the next a scheme of action is taken to mean a totality of his behaviour even though it may be different from another scheme only in minor details. Kelly (1963, p.64) suggests that a person 'chooses for himself that alternative

in a dichotomised construct through which he anticipates the greater possibility for the elaboration of his system'. In choosing the most interesting hypothesis to test the inquiring man cannot escape the fact that hypothesis testing is of its very nature an uncertain activity. It is an activity which may add to his knowledge of the location of characteristics he finds interesting or may destroy the knowledge that he previously had believed he possessed. His relative interest in certain characteristics will be the result of social and commercial pressures or his inbuilt preconceptions necessary for deductive theorising.

A negative outcome, such as the discovery that profits are not to be obtained in a particular way, is useful for further reference in the sense that it suggests where interesting characteristics are not to be found, but such progressive rejection may be a very inefficient way of conducting search for that which is felt interesting especially when, as in the case of entrepreneurship, a negative outcome actually hinders future search. The consumer who wishes to experience what it is like to drive at speed is clearly wasting his time if he chooses to buy a car which cannot be driven as fast as the one he presently owns. If he has no access to performance figures in advance of his choice or quality control is poor then he may end up discovering less than he would have done by not changing his car in the first place. Any kind of choice represents a gamble to some extent, though this will vary in degree between schemes of action in regard to a particular construct and between constructs. A probabilistic approach to the calculation of present values of competing schemes of action cannot be used where agents are dealing with partial models and unrepeatable, crucial experiments (especially given the prospect of capital loss on the resale of an asset found disappointing). Having lost the Battle of Waterloo, Napoleon may have been surprised that his strategy had not succeeded but he was then in no position to

see whether it would always fail - he was dealing with the possible rather than the probable.

Shackle suggests that men construe outcomes with regard to a scale of possibilities expressed in terms of degrees of potential surprise. In Kellian terms the scale can be represented by the construct 'unsurprising versus shocking'. A shocking outcome is one which the agent presently believes to be impossible and that which is felt impossible will not continue to hold his attention. Where a scheme of action is conceived of with regard to a particular construct and any outcome is thought perfectly possible the agent cannot be said to have formed a testable hypothesis about that scheme of action in regard to the construct in question. At present the construct is felt impermeable to the scheme of action and the scheme will not remain in his attention. Situations in which an inquiring man cannot theorise about the outcomes of any schemes on his agenda cause him to experience anxiety (c.f. Kelly (1955) p.495). He will try to avoid these as far as possible. He will also try to avoid those situations which threaten to destroy his knowledge unless they offer an adequate prospect of gain in return.

Where an hypothesis exists in regard to a particular construct an agent will, in principle, be able to define a potential surprise curve relating the possible outcomes of a scheme of action to some reference point and the degree of surprise they would cause if they actually came about. The reference point is either that set of events to which the agent is already committed or, if it exists, that scheme of action whose worse conceived of outcome is better than the best possible outcome seen for the present scheme of action, and less bad than the worst conceived outcome of any other hypothetical scheme on the agent's agenda. Shackle calls this reference point the natural outcome, G_N , and if it happens not to be the present scheme then he says that a 'contradiction' exists:

the agent will clearly change his behaviour. Figures 1, 2 and 3 illustrate families of potential surprise curves where ' G_N ' represents the scheme of action to which the agent is presently committed. They are drawn with regard to the construct "faster versus slower growth of income as a manager" - a manager may be interested in fast growth, i.e. characteristic locations towards the right hand sides of the figures. AA, BB and CC are possible results of novel schemes of action. Figure 1 illustrates a straightforward case, figure 2 illustrates a contradiction (CC being the true neutral outcome G_N) and figure 3 is figure 2 redrawn with CC as the neutral outcome. The scales on the figures should be thought of as being cardinal and where they are such that they would not usually have numbers attached these can be derived by progressive bisection (see Shackle, 1961) so long as there are at least two reference points from which to begin. It is of course inherent in the 'compare and contrast' nature of construing that such points shall exist.

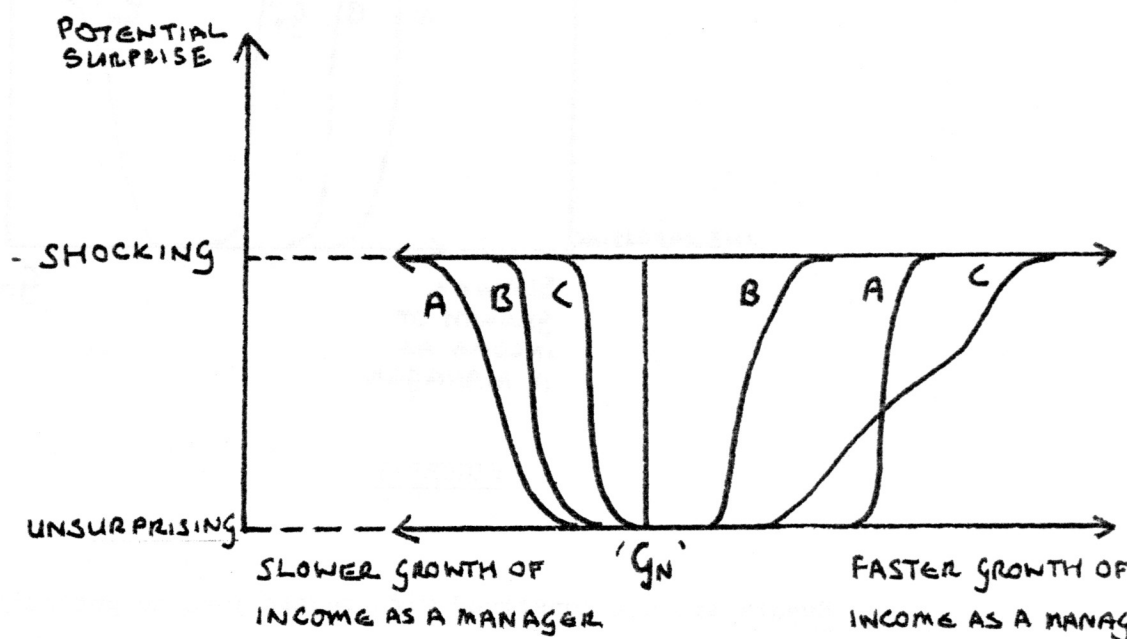


FIGURE 1

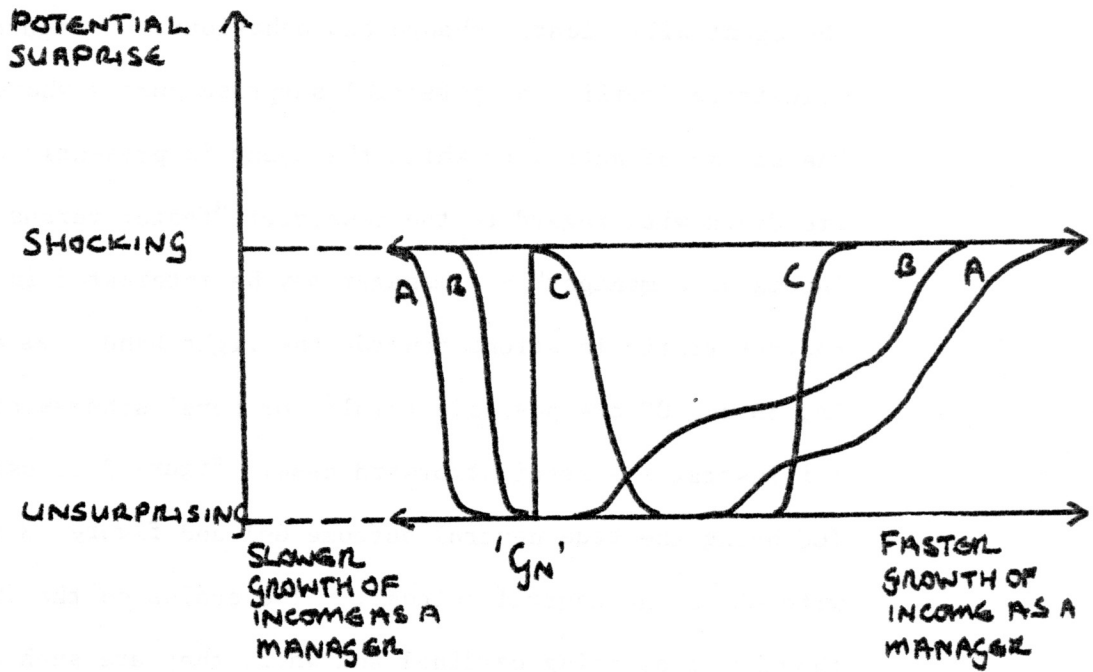


FIGURE 2

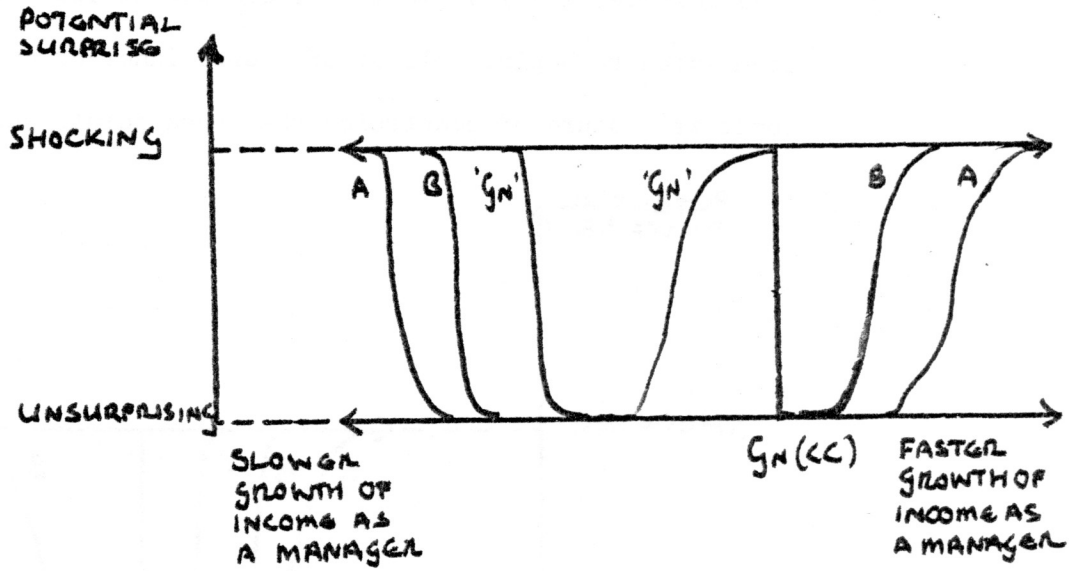


FIGURE 3

Events are not construed with regard just to potential surprise and one single other characteristic. Even the inquiring man with the overall goal to attain an understanding of the world has a hierarchy of different kinds of knowledge that attract his attention to different extents. Furthermore there is no guarantee that the scheme conceived possibly

to offer the maximum gain will not possibly offer a higher and less shocking loss than some other scheme competing for ultimate attention. The next section suggests a means of coping with these complications.

4. Aspirations and Priorities as Filters

When man is assumed to be a knowledge seeker G_N is not strictly his reference point since even the outcome of a neutral scheme is not certain and it may destroy previously acquired and accepted knowledge about the location of characteristic configurations. Where knowledge about the location of profits is concerned a previously attained accounting profit may seem in retrospect to have been an opportunity loss, while persistence in using a particular product may reveal that it is not as reliable as had been thought and leave the agent wondering where on earth reliability is to be found. The knowledge with which an agent begins a series of deliberations about possible choices cannot be shown on a potential surprise map. However, a relationship between the neutral outcome and what the agent seeks that is dependent on his existing knowledge can be illustrated if account is taken of Simon's (1959) point that in a world of bounded rationality agents cannot maximise and can merely aspire to attain certain levels or rates of achievement.

The scheme of action represented by a neutral outcome (contradictory or otherwise) promises possibly to add to the agent's existing understanding of the temporal and spatial locations of a characteristic at a particular rate. It threatens possibly also to destroy his understanding at a certain rate by shattering his expectations. Unless he decides that all points on the construct scale are uninteresting and shuts off his mind to that construct or declares it to be totally impermeable to any scheme of action on his agenda he cannot avoid some kind of commitment with possible gain or loss implications in this area of his understanding.

Unable globally to maximise or minimise he sets targets for the rate at which he will try to add to his knowledge concerning a particular characteristic and for the rate at which he is prepared to tolerate, in the search for gain, the loss of knowledge. Following Simon (1959) and Kornai (1971) agents are assumed not persistently to set targets that they cannot reach. Aspiration rates cease to exist if the agent decides he is no longer interested in discovering the location of the characteristic in the world in the light of his attainments and the relevant construct then ceases to be on his agenda. A person who commits suicide ceases to be an inquiring man; unable to tolerate the failure of his understanding to grow at an adequate rate, or tolerate the rate at which events destroy his previously achieved interpretations, he calls a halt to the search process.

If aspiration rates for gain and the avoidance of losses can be defined for any construct with the existing state of knowledge as the starting point then a pair of gambler aspirations levels can be defined with reference to the neutral outcome, that scheme of action which may contribute to the attainment of aspiration rates for the construct in question unless a scheme that is in some sense superior appears to be available.

Loss Avoidance Aspiration, A_L : the agent's aspiration possibly to loss in the pursuit of gain no more than a particular amount relative to the worst possible outcome of the neutral scheme of action of which he can conceive.

Gain Aspiration, A_G : the agent's aspiration possibly to gain a particular amount relative to the best possible outcome of which he can conceive for the neutral scheme of action for the construct in question.

Taking G_N in the following inequalities to refer to the relevant extreme outcomes of the neutral scheme of action it is possible

to define the agent's attitude towards the scheme with regard to the construct in question.

a) $G_N > A_G > A_L$ implies that the agent is satisfied with the prospective outcomes of the neutral scheme already on his agenda for that construct and will not engage in or even consider search for a better course of action able to permeate the construct even though he may later discover a better scheme in the course of searching to meet his aspirations for another construct.

b) $A_G > G_N > A_L$ implies that the agent is not satisfied and will be considering potentially more interesting schemes also able to permeate that construct or schemes of action that represent active search for schemes permeable to the construct as opposed to conducting merely routine scanning to avoid oversights. If G_N turns out to be the best available scheme his aspirations will have to come down - he will have to lower his sights or be more willing to take chances.

c) $A_G > A_L > G_N$ implies that the agent believes his understanding of the world with regard to the construct in question is likely to be crumbling away at an unacceptable rate if G_N is the best scheme of which he can conceive. In this case the agent must either lower his aspirations and adopt an air of disinterest to conceal his fear of incomprehension or force any outcomes into consistency with meeting his loss avoidance aspiration target. Steinbruner (1976, ch.4) offers a review of studies illustrating such reactions.

When G_N represents the hypothetical outcome of a non contradictory neutral scheme of action and $A_G > G_N > A_L$ then, for the characteristic/construct in question, it will only be regarded as acceptable so long as there is on the agenda no scheme of action whose worst conceivable result is no worse than A_L and whose best conceivable result is at least as good as A_G . Figure 4 shows potential surprise curves for five schemes

(e.g. job offers), G_N , AA, BB, CC, DD which permeate the fast versus slow growth of managerial income construct. Given the manager's gambler aspiration levels A_G and A_L only CC and DD are satisfactory.

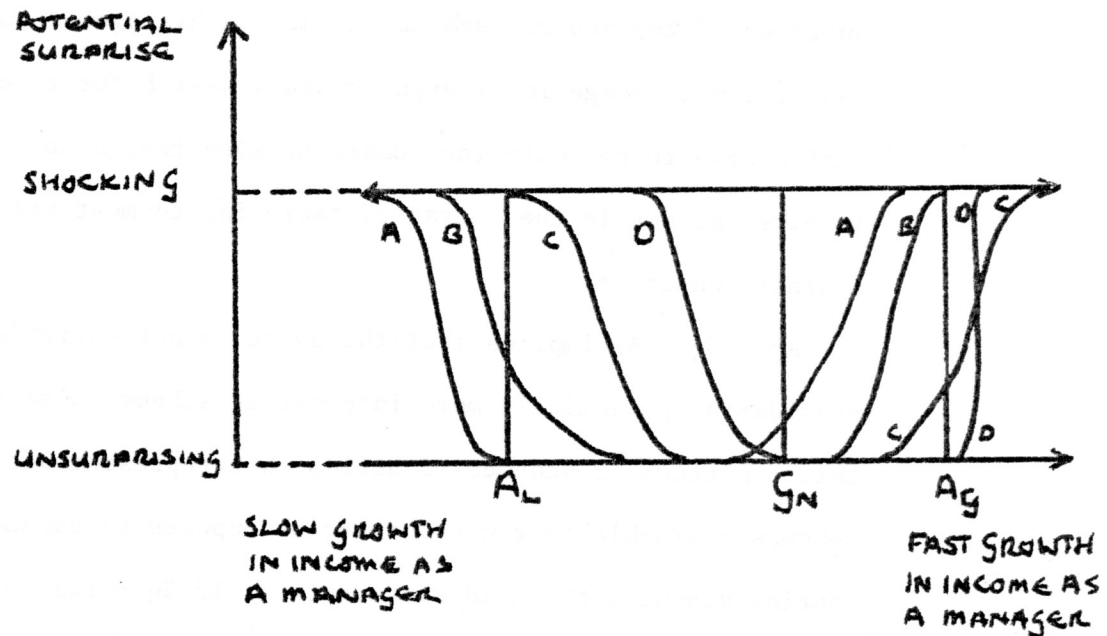


FIGURE 4

The aspiration levels filter out schemes AA, BB and G_N . Although both CC and DD are perceived by the agent as involving an element of chance they are both regarded as acceptable gambles. However, it would be unreasonable to dismiss from further attention schemes AA, BB and G_N as unsatisfactory without a consideration of how they fare with regard to other construct axes where they might be superior to CC and DD.

Conventional choice theory presumes that agents consider trade-offs between different bundles of goods equally able to satisfy their preferences. Lancaster's theory, while cast in terms of preferences over characteristics rather than goods, also assumes that agents perform this process of what Steinbruner (1976, p.62) calls 'value integration'. The present paper adopts instead the organization corollary of Kelly's theory of personalit

(1963, p.56). This states that "Each person characteristically evolves, for his convenience in anticipating events, a construction system embracing ordinal relationships between constructs." Kelly is proposing that, while some constructs used by inquiring man to theorise about the nature of things may be highly specific (i.e. relatively impermeable), constructs themselves are arranged in a hierarchical way to allow complexity to be handled and to avoid inconsistencies. To take an example from Bannister and Fransella (1971, p.23):

"For some people the construct traditional jazz versus modern jazz may be subsumed as a subordinate implication of the construct good jazz versus bad jazz and both poles of the construct might be subsumed under the music end of the construct music versus noise."

Assuming that agents have a general lexicographic ordering of characteristics in which they are interested, where aspiration levels provide for each relevant construct a means of filtering out schemes considered with regard to less and less permeable constructs it is now possible to state how a scheme of action is finally selected.

An agent will select that scheme of action whose imagined possible outcomes permeate to the lowest level of his construct system permeable to any of the schemes on his agenda and forms at that level either a non contradictory neutral outcome despite not satisfying both of the aspiration levels for that construct when no other schemes satisfy both aspiration levels, or the neutral outcome amongst the schemes able to satisfy both aspiration levels for that construct.

If the agent finds the scheme that becomes G_N at the lowest level unsatisfactory (i.e. $A_G > G_N > A_L$, or $A_G > A_L > G_N$) then he will consider whether or not it will be worth searching for something better, bearing in mind that schemes of search have opportunity costs. Should he, by a similar means, choose not to bother to search (i.e. not to change his course of action with regard to information seeking in a particular area) he will deem the prospective outcome suggested by the

above rule acceptable and adapt his behaviour accordingly.

In the example illustrated in figure 4 scheme DD represents the neutral outcome out of those schemes that are satisfactory with respect to both aspiration levels and should the manager have no lower priority characteristic (such as a friendly working environment, or travel potential) on his list of interesting constructs that scheme CC and/or scheme DD can permeate then he will select DD. Should both of schemes CC and DD suddenly become unavailable for some reason then he will select G_N , the scheme that is already the neutral outcome for the construct.

To propose a priority ranking over characteristics is to make an assumption that is clearly at odds with Lancaster's approach where agents are assumed to carry out value integration and convex indifference curves among characteristics are very much a feature of the analysis. Abandoning convexity for aspirational filters is also a departure from Shackle's analysis but one which enables complex situations involving multiple objectives to be handled with simplicity. What is being suggested, in effect, is that while men may trade between alternative bundles of, say, apples and oranges as if they are moving between or along conventional indifference curves they are not doing trade-off computations, are not performing instantaneous linear programming operations at all. They are not trading individual apples and oranges or characteristics against each other to equate marginal rates of substitution and relative prices, but are filtering out competing schemes of action under self-imposed pairs of aspirational constraints.

To suggest that consumers do not perform value integration between characteristics is not to suggest that linear programming computations cannot be done once a task has been specified and constraints set. Clearly product designers and engineers do it frequently. A product will not usually be designed as if it has to pass a particular order of

characteristic screens since priority rankings, aspiration rates and attitudes towards gambling will vary between consumers, even between those with broadly similar lifestyles. Rather, firms tend to design their products as if characteristic trade-offs do matter for individual consumers and will only attempt to suggest that consumers ought to have a certain priority ranking between characteristics where their products would be more likely to dominate if consumers could be persuaded to use the ranking when considering which products to purchase. However the characteristic trade-off perceived by companies is merely an aggregative phenomenon. Hence if the core assumption of the theory proposed in this paper is correct Lancaster's approach cannot provide a satisfactory microfoundations for a higher level discussion of economic phenomena. While implying that conventional Hicksian indifference analysis may be absolutely incorrect as a description of how agents think when they make choices the characteristic-filter theory of choice does not necessarily render the usual approach completely useless as an 'as if' model for investigating the effects of changing constraints on individual behaviour. However, the new theory has no need to assume divisibility, convexity, a fixed set of goods or that agents possess vast computational powers.

5. Budgeting

Within a conventional utility maximising framework Strotz (1957) has suggested that it might be helpful to view consumers as having hierarchical utility trees and not comparing possible expenditure switches between all goods simultaneously, but between separated groups of related goods. The use of hierarchical structures to decompose complex choice problems has since been investigated more generally by Simon (1962, 1969) and Koestler (1967). With its assumptions that agents have priority rankings over the construct scales in which they

are interested and that constructs vary in their permeability with regard to events the theory of choice proposed in earlier sections of this paper lends itself neatly to the analysis of hierarchical choices. So far the paper has argued as if choices were being made all at once between competing completely detailed lifestyles and looking forward to some point in future time. This section shows how choices might be decomposed and details attended to sequentially. Viewing choice in a 'top down' sense and referring to aggregative concepts such as lifestyle plans or budgets for categories of expenditure obviously does not fit in with 'bottom up' reductionist neoclassical analysis of the familiar kind but complements Kay's (1979) recent work on corporate resource allocation from the behavioural standpoint.

For simplicity, assume the agent has already made his choice with regard to employment and thus has a clearly defined budget constraint and is choosing whether or not to spend money on 'a car' or 'other goods'. He decides on a minimum amount he will be prepared to spend in each category and these minimum amounts, considered in relation to his total budget constraint, imply maximum amounts for other categories. To the extent that minimum amounts do not sum to his entire budget his pattern of expenditure will not be invariant with the order in which individual items are purchased - the concept of a hierarchical budgeting denies he will compare particular cars with particular items of other expenditure though he may compare particular combinations of specific goods on rare occasions when extreme complementarity is involved and he is really choosing with regard to alternative lifestyles in the manner assumed in the previous sections. Particular goods may be used as an aid to image formation when budget allocations are being worked out but choice between fully specified lifestyles involving extreme complementarities seems likely to be uncommon. (The use of certain goods as reference

points is in keeping with Koestler's (1979) suggestion that hierarchical components do not merely face downwards or, for reductionists, upwards; they are Janus-faced). The task of this section is to explain how budget ranges for particular expenditure categories are decided upon and how it is decided which category of expenditure will receive the most immediate attention.

Budgets are resource allocations that do not attempt to describe choices within categories beyond a certain level of detail. This means that as higher order concepts they do not permeate beyond a certain level down the agent's construct ranking. This level is that of the construct that is permeable to each of the categories being considered simultaneously. Food, for example, is not usually able to permeate the construct "fast versus slow", nor cars the construct "sweet versus sour" but combinations of expenditure on food and motoring may be appraised with regard to their possible ability to enable the agent to meet his aspirations for the construct "supporting my self-image as a jetsetter versus suggesting I am a bore". In formal terms, it may be said that

When a person decides on a particular budget allocation between categories he elects to adopt a particular configuration of expenditure (expressed in terms of maximum possible and minimum acceptable expenditures for each abstract category) because, being the neutral outcome amongst those schemes which satisfy aspirations (or, if none are available, the non-contradictory neutral outcome in general for the construct in question), it satisfies his general choice criterion for expenditure configuration schemes of action with regard to the lowest level construct that has been perceived by him to be permeable for all of the categories under consideration.

When a construct is discovered to be impermeable as he moves down his priority ranking he considers whether or not to engage in further thought and search to see whether, still further down the list of interesting constructs there is one which is permeable for expenditure configurations

pertaining to all of the general categories under consideration. If he considers further search not worth the effort he selects the expenditure configuration which satisfies the above choice condition. The minimum satisfactory expenditures for each category enable him to infer a maximum possible expenditure for each category which, if made first, would not conflict with meeting the minimum expenditures in all of the remaining categories. These minimum and maximum allocations serve to filter from his agenda for the next stage of the decision process those goods costing more or less than the budget allocation for the category. If he considers further search worthwhile he will check whether or not any lower level constructs are permeable for all of the categories and if they are some configurations of budgetary allocations may be filtered out, narrowing down the ranges of acceptable expenditure. At the next stage in the decision process goods are construed only with regard to lower level constructs (owing to the separability assumption) and budget allocations will only be revised if goods otherwise off the agenda come to the agent's attention which suggest that his earlier theories of necessary sectoral expenditure allocations were misconceived.

Figure 5 shows hypothetical combinations of minimum expenditures on cars and other goods which the agent presently believes will satisfy his aspirations with regard to the characteristics/constructs XX, YY and ZZ. A locus of satisfactory minimum expenditures that is convex to the origin (such as XX) implies that the goods in the two categories are complementary; a concave one (such as YY) implies that they are positively antagonistic. Any point to the southwest of the boundary indicated by the hatching fails to meet the aspirations for at least one of the constructs. If a budget category is unable to permeate a construct permeable to another category then the necessary expenditure for meeting the agent's aspirations for the construct will be shown (if

only two categories are being considered) as a line perpendicular to the axis for the latter. The line perpendicular to the point S could refer to expenditure felt necessary to meet aspirations with regard to the construct "high versus low cornering power" which categories other than car expenditure might not be able to permeate.

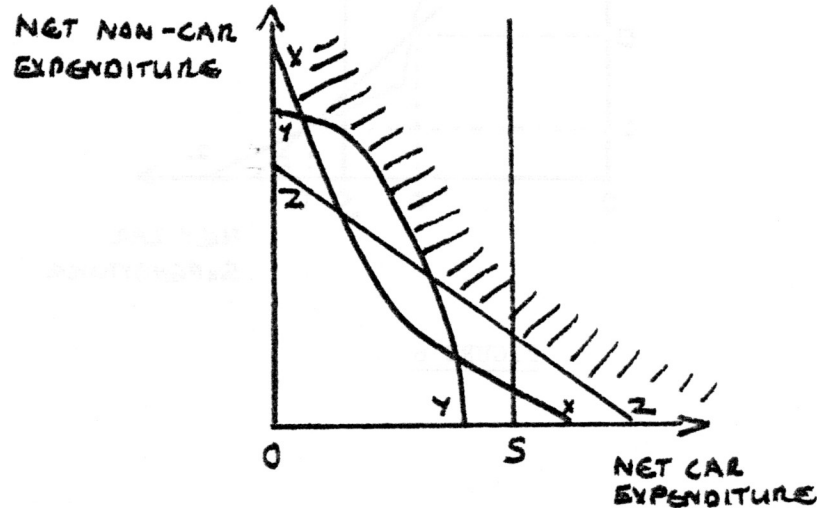


FIGURE 5

Figure 6 redraws the boundary of acceptable expenditure combination XZ and adds in the consumer's budget constraint PP. This suggests that the agent will plan to spend no less on motoring than OA but will not be able to spend any more on it than OB without preventing himself from meeting his aspirations for the characteristic/construct ZZ. Unless assumptions are made to rule out constructs permeable to categories of expenditure that are positively antagonistic there is, of course, no guarantee that the frontier for acceptable expenditure combinations will necessarily be convex and the budget range for any category continuous. Several price ranges may initially be of interest for the agent for each category.

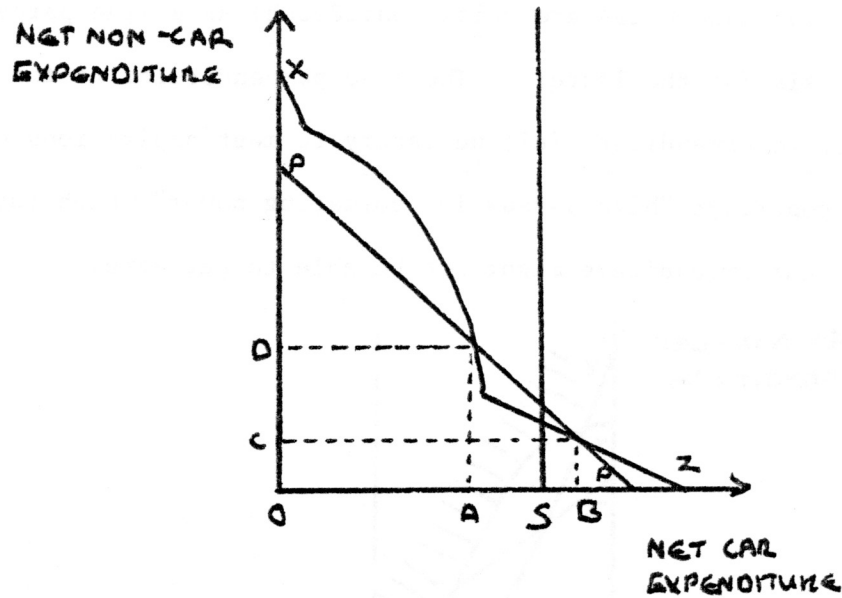


FIGURE 6

If a discontinuous set of budget ranges is selected (unlike the ~~example on figure six~~) the scope for indeterminacy will be eliminated rapidly once attention is directed at a single category of expenditure. If the next highest construct in the agent's construction system relative to the lowest of XX, YY and ZZ is one permeable only with regard to motoring expenditure (e.g. the one concerned with cornering power) then the range of acceptable choices is immediately narrowed down for motoring expenditure and expenditure in this area becomes the focus of attention. All cars on the agenda costing less than OS are rapidly ruled out as not worth gambling on with regard to cornering power. The filtering process continues for lower and lower level constructs in the manner suggested in section 4 until only one car remains. This car having been purchased, a maximum sum is left available for expenditure in the next most interesting category, which is that category able to permeate a construct as high as possible in the agent's ranking relative

to the one concerned with cornering power. If the maximum car budget OB has been spent then only OC will be left for expenditure elsewhere. When resources have been committed in a particular area it will not come back on to the agent's expenditure agenda until he can no longer meet his aspirations with regard to any of the constructs to which the expenditure category is permeable - i.e. not until he gets bored with his experimental results as he experiences using the goods in question or until goods wear out.

6. Summary and Conclusion

Recognising the virtues of neoclassical work on choice by Strotz (1957) and Lancaster (1966) which investigated, respectively, the possibility of agents possessing utility trees and preferences over characteristics this paper has attempted to construct an alternative theory of choice in which the management of uncertainty and complexity are central features. The theory proposed is concerned with forward-looking choice over competing schemes of action whose possible outcomes are construed in terms of temporal and spatial configurations of characteristic locations on bi-polar construct axes, after Kelly's (1963) theory of personality. Constructs are assumed to be related in an ordinal ranking of ability to arrest an agent's attention and for each construct agents are assumed to possess a pair of gambler aspiration targets for prospective gains and avoidable losses. These aspiration targets filter out schemes of action hypothesised as being unsatisfactory as regards meeting the agent's aspirations for a particular construct, the process continuing further and further down the construct ranking until a single scheme remains possibly to permeate still lower level constructs.

This "characteristic-filter" theory of choice has been constructed

from elements of theories proposed by Kornai, Kelly, Steinbruner and Shackle. Kornai's (1971) approach makes much use of multiple goals and aspirations levels but because he only considers a restricted number of goals is able merely to narrow down acceptable choices somewhat, suggesting that final choices are made at random. Kelly's theory is unique in replacing 'man the hedonist' by 'man the scientist' to explain what agents are doing and explicitly introduces an ordinal construct system. However, he fails to discuss the problems caused by the gambling dimension in choice and cannot explain, for a particular construct, how schemes of action are selected for possible testing to see whether their outcomes have been correctly construed. Steinbruner questions the concept of value integration central to the analytic choice paradigm of neoclassical economics and proposes that agents pursue values separately but he does not recognise explicitly a hierarchy of values at the level of the individual decision taker - this is something which has been inferred from his survey (1976, ch.4) of psychological studies on inconsistency management and the handling of complexity. Nor, despite frequent references to the work of Cyert and March (1963) and Simon, does he make use of the concept of the aspiration level. Shackle's theory of choice abandons the concept of probability for the more logical notion of possibility and, by discussing agents as considering theories of outcomes resulting from choosing certain courses of action with different powers to attract their attention, in some respects comes close to Kelly. However, because Shackle's theory applies only to a single profit/loss characteristic or can only compare alternative all-embracing utility-providing schemes of action it seems of limited use in the analysis of the kinds of complex situation discussed by the other authors. Furthermore, it cannot be applied in game situations where different schemes offer identical pairs of good and bad outcomes if construed with regard

to a single construct axis.

The theory constructed in this paper appears to have none of these defects. It even covers bargaining situations in a determinate way, unlike usual analysis with Edgeworth boxes and contract curves, so long as agents can form theories about each other's possible courses of action. (Agents will avoid those situations about which they cannot theorise or find boring in prospect). For this reason the characteristic-filter theory of choice may help to provide suitable microfoundations for Cyert and March's behavioural theory of the firm, though clearly empirical work must be done further to test its core assumption of ordinal preferences over characteristics.

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