Scarcity

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Publication date:
1984

Document Version
Publisher's PDF, also known as Version of record

SCARCITY: UNAVAILABILITY AND BEHAVIORAL COSTS

PROEFSCHRIFT

ter verkrijging van de graad van
doctor in de sociale wetenschappen
aan de Katholieke Hogeschool Tilburg,
op gezag van de rector magnificus, prof. dr. R.A. de Moor,
in het openbaar te verdedigen ten overstaan van een door
het college van decanen aangewezen commissie
in de aula van de Hogeschool
op vrijdag 29 juni 1984 te 16.15 uur

door

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geboren te Eindhoven

1984

Offsetdrukkerij Kanters B.V.,
Alblasserdam

Promotores: Prof. dr. G.M. van Veldhoven
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ACKNOWLEDGEMENT

The article that constitute this dissertation all date from 1982 to 1984. However as early as in 1976 in one of our discussions on economic psychology my promotor Prof.Dr. Gery M. van Veldhoven suggested the subject matter of my dissertation: 'Scarcity'. A concept central to Economics with little behavioral connotation. Trying to translate such a concept into behavioral terms is not as following a paved way.
My pushing force in this undertaking was Prof.Dr. Gery M. Veldhoven. Without his suggestions, his stimulations and genuine interest I am not at all sure, I would not have swifted to another problem area, more traditional, less challenging and less satisfying.,
I would also like to thank my second promotor Prof.Dr. W. Fred van Raaij for the many stimulating discussions we had. They formed my thinking about economic psychology and made us to produce many papers and articles together. It gradually helped me to get a grisp on the study of the other side of scarcity: the individuals handling of scarce means.
I am indebted to my other co-authors Drs. Gert Jan de Nooij and Drs. Rik Pieters for the open and stimulating atmosphere when working together .
I appreciated that very much.
This dissertation is the fruit of the behavioral costs of a great many other persons.
I would like to thank all those I now remember and do mention and also the others I now forget and unjustly do not mention.
For assistance by carrying out the experiments: Drs. Edward Groenland, Ruud Drabbe, and Ineke Grbic;
For assistance in the field studies: Drs. Hein Tilborghs and Drs. Jan de Schouwer;
For literature search: Drs. Marie-Claire van de Maele and Drs. Pol Sala;
For computer programming: Dr. Marcel Croon;
For reading drafts or parts of the manuscript, giving suggestions and checking my English: Dr. Theo Poiesz, Dr. Walle Oppedijk van Veen, Dr. Karel Soudijn, Dr. Thijs Poppe, Dr. Richard de Ridder, Drs. Berry de Beer, Drs. Cees Midden, Dr. Frans Leeuw, Dr. Bob Chestnut, Prof.Dr. Monty Friedman , Dr. Bernward Joerges, Dr. Gordon McDougall, Dr. Stephen Lea and all the reviewers of the

Journal of Economic Psychology that as such have remained anonymous to me. Prof.Dr. Karl-Erik Wärneryd who teached me the practice of the theory of the small wins: do what you can do then you will achieve what you want to have done.
Thanks are due to Marianne Kennis, Ineke Grbic, Janny van Baardwijk and especially Mia Smulders for typing and retyping parts of the manuscript. Finally I am grateful to my wife and children for their moral support.

To Loes, Tessa and Mark

Read suggestions

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INTRODUCTION

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Originally published as 'Schaarste en Economisch Gedrag', written on invitation for: K.A. Soudijn (Ed.) "Psychologisch onderzoek in perspectief', Lisse: Swets & Zeitlinger, 1982, 121-133.

1.1. PREVIEW

Scarcity is a central concept in economics in two ways: First, it is used to delineate the fields of economics. Economics is generally defined as the science that studies scarce goods and scarce resources. The study of free non scarce goods falls outside the area of economic science. Second, the influence of scarcity on economic behavior is a gradual one. Expressions such as 'The value of things grows with their scarcity and diminishes with their abundance' (Condillac, 1776) and 'The relative scarcity of goods is expressed in their prices' may adstruct this. In this dissertation the gradual effect of scarcity on human behavior is investigated.

Traditionally the study of scarcity phenomena has been the exclusive domain of economists. Recently problems such as the world population growth, the dwindling of oil supplies and the pressure on our natural environment have given rise to an increasing interest of other social sciences in scarcity (Lerner, 1981). Studies on deprivation (de Carufel, 1981), social cultural covariates of scarcity (Williams, 1973), distributive justice and resource allocation (Greenberg, 1981), expretial effects (Goudzwaard, 1970) and the usage of natural resources (Cole et al., 1972) might be mentioned to examplify this increased interest.

The articles brought together in this dissertation focus on scarcity and choice behavior. Both the choice between scarcily available goods as well as the choice between behavioral alternatives that involve the usage of scarce behavioral means will be considered.

1. Introduction.

In the introductory article 'Scarcity and economic behavior' it is elaborated that scarcity is treated in a purely financial way in the tradional economic theory of consumer demand (Hicks, 1959). In this tradition there exists a consensus that the scarcity of goods is reflected in their relative prices while the scarcity of means is reflected in a budget restriction. The confrontation of prices and a budget constraint on the one hand with the preferences for goods on the other hand results in choices that provide the consumer with maximal utility. The economic model of man has received various types of critiscism (See e.g. Clarkson, 1963).

For an overview of the shortcomings of the economic view on human behavior see Frey, 1983.

In this part of the dissertation an enrichment of the economic approach to choice behavior is introduced by providing theoretical support and empirical evidence for the relevance of behavioral and social factors. By the extension of the concept of economic cost with behavioral terms a concept of behavioral costs is introduced that may enrich both economic and psychological insights.

2. Scarcity of goods: unavailability

Both the articles in chapter 2 deal with one basic assumption in the economic analysis of consumer demand: the independence of preferences and availability. (See e.g. Becker, 1979; Frey, 1983, p.2.).
In the article 'Scarcity and consumer choice behavior' departing from the commodity theory (Brock, 1968) two experiments are described that show a limitedly available good to be preferred to an unlimitedly available alternative, only if the limitations in availability are due to market factors. Commodity theory does not allow predictions on the effect of complete unavialability on the preference for goods. This and the lack of an explanatory behavioral mechanism in the commodity theory led to the introduction of hypotheses based on reactance theory (Brehm, 1966) Both aformentioned theories could not fully explain the findings. Other possibilities, the occurence of frustration and the arousal of social inhibitions, were shortly discussed. The usage of laboratory experimentation in this area is advocated (see also Wärneryd and Olander, 1972).

In the article 'Unavailability and the evaluation of goods: a behavioral economics approach' a distinction is made between different types of limited availability. A number of psychological reactions (reactance, frustration, unicity arousal, cost perception) to explain the effect of different unavailability cases on the preference for goods is discussed. With this the popular notions on the interdependence of preferences and (un)availability, the so-called 'forbidden fruit is sweet' and the 'sour grape' explanations (Elster, 1982) are further developed. Through the execution of a laboratory experiment it is shown that a good limitedly available due to market factors is evaluated as being more unique and more costly and preferred to unlimitedly available

alternatives. It is further found that social circumstances may arouse certain mechanisms that inhibit more positive evaluated alternatives from being chosen. This provides empirical basis for the notion that not only financial budget restrictions but also external social restrictions may determine consumer choice. (See also Lindenberg, 1983). In conclusion we state that the boundedness of consumer choice is not only of a financial and temporal nature (Becker, 1965) but also includes cognitive (rational) (Simon, 1955), physical (availability) and social (norms) factors. (Lesourne, 1979, p. 33).

3. Scarcity of means: Behavioral costs

The extension of financial constraints with social, temporal and behavioral constraints is further theoretically elaborated in the article 'Attitude theory and behavioral costs'. There it is argued that psychological attitude theory lacks a concept such as the economic cost concept. (See also Meyer, 1982).
The Fishbein and Ajzen reasoned action theory (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) is taken to examplify the relevance of a concept of costs for psychological theories. The economic cost concept is extended with behavioral and social costs. These cost concepts generally have the same feature as financial costs. They involve behavioral and social 'prices', task 'demands' such as time, psychic and physical 'demands' that are related to behavioral and social 'budgets'. The main feature of a behavioral budget is its dependence on the goal importance of the associated behavioral field: the more important a goal is to an individual the more budget will be allocated to it. For a detailed elaboration of this topic see the 'behavioral cost' article.

The last two articles, on energy use and on shopping patronage, might be said to refer to real scarcity phenomena in contemporary society. Energy has recently being emphasized as a scarce resource and shopping involves making use of the distribution system, the availability in practice.
This does, however, not form the main reason for their inclusion in this dissertation.
In the article 'A behavioral model of residential energy use' the changes for attitude models as proposed in the foregoing article, are built into a holistic interdisciplinary approach to the study of behavior i.c. residential

energy-related behavior. The behavioral field approach advocated in the aforementioned 'behavioral cost' article, is there brought into practice. The model includes, among others, how a general attitude toward the behavioral field 'energy conservation' is to be related to specific energy conserving acts. The attitude-act relationship includes the factors: knowledge about the relatedness of specific acts with energy use, the acceptance of responsibility and the perceived effectiveness of one's contribution for the solution of the energy problem (both latter factors according to Schwartz, 1975) and an act specific cost-benefit trade-off that incorporates behavioral costs. Empirical studies that are related to this model for energy conservation are Verhallen and Van Raaij, 1981a, b; Van Raaij and Verhallen, 1983; Karns and Khera, 1983.

In the last article 'Retail attribute sensitivity and shopping patronage' the behavioral cost concept has been used "avant la lettre". Retail attribute sensitivity refers to the sensitivities of consumers for changes in retail characteristics such as price, quality, assortment and location. Through the clustering of respondents on their differences in shopping attribute utilities, obtained via conjoint analysis, 'sensitivity patterns' are distinghuised. These sensitivity patterns may be considered as 'proxies' for behavioral budget mixes. The sensitivity patterns reveal the importance of e.g. price and distance (in time) differences of outlets for shopping patronage. The analyses of the relationships of socio-demographics with retail mix sensitivities and of the relationships of sensitivities with shopping behavior (see also De Nooij and Verhallen, 1979; Verhallen, 1980) give support to both the content validity and the predictive validity of the sensitivity concept. The survey study that contained two separate measurement waves demonstrates the potential of such a concept for practical applications such as (backward) market segmentation.

Both Van Veldhoven (1981) and Van Raaij (1981) emphazise that the challence of Economic Psychology, Psychological Economics or Behavioral Economics (terms interchangeably used) and a way to promote its development as a young discipline is to provide economic concepts with a firm behavioral basis. Maital (1982) expects psychology to start a revolutionary development in economic theorizing comparable with the impetus of mathematics on economics. Although I am a firm believer in above statements perhaps the reverse is also true

(Becker, 1979).
Economics as the 'Queen of Social Sciences' (Lindenberg, 1983) might offer the concepts and the formal thinking that may further psychological theories.

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1.2 SCARCITY AND ECONOMIC BEHAVIOR

Introduction

Van Veldhoven (1981) gives an overview of the state of affairs with regard to economic psychology. It appears that consumer research has a dominant place within economic psychology. The study of other economic behavior is also taking shape. We may think about research on saving behavior, entrepreneurial behavior, bargaining behavior and research and theorizing pertaining to the evaluation and acceptance of general economic phenomena, such as well-being, income, taxation. A future task for economic psychology is to provide concepts and theories in economics with a behavioral basis. The importance to support economics with psychology is underlined with the award of the Nobelprize for economics to the psychologist Herbert Simon. His work is concerned with the psychological extension of the principle of rationality within economics.
In this contribution we will go further into the most central concept within economics: the concept of scarcity. We will consider its behavioral aspects. First we will briefly discuss economic opinions about the concept of scarcity. Hereby we will focuss on the micro economic theory of consumer demand. Starting from the shortcomings of this economic theory a further behavioral extension of the concept of scarcity will be presented. Two aspects of scarcity will be considered, namely the scarcity of means and the scarcity of goods. Research and psychological theories of relevance in the attempt to further base the concept of scarcity on psychology will be discussed.

The concept of scarcity in economics

Economics is referred to as the science of scarcity. In two respects the concept of scarcity is of relevance for economic science:

1. The scarcity of means in relation to needs that demand satisfaction leads to a choice when employing these means. Even with the classical economists (e.g. Pareto) economics is therefore defined as 'the science of choice'.
2. Over and above that gradual influence of the scarcity of goods on demand is then described. 'The value of things grows with their scarcity and

diminishes with their abundance' (Condillac, 1776). Expressed more modern: 'Prices form the expression of the relative scarcity ratios'.

The aforementioned views with regard to scarcity are part of the economic theory of consumer demand. The scarcity of means and the scarcity of goods is there further elaborated.

Scarcity within the micro-economic theory of consumer demand

In the classical economic theory of consumer demand from Slutsky and Hicks (Hicks, 1959) both aforementioned aspects of scarcity are represented respectively as a budget restriction and the prices of goods. From the financial means of the consumer and the prices of goods the maximal quantity of a good or a combination of goods that the consumer can afford can be deduced.
The critisism that has been raised is especially directed at the man within the economy, the homo economicus, who rationally and completely informed maximizes his utility. That this image of man does not completely fit in with reality does an economist as Scitovsky sigh: "Are men rational or economists wrong ?" (1974). A second point of critisism concerns the usefullness, the predictive power of the theory. Clarkson (1963) on philosophy of science grounds demonstrates the economic theory of consumer demand not to be a theory but only a model. No operational definitions for the most important concepts are provided so that no predictions about the empiricism can be made. With help of this theory, demand phenomena can only be explained afterwards. In more modern forms of the economic theory of consumer demand such as the Lancaster model (Lancaster, 1969) indeed the operational characteristics have been strongly improved, however, how scarce means are employed remains outside the discussion there. The theory has little to go by when explaining specific consumer behavior.

The scarcity of means and consumer research

It is useful to direct research on decision- and choice-behavior. In the consumer literature of the last decennia, an increasing stream of research on decision- and choice-behavior has been undertaken. This research approach is

directed at questions concerning the influence of the format and quantity of information, the order of information processing and the way it is cognitive represented in the final choice process (see e.g. Van Raaij, 1977; Bettman, 1979). The economic aspect of the scarcity of means is there, however, not a point of discussion. The concept of scarcity in the economy does not only imply a choice to be made, but also implies this to be a choice from scarce means to obtain a good (scarcity of means) or focussing on the influence of scarcity characteristics of goods (scarcity of goods) such as the price and the availability.

In the 'behavioral process'-approach of consumer decision behavior (Chestnut and Jacoby, 1981) this aspect has been partly taken into account.

There it is posed that the choice process is not taking place within an experimental vacuum. In the choice process approach a consumer usually is confronted with a laboratorium situation in which (complete) information about the choice alternatives is offered. From research (Jacoby et al., 1976; Jacoby et al., 1978) it, however, appears that within an actual supermarket setting only a very small part of the available information is being used: for half of the research population less than 2% of the total information on the package. This pleads for further research on the behavioral process. 'To quote Chestnut and Jacoby (1981): To describe acquisition behavior was in effect to describe decision'. Part of the selectivity when searching information about choice alternatives will, no doubt, lay in referring to the memory instead of searching information at the spot. At the same time the scarcity of means (time, energy and money) plays a role when searching information about choice alternatives and when taking decisions. The question is not only what the financial or cognitive capacity is. The attention should especially be directed at the preparedness to make (additional) behavioral costs (time, effort, psychic costs) to be able to make a better decision. In other words, the confrontation in micro-economics of financial means (the budget restriction) with the preference for goods (the utility) has to be broadened with a trade-off that includes the total behavioral costs, to obtain a good picture. Especially for sequential decision behavior, when information about choice alternatives can only be obtained one after the other, this hypothetical concept of 'behavioral costs' could offer a fruitful point of departure. In the foregoing, the aspect of scarcity has been related to the means that can be employed in consumer behavior. The concept of 'behavioral costs' is introduced as an extension of the economic concept of costs. In more recent economic views besides financial

costs also time costs have been mentioned. Especially Becker (1965) stresses the importance of this type of costs especially for the explanation of household production. In the following two examples will be given to demonstrate the usefulness of applying the concept of 'behavioral costs'.

Behavioral costs and store choice

In research on store choice often the relationship is investigated between attitudes toward store outlets, often referred to as store images, and store choice. (Lindquist, 1975). There, usually only weak positive relationships are found between attitudes or images and store choice. An important part of the explanation for this can be found in the abstractions that are being made with regard to behavior.

1.In this research only one facet of the total behavioral pattern 'doing the shopping' namely the store choice is being considered. The store choice when doing the shopping can hardly be explained. This coincides with the arguments of 'behavioral process' proponents: the outcomes of behavior can only be explained from the behavioral context in which it is brought about. Based on an analysis of shopping behavior Verhallen and De Nooij (1982), among others, find two types of 'discount shoppers'. One type of discount shopper buys the total shopping package at the weekly shopping trip: the so-called 'overall discount shopper'. One other type buys only the groceries that can be kept in a discount shop and the rest of the shopping package at several different retailers. The explanation of the choice of a discounter, when doing the daily shopping, appears to be totally different for both type of visitors. The combination of both types under the heading 'discount choosers' thus derogates the explanation of this behavior.

2. Next to this it is being abstracted from the fact that images, attitudes or preferences do not automatically lead to the performance of a specific behavior. The person has to 'behave oneself' that is to say to employ his scarce means (time, energy, psychic costs and money) to bring about a choice. The way in which these behavioral costs are perceived and the way in which they are traded off against one another, may provide an important contribution to the explanation of the final store choice.

In the trade-off approach that has been followed by Verhallen and De Nooij (1982) the participants in the research had to weight two aspects of behavioral costs, price and distance (time) one against the other as well as against with the behavioral outcomes, quality and decision freedom. The difference in weighting operationalized by using a conjoint measurement procedure, appear to be a good predictor for behavior with regard to store choice. The behavioral cost approach from Verhallen and De Nooij has been followed in a large nationwide research project on shopping behavior in The Netherlands.

Attitudes and energy behavior

In social-scientific energy literature usually low correlations between attitudes and behavior are found (see e.g. Verhallen and Van Raaij, 1981). Partially this can be blamed on poor operationalizations or on the difference in level of operationalization: general attitudes toward energy are employed to explain specific behavior (Kok, 1981). Besides this, intervening variables are being introduced such as 'social norms' (Fishbein and Ajzen, 1975), 'acceptance of responsibility', 'perceived effectiveness' and 'expected consequences' (Schwartz, 1975). These intervening variables, especially aim at expliciting the relationship of attitudes with behavioral intentions. In other words, attitudes do only correspond with behavior when some conditions are met. The behavior to be performed may not be in conflict with existing social norms. In addition the person has to accept his responsibility with regard to energy conservation and to perceive his own contribution to be effective in energy conservation. Next to this, behavioral intentions are set equal to actual behavior. In proportion as a specific behavior has a smaller cognitive content and more behavioral costs (time, effort) and it contains other benefits (e.g. comfort, maintenance of care-level) the validity and predictive power of energy-attitudes will diminish. An approach that could be choosen by the government that is directed at a change of the cost-benefit balance of household energy behavior or behavioral patters, may well be a totally different one from the traditional attitude-influencing campaignes. The study of the behavioral process within the household, in which energy use forms an aspect, may provide insight in the individual cost-benefit balance. Information may then be attuned to that behavior in which small (behavioral) sacrifices may

yield an often unexpectedly high result. Research also based on this starting point (Van Raaij and Verhallen, 1981) is now in progress by the SWOKA (Foundation for Scientific Research in Consumer Affairs).

Scarcity and Consumer behavior: the scarcity of goods

Complementary to the scarcity of means is the scarcity of goods. The scarcity of goods is translated within the traditional micro-economic theory of consumer demand into the financial price that has to be paid for a good. The confrontation of the price and the financial budget with the preference curves of goods results, according to the economic micro theory, in a choice with an optimal price-quality ratio. In this the valuation (the utility) of goods, bundles of product attributes, is taken as independent of the financial sacrifice (price/budget ratio) and independent of market factors such as the size and composition of demand and supply. In recent economic literature the traditional treatment of scarcity and consumer demand is extended with the introduction of concepts such as 'social scarcity' and 'positional goods' (Hirsch, 1976) and 'functional' and 'non-functional' demand (Leibenstein, 1976). By recognizing the influence of characteristics other than pure product intrinsic ones and relating this to the theory of demand Hirsch and Leibenstein argue for an extension of the traditional economic theory. However, they do not go into the question of the behavioral determinants or the underlying psychological mechanisms that can provide an explanation for the occurence of the effects of non-intrinsic product characteristics on consumer demand.

Behavioral research on aspects of the scarcity of goods

Two research traditions are concerned with the relationship of the scarcity of goods with consumer behavior. In economic theory it is said that the scarcity of a good is expressed in its price. As the preference for a good is considered to be only dependent on intrinsic product attributes a higher price for a given product will lead, according to the economic theory of demand, to a smaller demand. Since the research of Gabor and Granger (1966) it is known, however, that both aspects of a product (the price, costs) and the product intrinsic qualities (the benefits) can not be seen as independent of one

another. Gabor and Granger demonstrated that sometimes the same product will be chosen more often at a higher price. This is in contradiction with the micro-economic theory of demand. Research that followed has demonstrated that the price often is seen as an indicator of quality. The occurence of a price-quality relationship especially seems to appear whenever there is little product information. Then the price is used as information-cue for the product evaluation (Olsen, 1974). With complete information this effect disappears. Another research tradition concerning the effect of scarcity of goods is inspired by the 'commodity'-theory of Brock (1968). We will treat this theory more in detail. In the commodity theory it is said that the valuation of goods is not only dependent on intrinsic, functional, product attributes but also dependent on demand and supply characteristics.

The commodity theory

The theory promotes a psychological conceptualization of traditional economic variables such as demand, supply and utility. A 'commodity' is defined as anything that is of use for the possessor and that can be conveyed from person to person. The basic premise of the theory is that any commodity is valued to the extent that it is unavailable. This general premise is specified into eight hypotheses that can be brought into four categories. The categories pertain to: scarcity, effort, restrictions and delay. They express that a good is valued to the extent that it is more difficult to attain (effort, delay), there are more restrictions on its availability (restrictions) and it is available to a lesser extent (scarcity). The hypotheses derived from commodity theory do all pertain to information com dities, the effectiveness of messages. Brock discusses research with spect to the hypotheses put (Brock, 1968, pp. 252-270). He finds support for the commodity theory.
Two critical remarks should be made about this:

- Almost all studies reported are concerned with communications. The question arises to what extent the intrinsic qualities of material goods interfere with the value increasing effect of (restricted) availability characteristics, as specified in the commodity theory.
- The dependent variable in almost all studies is evaluative, attitudinal in nature. The question remains unanswered whether the behavioral impetus of the reported value increases is strong enough to cause a change in

choice behavior.
In particular with regard to the first mentioned point studies on scarcity and material goods deserve special attention.

Scarcity research with regard to material goods

The quantity of research with regard to the influence of scarcity aspects using material goods is very limited: only four such experimental studies are known in the literature.
Fromkin et. al (1971) investigated the influence of availability (low versus high) and the expectation to obtain the product (possession versus non possession) on the price evaluation of panties. Only the manipulation of availability showed an indicative effect on the price evaluation of scarce panties. The more limited available panties were judged to be more expensive. No effect was revealed of the expectation to obtain the product on the price evaluation.
Worchel et al. (1975) investigated the effect of scarcity (abundant versus scarce), the cause for scarcity (by accident or by popularity) and a change in the scarcity of cookies. All experimental treatments revealed a significant effect on the attractiveness evaluations. Especially cookies that became 'scarce' due to popularity during the experiment were valued highest.
Piehl (1977) tested the effect for psychology books of price level (high versus low), the kind of book (a clinical versus an experimental psychology book) and the size of potential readership on four evaluative aspects. With respect to the 'scarcity' manipulation (the size of potential readership) only for a clinical psychology book a significant interaction effect of price with size of readership was found. When a high price was combined with restricted readership a stronger desire to read and possess was reported. The other two evaluations of importance and interest were not influenced by the 'scarcity' manipulation.
The aforementioned experiments only partly answer the questions put before. To what extent scarcity characteristics influence the evaluation of products when intrinsic product information is at hand remains unanswered. Within no one of the aforementioned experiments extensive intrinsic product information was provided. The question whether scarcity characteristics are able to influence actual choice behavior also remains unanswered; the dependent variable in the

experiments always was evaluative in nature. This formed the basis for designing two experiments executed by the author. (Verhallen, 1982). A choice situation was created in which product intrinsic information was provided to the subjects. The experiments are concerned with the choice of recipe booklets. The effects of availability respectively attainability and its 'market' causes (limited available respectively attainable due to a limited supply, a high popularity or both combined) were investigated. Therefore the subjects (housewives) were brought into a product test situation. They could choose, among others from three recipe booklets. The experiment on the effect of limited availability on choice behavior revealed that only for subjects who were attracted to the product category (recipe booklets) a limitedly available booklet was choosen significantly more often. This only holds when the limited availibility was attributed to a market cause. In the controle condition with an 'accidentally' limited quantity that booklet was not choosen more frequently than another. Furtheron it was found, in the same experiment, that subjects not interested in the product category significantly more often did not choose the most scarce booklet. This again only holds when the cause for limited availability was not 'accidental'.
The presence of others in the choice situation could have caused the arousal of an 'altruism' motive: not choosing the scarce alternative to give others, interested, the opportunity to do so. In the analoguous experiment on the effect of attainability on product choice it appeared that when a product that is nonattainable at first, in the product test situation, lateron is made attainable is significantly more often chosen by subjects interested in the product category. Booklets that remained to be nonattainable were evaluated significantly lower than attainable ones, again only for interested subjects.

Issues about research on scarcity of goods

The experiments described before give raise to some important questions. The hypotheses formulated within Brock's commodity theory have to be translated when applied to material goods. Brock is deliberately vague in this respect. As a starting point, so he sais, his theoretical frame is restricted to the effectiveness of communications. The hypothetical effects of providing more product intrinsic information, as with material goods, is not being specified. With product intrinsic information at least two aspects can be distinguished:

the nature and the quantity of the information. Only in the experiments of Verhallen information about the productis given explicitely in the form of a description of the contents. As in the other experiments hardly any product intrinsic information was provided, only hypotheses can be formulated with regard to the interfering effect of product information. In particular the hypothesis that price information interferes with the effect of aspects of scarcity on product preference deserves future research attention. The kind of product can also be of influence on the effects of aspects of scarcity. For example, with so-called 'positional' goods (Hirsch, 1976) the effect of scarcity could be stronger when caused by popularity.

With regard to the influence of the amount of information, the number of product cues, an analogy with the price-quality relationship can be made. It could well be that the relationship of scarcity with product valuation is especially valid whenever few or no other information on the product is provided.

The question about the behavioral impetus of scarcity has been mentioned earlier. In the research of Verhallen it appeared that the presence of others in the choice situation might explain the reversal of the effect of limited availability. Non involved subjects appeared exactly not to choose a scarce product. Fromkin (1970) also supposes that, dependent on the situation scarcity may arouse motives such as 'competition' or 'social comparison'. In any case it is evident that the commodity theory is insufficient.

In the literature more often the lack of an explaining behavioral mechanism within the commodity theory has been mentioned. The hypotheses formulated by Brock are not being explained: nowhere it becomes clear <u>why</u> scarcity, effort, restrictions and delay have a positive effect on the valuation of a commodity. Fromkin (1970) supposes that scarcity leads to the arousal of an unicity motive, analogous to the snob-effect. This, however, can not explain the higher valuation found by Worchel et al. and the more frequent choice found by Verhallen, for products that are limitedly available due to a large popularity. We could rather speak of a 'bandwagon'-effect. In this context it is characteristically that both Worchel et al. (1975) and Verhallen (1982) have recoursed to the 'reactance theory' (Brehm, 1966). The reactance theory says that when the individuals freedom to have a specific item is threatened or eliminated, that item will increase in value. This could be the result of the motivation of the individual to restore his freedom to have that item.

However, also the reactance theory could not explain the results of the attainability experiment of Verhallen. Other explaining psychological mechanisms (e.g. frustration) appear to be necessary. It is evident that such a psychological foundation to the several aspects of scarcity of goods needs further research and further theorizing.

Discussion

In the state of the art article of Van Veldhoven (1981) one of the problem areas of economic psychology mentioned, is to foundate concepts, postulates and assumptions of economic theory in behavioral science. With regard to the concept of scarcity a first step in this has been made here. With respect to the relationship of the scarcity of goods and consumer behavior the research discussed makes clear that this will no be an easy task. The existing commodity theory raises more questions than it answers. To explain how and why scarcity characteristics, such as price, availability and attainability affect product evaluation and product choice, further research is necessary. A reason mentioned by Simon and Stedry (1972) why economists despite evident shortcomings in the economic theory of consumer demand are hesitative for behavioral scientific research becomes clear: the number of variables with what the economic theory has to be extended cannot be overseen the time being. Gaining a (better) insight in the behavior of the consumer can, however, only in this way be obtained. The psychological extension of the concept of 'budget-restriction' into 'scarcity of means' shows that an economic psychological approach can also be fruitful for psychology. Although there has hardly been any research on the way people trade-off and handle their scarce resources such as time and effort (Lanzetta and Kanareff, 1962) the concept of behavioral costs if further elaborated and specified, nevertheless opens perspectives for explaining longitudinal choice processes and attitude-behavior relationships.

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CHAPTER 2.

SCARCITY OF GOODS: unavailability

2.1 Scarcity and Consumer choice behavior
Journal of Economic Psychology, 2, 1982, 299-322.

2.2 Unavailability and the evaluation of goods:
a behavioral economics approach
(submitted for publication).

Journal of Economic Psychology 2 (1982) 299–322
North-Holland Publishing Company

SCARCITY AND CONSUMER CHOICE BEHAVIOR

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Received November 9, 1981; accepted April 20, 1982

Two experiments are performed to test hypotheses derived from commodity theory. Commodity theory promotes a psychological conceptualization of traditionally economic variables such as supply, demand and utility. The theory concerns itself mainly with the effect of restricted availability upon the valuation of communications, but in the present paper the effect of restricted availability and attainability on the preference for material goods (recipe books) is investigated.

The first experiment was designed to test the effect of degree of availability (low, middle or high) and cause of unavailability (accidental unavailability, unavailability due to popularity, unavailability due to limited supply and unavailability due to both limited supply and popularity) on the choice between three recipe books in a simulated product test. The results suggest that the theory is valid only for attractive products. For subjects who were not attracted to the product this relationship was reversed (they avoided choosing the scarce product), indicating the arousal of an 'altruism' motive in the experimental setting.

The second experiment was designed to test the effect of attainability (attainable, unattainable changed to attainable and unattainable) and cause of unattainability (accidental, popularity, limited supply and both limited supply and popularity) on the same kind of choice. The results again suggest that commodity theory is valid only for subjects attracted to the good, and only for the restricted attainability situation. For subjects not attracted to the product field no treatment effects were found. Commodity theory makes no clear prediction of the effects of unattainability, so reactance theory was used to predict the effects of this variable. The hypothesis that an unattainable good is valued more than an attainable good had to be rejected. A possible explanation based on the occurrence of frustration in this condition is discussed.

Introduction

Scarcity is a central concept in economics. It is in fact part of the definition of economics. The scarcity of means and goods sets the boundaries of economic science.

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0167-4870/82/0000–0000/$02.75

As we restrict ourselves here to the effects of scarcity on consumer behavior, the relevant question is how the concept of scarcity is handled in the microeconomic theory of demand. Although this is not explicitly stated, Slutsky and Hicks' (Hicks 1959) classical theory of consumer demand deals with both scarcity of means and scarcity of goods. Scarcity of means is translated into financial terms, as budget restriction; scarcity of goods is translated into the price of goods. Later (Becker 1965) the purely financial definition of scarcity of means has been broadened to include scarcity of time. However, no behavioral theory and little research (Lanzetta and Kanareff 1962) has been devoted to the ways consumers handle their scarce resources of money, time and effort.

Complementary to the scarcity of means is the scarcity of goods. In the traditional microeconomic theory of demand the scarcity of goods is translated into a financial price to be paid for a given good.

According to traditional economic theory, the confrontation of price and budget, on the one hand, with the preference curve for goods, on the other hand, results in an optimal price-quality (value) choice. Here the evaluation of product attributes is seen as independent of the financial sacrifice (price/budget ratio). Since Gabor and Granger (1966) we have known that the two aspects of product evaluation, price and quality, can no longer be seen as independent. If there is little product information to hand, then price is seen as an indicator of quality. This price-quality relationship has been demonstrated in several more recent studies (see Olson 1974, for an overview).

In recent economic literature the traditional economic treatment of scarcity and consumer demand is extended with the introduction of concepts such as 'social scarcity' and 'positional goods' (Hirsch 1976) and 'functional' and 'non-functional' demand (Leibenstein 1976). Hirsch distinguishes social scarcity from material scarcity. If the availability of a good depends only on technological and economic production factors, it is referred to as materially scarce. Goods which are available to each of us, but which cannot be made available to us all e.g. a high social position, an old masterpiece of art, are referred to as socially scarce goods.

The satisfaction derived from such (postional) goods will not only depend on their intrinsic characteristics but will also be influenced by the extensiveness of their use. Leibenstein argues for a reformulation of traditional microeconomic theory by including interdependencies be-

tween consumers, as reflected in bandwagon-, snob- and Veblen-effects, in his economic treatment of consumer demand. He recognized that in such effects a nonfunctional demand becomes overt. Nonfunctional demand is defined by Leibenstein as that portion of demand which results from factors other than the qualities inherent in the commodity. So both Hirsch and Leibenstein argue for an extension of the traditional economic theory of consumer demand. However, they do not go into the behavioral basis or underlying psychological mechanisms for explaining the effects of nonintrinsic product characteristics on consumer demand.

The commodity theory of Brock (1968) deals with this more extensively and deserves special attention.

The commodity theory of T.C. Brock

The theory argues for a psychological conceptualization of such traditional economic variables as supply, demand and utility. In this theory the valuation of a commodity is said to depend not just on intrinsic, functional product attributes, but also on supply and demand characteristics. A 'commodity' is defined as anything which has usefulness to the possessor and which can be conveyed from person to person (Brock 1968: 246). The main premise of the theory is that any commodity will be valued to the extent that it is unavailable. The more restricted and less available a good is, the more it will be valued.

This general premise is expressed in a number of more specific hypotheses. These hypotheses are placed into four categories, referring to scarcity, effort, restrictions and delay. All these hypotheses begin with 'a message will increase in effectiveness', because the theory focuses on information as the major commodity of interest.

The hypotheses with regard to scarcity are:

Hypothesis a: "a message will increase in effectiveness as the perceived number of co-recipients, relative to the total number of potential co-recipients, declines".

Hypothesis b: "a message will increase in effectiveness to the extent the recipient perceives that few other communicators exist who might have delivered the same message".

With regard to effort:

Hypothesis c: "a message will increase in effectiveness the greater the

degree of coercion upon the communicator needed to bring about disclosure".

Hypothesis d: "a message will increase in effectiveness the greater the perceived effort involved for the communicator, either to conceal the information or to transmit it".

Hypothesis e: "a message will increase in effectiveness the greater the magnitude of the recipient's effort to obtain the information or to understand (decode) it".

With regard to restriction:

Hypothesis f: "a message will increase in effectiveness in proportion to the amount of accompanying reasons opposing disclosure".

Hypothesis g: "a message will increase in effectiveness the greater the restrictions set by the communicator on further transmission".

Delay is seen as a further means of conveying unavailability:

Hypothesis h: "a message will increase in effectiveness the greater the delay by the communicator".

These hypotheses are discussed by Brock in the light of research collected by other investigators and of research carried out by himself and his associates. He finds support for hypotheses a, d and g. Other hypotheses receive only partial support and c very little (see Brock 1968: 252–270).

A few critical remarks must be made:

- In almost all reported studies the only commodity investigated was information. The only information provided to subjects was the limited availability of the message, holding the intrinsic properties of 'commodities' constant across conditions. So the question arises whether the commodity hypotheses can be transferred to material, tangible goods. The intrinsic properties of material goods might interfere with the value-increasing effects of the unavailability characteristics specified in the hypotheses.
- The dependent variable in almost all reported studies was evaluative. So the question remains whether the more positive verbal evaluations found are strong enough to influence choice behavior.

What little evidence does exist on the scarcity of material goods deserves special attention.

Scarcity research with regard to material goods

Research on commodity theory with regard to the effect of scarcity on the valuation of material goods is very limited. A literature review revealed only three experiments. Using nylon hosiery, Fromkin et al. (1971) investigated the influence of availability (high vs. low) and expectations of obtaining the product (possession vs. nonpossession) on price evaluation. Only availability revealed a trend in the expected direction ($p < 0.06$) on the valuation of scarce nylons. Less available nylons were rated as more expensive. Expected possession did not affect the price evaluation.

Worchel et al. (1975) investigated in a $(2 \times 2) \times 2$ design the effect of scarcity (abundant vs. scarce), change in scarcity (change from abundant to scarce, change from scarce to abundant, scarce no change and abundant no change) and the cause of scarcity (accidental vs. popularity) on the valuation of cookies. All their experimental treatments had a significant effect on liking and attraction ratings.

Scarce cookies, especially when becoming scarce due to popularity, were rated highest. In a further check upon the experimental effects Worchel et al. revealed an effect completely opposite to that hypothesized, for subjects showing suspicion with regard to the experimental manipulations. Subjects who were aware of the experimenters' intended manipulations reacted uncooperatively, that is exactly opposite to the overall trends described above.

A third study testing the commodity theory for material goods is reported by Piehl (1977), using textbooks. In a $2 \times 2 \times 2$ design, he investigated the effects on four evaluative dimensions of price level (high vs. low), the range of potential readers (small, only psychologists, vs. large, addressed to social scientists and others) and kind of book (a clinical vs. an experimental psychology book). For the clinical book only, a high price combined with a small range of potential readers had an effect on the wish to read and to possess the book. The other two evaluations (importance and interest ratings) were not affected by the experimental manipulations. The amount of variance explained by the scarcity treatment (size of potential readership) was very small (2%). The kind of book and the price level accounted for 39% and 12% of the variance respectively.

The experiments described here raise some important questions. The

first question is whether scarcity characteristics do affect the valuation of a material good strongly enough to have any effect when intrinsic product characteristics are prominent in the experimental setting. In the experiments of Fromkin et al. and Worchel et al. almost no (if any) information on intrinsic product characteristics was provided. Piehl provided more intrinsic product cues (a clinical vs. an experimental psychology book). Support for a 'commodity hypothesis' was found only for the clinical book, and then only weakly.

So a possible parallel with findings from price-quality research suggests itself. In that line of research it has been known that price serves as a quality indicator (Olson 1974) only when little intrinsic product information is provided. Note, however, that Piehl did not manipulate availability or attainability.

A second question already raised above, is whether the valuation change due to scarcity manipulations affects actual choice behavior.

The above questions were the basis for designing the two experiments reported here. A choice situation was created in which both intrinsic product information and 'scarcity' information were provided. The dependent variable in both experiments was the actual choice subjects made under different conditions. Another unresolved question is how the hypotheses formulated within Brock's commodity theory are to be translated for use with material goods. Brock is deliberately vague in this respect. As a matter of choice, as he puts it, his theoretical framework is restricted to communications (Brock 1968: 248). For communications the distinction between unavailable and unattainable may be less relevant. However, for material goods this difference may induce different psychological mechanisms. This distinction (first made by Fromkin in his experiment) seems necessary if further theoretical development is to be possible. Of the different reasons for unavailability, as reflected in the hypotheses derived in the commodity theory, market conditions, (social) demand and (limited) supply appear to be the most relevant starting points for experimental research. These considerations led me to explore, in the first experiment, the effect of unavailability and its possible demand and supply causes on choice behavior. The second experiment was designed to explore the effect of unattainability and its causes on choice behavior.

Experiment 1

Design

As a cover for this experiment, a product test situation was used. Subjects had to choose one from three recipe books. Information about the content of the books was given, as well as information about the availability of the books in the choice situation. The three levels of availability (high: 30 copies available; medium: 16 copies available; and low: 6 copies available) were varied across the three books. In the limited availability conditions, one of the following four reasons for limited availability was given: accidental circumstances, popularity of the books in earlier products tests, limited supply, or both popularity and limited supply.

The design may be summarized as a nested $(3 \times 3) \times 4$ factorial design. It includes: 3 recipe books, 3 levels of availability (6, 16 and 30 copies) and 4 causes for the limited availability (accident, popularity, limited supply, and both popularity plus limited supply). This resulted in the full rank design per (four) treatment (accident, popularity, etc.) shown in table 1.

Method

Subjects

Each of the $6 \times 4 = 24$ cells of the design contained at least 4 subjects. The subjects were 111 respondents from the Tilburg area selected randomly from the telephone directory. Female subjects were used for practical rather than theoretical reasons. Student subjects could not be used as the cover story for the scarcity experiments (product tests) caused suspicion among them in a pilot study. They did not consider this kind of research to be 'scientific' enough to be

Table 1

Books	N-copies (six availability combinations)					
- P 1	6	6	16	16	30	30
- P 2	16	30	6	30	6	16
- P 3	30	16	30	6	16	6

performed at a psychological laboratory, and so they guessed that it must have some other purpose. So, to prevent the reactance effect reported by Worchel et al. (1975), housewives were used as subjects in the experiments. In the debriefing, 3 subjects (all familiar with psychological research) showed suspicion and were excluded from the analysis. One other subject already possessed one of the recipe books and was also excluded. So the number of subjects for this experiment was 107.

Procedure

The subjects entered the experiment in groups of 3 to 5, usually 4. As in the advance information they had received, they were told that this was a research project on how to perform product tests. They would be able to keep the products they chose. They were also told that product tests of this kind were held on a regular basis, and they were therefore asked to indicate their interest in 18 different kind of products in case they might cooperate in future product tests.

The subjects were then led into the experimental laboratory. In this laboratory 6 cubicles were available, one for each subject. They were informed that this was in order that they should not influence one another, when making their choices among the products to be displayed before them. The standard instructions were then given to them via earphones and using TV-screens in front of each cubicle. The subjects were instructed to choose between 18 recipe books displayed before them on a table. They could see that all the books were from the same editorial series. They were told that there would be three parts to this particular product test. In each they would have to evaluate and choose between three books chosen at random from the 18. At the end the experimenter would choose, at random, one of the three choice forms the subject had filled out. The subject would receive the book given as first choice on that form. It was emphasized that they should not see each other as competing, as they each would receive different choice forms. They were then given the first choice form on which three books were described.

The information was taken from the back cover of the book, discarding the information referring to popularity, uniqueness, etc. Besides this 'factual' information the subjects received information about the evaluations and choices in previous product tests. They were told that this was to provide them with some more of the 'real world' kind of information they would receive in bookshops or from friends.

The first choice between three recipe books was the same for all subjects. The information given consisted of the content of the books, the popularity of the three books in a previous product test (about equally popular), the number of copies available at the beginning of the experiment (abundant, about 30 copies), and the real world availability (available in the average bookshop). In the second choice, the experimental one, the information about availability within the experiment was varied between the three books. The number of copies available was said to be 6, 16 or 30. The reasons given for these differences in available numbers were varied between subjects:

Condition 1 – by accident: the subjects were told that, by accident, the publisher had sent unequal numbers of the three books;

Condition 2 – popularity: here it was said that these books had been used in a previous product test which started with equal numbers (35 copies of each book), but that one book was chosen 29 times so 6 copies of that book remained, but that the others had been less popular, so that more copies of them remained for this product test;

Condition 3 – limited supply: the different numbers of copies available were attributed to the size of the edition. One book had a very limited edition so that the publisher could spare only six copies. The second book had a less limited but still restricted edition, so the publisher could spare only 16 copies. The third book had a large edition so a sufficient number (30 copies) was available for this test;

Condition 4 – popularity plus limited supply: the subjects were provided with the information from condition 2 and 3 combined. Thus both limited supply and popularity was said to cause the restricted availability of the books.

The subjects were assigned randomly to the conditions. After having received the information on the three books the subjects had to rank-order the books according to their preference.

In the debriefing the subjects filled in a short questionnaire concerning:

- possession of the books (one of the subjects already owned one of the 'experimental' recipe books and was therefore excluded from the analysis);
- understanding of the procedure, instructions, etc.;
- and a (leading) question about the correctness of the availability information. Here three subjects showed suspicion and were excluded from the analysis.

The chosen books were mailed to them later.

Hypotheses

The following hypotheses were tested:

(1) There is no difference in preference for the three recipe books P1 = P2 = P3.
(2) There is a difference in (recipe book) preference for the three availability levels: 6 > 16 > 30.
(3) There is a difference between the availability causes (accidental, popularity, limited supply and popularity plus limited supply) in the effect of availability levels on preferences. Therefore the treatments popularity, limited supply and limited supply plus popularity are tested against the 'neutral' condition, 'accidental' availability.

Results

The book preference rankorders were analyzed using a conjoint measurement algorithm TRIRANK [1], which determines the utility of each level of each factor in the design. A χ^2-test is then used to test the differences between observed and expected rankorders. The procedure can be compared to an analysis of variance in which the variances attributed to different factors are computed first and then the significance of differences between factor levels is tested using the *F*-distribution.

The analyses have been done with conventional analyses of variance as well as with conjoint measurement. As no substantial differences between these analysis techniques were found, only the results from the more appropriate conjoint measurement analyses are provided. The utility scores obtained from TRIRANK for each of the factor levels are presented in table 2. Since, in conjoint measurement analysis, the utilities obtained can only be interpreted relative to each other, the utility of one level of each factor is set, arbitrarily, at zero.

As shown in table 2, none of the experimental treatments produced a significant effect on the preference rankings of the recipe books.

Several possible explanations for these findings can be suggested. First, the operationalization may have failed to produce an impression of unavailability in the experimental subjects. But as all but the three

[1] The author wishes to thank Dr M. Croon, Tilburg University, for developing the computer program TRIRANK to test the effect of treatments in a full rank design on rank data

Table 2
The effect of limited availability and cause of limited availability on product preference

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	−0 36	4 65	*n s*
	P 3	−0 04		
Limited availability cause				
Accidental	6 copies	−0 06		
	16	0	0 05	*n s*
	30	−0 07		
Popularity	6 copies	0 48		
	16	0	2 22	*n s*
	30	0 03		
Limited supply	6 copies	−0 38		
	16	0	0 85	*n s*
	30	−0 20		
Popularity plus	6 copies	−0 26		
limited supply	16	0	0 73	*n s*
	30	0 02		

excluded subjects stated explicitly that they believed in the information provided, this possibility can be excluded.

A second possibility is that commodity theory holds only in situations where no other information about the 'commodities' is given. As this is the major difference between the present experiment and the ones discussed above, this hypothesis seems attractive. It might well be that unavailability only affects the valuation and preference for goods if few or no other information cues are given, as is the case for the price–quality relationship. A third reason could lie in the material used in this experiment, recipe books. A commodity is defined as anything which has usefulness. It is possible that some of our subjects did not in fact use recipe books, so that this condition was not fulfilled. A recipe book was one of the 18 products the subjects rated on a 7-point scale (very attractive – very unattractive) before entering the experiment, and these ratings were used to check upon this last possibility. On the basis of these ratings the subjects were subdivided into an 'attractive product group' ($N = 56$) who had rated recipe books as attractive, and a 'non-attractive product group' ($N = 51$) who had rated recipe books as

neutral or unattractive. The preference rankings were then analyzed separately for the two groups.

The results for the attractive product group are presented in table 3. For this group the availability treatments had a significant effect on product preference for all but the accidental unavailability condition. Two hypotheses with regard to within-treatment difference were tested. The χ^2-values, denoted with (a) in table 3, refer to the overall difference within the condition. The χ^2's denoted with (b) refer to the difference between the highest unavailability level (6 copies) and the two lower unavailability levels (16 and 30) taken together. A higher significance level was obtained with the latter test, indicating the exceptional attractiveness conferred by unavailability at the 6 copies availability level. Note that even though there was a significant effect of the product itself on preference, the hypotheses derived from commodity theory were still confirmed. Only in the accidental availability condition was the hypothesis not confirmed.

Table 3
The effect of limited availability and cause of limited availability on the preference for *attractive* products. ($N = 56$)

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	−0.73	11.1	$p < 0.01$
	P 3	−0.05		
Limited availability cause:				
Accidental	6 copies	0.81		
	16	0	3.66 [a]	*n.s.*
	30	0.59	3.00 [b]	*n.s.*
Popularity	6 copies	1.51		
	16	0	6.55 [a]	$p < 0.05$
	30	0.27	10.50 [b]	$p < 0.01$
Limited supply	6 copies	0.82		
	16	0	6.42 [a]	$p < 0.05$
	30	−0.35	9.63 [b]	$p < 0.01$
Popularity plus limited supply	6 copies	0.86		
	16	0	3.45 [a]	*n.s.*
	30	−0.05	6.01 [b]	$p < 0.05$

[a] χ^2 when testing overall availability within treatment.
[b] χ^2 when testing availability level 6 against the others.

This might indicate that unavailability affects product preference only when it can be attributed to either social demand (popularity) or limited supply. The indicative difference between the medium availability (16 copies) and the 'extreme' availabilities (6 and 30 copies): $\chi^2 = 4.8$, $df = 2$, $p < 0.10$ seem to point in that direction. So the number of 6 copies may have been interpreted by the subjects as not truly accidental but due to limited supply and 30 copies 'accidentally' available may have been taken to mean 'it must be popular'. To test this more directly, the conditions in which the degree of availability was attributed to market conditions were tested against the accidental condition.

Table 4 shows that the accidental condition differed significantly from the others. This confirms that unavailability affects product preference only when it is attributed to market conditions.

The same analysis was performed for the subjects who rated recipe books as unattractive. The results show a pattern completely opposite to what would be expected from commodity theory. The most unavailable book (level 6) received the *lowest* utility value. When the effect of this availability level was tested against the other two levels (denoted (b) in table 5) this difference was significant for all but the accidental condition.

A plausible explanation, not testable in the present data, was offered by the subjects themselves in the debriefing phase of the experiment. When asked whether they felt that they were influenced by the availability information some subjects immediately said 'yes'. They had not chosen the most scarce book, so as to leave it to the others. This effect may have been due to the experimental situation. Most usually, the subjects were performing the 'product test' with three others. They had been introduced to one another before the experiment started. (This was to make them feel more at home in what might have been a

Table 4
The effect of different causes of limited availability on the preference for *attractive* products ($N = 56$)

Limited availability causes	χ^2	*df*	Significance
Popularity vs accidental	6.62	2	$p < 0.05$
Limited supply vs. accidental	7 47	2	$p < 0 05$
Popularity plus limited supply vs accidental	4 73	2	$p < 0 10$

Table 5
The effect of limited availability and cause of limited availability on the preference for *non-attractive* products ($N = 51$)

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	0 39	5 35	*n s*
	P 3	−0 04		
Limited availability cause				
Accidental	6 copies	−0 94		
	16	0	4 12 [a]	*n s*
	30	−0 73	3 57 [b]	*n s*
Popularity	6 copies	−1 03		
	16	0	4 60 [a]	$p < 0$ 10
	30	−0.24	6 07 [b]	$p < 0$ 05
Limited supply	6 copies	−1 32		
	16	0	7 14 [a]	$p < 0$ 05
	30	0 17	10 10 [b]	$p < 0$ 01
Popularity plus limited supply	6 copies	−1 26		
	16	0	6 80 [a]	$p < 0$ 05
	30	0 10	9 20 [b]	$p < 0$ 01

[a] χ^2 when testing overall availability within treatments
[b] χ^2 when testing availability level 6 against the others

threatening situation for them.) They might have anticipated having to confront the other subjects after finishing the experiments. This interesting result may indicate that unavailability, especially when due to scarcity, arouses a social motive when the situation involves the presence of others, and a follow-up experiment has been designed to test this hypothesis more explicitly.

Summarizing the findings: the first experiment indicates that the commodity theory is applicable to tangible products, provided that subjects are attracted to the product field. For such subjects a preference increase for books of limited availability is found, when the limited availability is due to market circumstances (popularity, limited supply or both popularity and limited supply). The expected increase in preference due to limited availability was found to be reversed for subjects who were not attracted to the product field. This indicates that other motives ('altruism') may be aroused by scarcity in subjects who are not interested in the product.

Experiment 2

Design

As in experiment 1, a product test situation was simulated. The same subjects had to choose between three recipe books. Three levels of attainability (attainable, unattainable, unattainable changed to attainable) were varied across the three books. As in experiment 1, one of the following four reasons was given for the non-attainability: accidental circumstances, popularity, limited supply, both popularity and limited supply. These treatments yield a nested $(3 \times 3) \times 4$ factorial design. For each of the four attainability causes six attainability × book combinations are created as shown in table 6. Thus in each cell of the design two of the books are attainable and one of the books is either non-attainable or non-attainable changed to attainable.

Method

Subjects

Each of the $6 \times 4 = 24$ cells of the design contained a minimum of 4 subjects. In practice we ended up with 111 usable subjects spread evenly over the treatments (the same three subjects as in experiment 1 were excluded).

Not knowing beforehand how many subjects would be suspicious, and so have to be excluded, we 'oversampled'. In total 132 subjects participated in these and a following experiment (not reported here), in which the same subjects again had to choose from three different recipe books.

A restriction was imposed in the second experiment to the effect that

Table 6

Books	Six attainability combinations					
- B1	N [a]	A	A	NA [c]	A	A
- B2	A [b]	N	A	A	NA	A
- B3	A	A	N	A	A	NA

[a] N = non-attainable
[b] A = attainable
[c] NA = non-attainable changed to attainable

no subject could receive a treatment similar to her treatment in experiment 1. So for example all subjects receiving the treatment 'Popularity plus limited supply' in the first experiment were assigned to the 'accident' treatment in the second experiment. Similarly, all subjects from the treatment 'Popularity plus limited supply' in experiment 2 were recruited from the 'accident' treatment in the first experiment.

Procedure

The general procedure for this experiment was identical to the one used in the first experiment. Besides the information about the content of the recipe books information was provided now concerning the attainability of the books. The subjects were instructed that two of the three books (completely counterbalanced in the design) were completely attainable. More than sufficient copies were available. All the subjects were instructed on the choice form that regrettably one of the books was not there. The causes for this were similar to those used in experiment one:

- *Accidental:* they had not arrived in time from the publishing house;
- *Popularity:* the subjects participating in the product tests on previous days had chosen them far more often than expected. We were temporarily sold out;
- *Limited supply:* the size of the edition of the books was so small that the publisher could not spare more than the one copy that they saw before them on the table. They could not have that one;
- *Popularity plus limited supply:* both the foregoing attributions taken together. The book has been chosen far more often than expected and because of the small size of the edition the publisher could not spare more copies.

Half of the subjects from each treatment received a piece of paper attached to the choice form. It said that the originally unattainable recipe book was now, contrary to the information given above, attainable. Copies had arrived that morning. The publisher had (agreed to) send sufficient new ones. As the always unattainable book could not be chosen by the subject, the subject was instructed to evaluate it relative to the others. For these conditions, therefore, a preference ranking for the three books was obtained.

Hypotheses

Unattainability changed to attainability

Although the commodity theory is not very specific with regard to attainability, the effort hypotheses derived from the theory can be interpreted as: 'the harder to obtain a good the more it will be valued'.

Based on this interpretation we expect the books that were at first unattainable but later became attainable to be perceived by the subjects in the experiment as harder to obtain, and hence to be preferred to books that were always attainable. We especially expect this to happen in the two 'limited supply' conditions. Thus the first hypothesis is:

H1: The books that were unattainable at first will be preferred to the always attainable books, especially for the two 'limited supply' conditions.

However, as this hypothesis is based upon our interpretation of commodity theory, we turn to the 'gain-loss' notion of interpersonal attractiveness, introduced by Aronson and Linder (1965), to support this interpretation. They found that a change in the behavior of a person from cold to warm led to a higher attractiveness rating for that person than consistently warm behavior. This gain in attractiveness rating, as well as a loss in attractiveness rating for persons changing in behavior from warm to cold as compared with consistently cold, has been discussed more extensively by Clore et al. (1975). In this gain-loss model of interpersonal attraction, we find support for the expectation that subjects in our choice situation will increase their valuation (a 'gain' effect) of an originally unattainable book when becoming attainable.

Worchel et al. (1975), when discussing their results, argue that as the commodity theory does not incorporate a behavioral mechanism as to why scarcity arouses a value increase, a reactance mechanism could be at work. The reactance theory (Brehm 1966) hypothesizes that when a subject's freedom to have a particular item is threatened or eliminated, that item increases in value and attractiveness. This increase in value is the result of subjects' being motivated to restore their freedom to have the item. Worchel et al. found significant differences between their 'scarcity change' and 'scarcity no change' conditions. When the number of cookies changed from scarce to abundant they were valued less than when always abundant.

When cookies changed from being abundant to being scarce they were valued more highly than when always scarce. The reactance-theory explanation given by Worchel et al. (1975: 911) is that "the greater attraction for the cookies in the change than in the no change conditions may have resulted because subjects in the change conditions felt greater reactance as they were made explicitly aware of the threat to their freedom by the actual removal of some of their choice alternatives (cookies). Subjects in the no-change condition were not so explicitly threatened".

So for our experimental condition in which an unattainable book becomes attainable the reactance theory hypothesizes that decision freedom increases. This leads to a decrease in valuation for the originally unattainable book. So the alternative to H1 is:

H2: The books that were unattainable at first will be preferred *less* than the always attainable books. This holds for all causes of unattainability.

Complete unattainability

The hypotheses derived from commodity theory are not applicable to unattainable goods.

The reactance theory however is fairly clear with respect to an unattainable good. The elimination of a choice alternative is expected to be perceived as a decrease in the subjects' decision freedom, so the item removed is expected to increase in value and to be preferred more. So based on the reactance theory we expect:

H3: The book that is unattainable in the choice situation will be preferred to the attainable books regardless of the cause of unattainability.

Results

A general overview of the results from experiment 2 is presented in table 7. The analysis is identical to that pursued in the first experiment. The utility score for the different factor levels were determined using the conjoint measurement algorithm TRIRANK. The differences between them were tested with a χ^2-statistic.

As in experiment 1 no significant effects, except for the product

Table 7
The overall effect of non-attainability and cause of non-attainability on product preference

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	B 1	0		
	B 2	0 58	11 61	$p < 0$ 01
	B 3	0 09		
Non attainability cause				
Accidental	A [a]	−0 57		
	NA [b]	0	1 79	*n s*
	N [c]	−0 81		
Popularity	A	−0 17		
	NA	0	0 58	*n s*
	N	−0 44		
Limited supply	A	−0 25		
	NA	0	1 76	*n s*
	N	−0 76		
Popularity plus limited supply	A	−0 53		
	NA	0	1 32	*n s*
	N	−0 65		

[a] A = attainable
[b] NA = non-attainable changed in attainable
[c] N = non-attainable

factor, were found for the group as a whole. Again the analyses were repeated, separately, for the group of subjects ($N = 60$) who had rated recipe books as attractive, and for the non-attracted group ($N = 51$). The overall findings for the attractive-product group are presented in table 8.

Although this table is shown merely to present the reader with a general overview of the manipulation effects in terms of utility scores, it is evident that the pattern of scores already present in table 7 becomes more pronounced here. The book that was unattainable at first but became attainable was most preferred over all conditions. The freely attainable book came next and the completely unattainable book was least preferred.

Attainability change

The results relevant to the first hypothesis are presented in table 9.

Table 8
The overall effect of non-attainability and cause of non-attainability on the preference order of *attractive* products.

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	B 1	0		
	B 2	0.52	5.44	$p < 0.10$
	B 3	−0.01		
Non-attainability cause:				
Accidental	A [a]	−0.22		
	NA [b]	0	0.10	*n.s.*
	N [c]	−0.21		
Popularity	A	−0.77		
	NA	0	1.75	*n.s.*
	N	−1.15		
Limited supply	A	−0.57		
	NA	0	6.94	$p < 0.05$
	N	−2.44		
Popularity plus limited supply	A	−1.82		
	NA	0	5.65	$p < 0.10$
	N	−2.31		

[a] A = attainable
[b] NA = non-attainable changed in attainable
[c] N = non-attainable

Table 9
The effect of restricted attainability on product preference.

Cause of restricted attainability	Attainable vs. Attainable, but first not Attainable (χ^2 with $df = 1$)		
	Total group ($N = 111$)	Attracted group ($N = 60$)	Non-attracted group ($N = 51$)
Accidental	1.46	0.10	1.75
Popularity	0.12	1.25	0.35
Limited supply	0.28	0.98	0.29
Popularity plus limited supply	1.26	4.96 [a]	0.63
Overall ($df = 2$)	4.37	10.64 [b]	0.62

[a] $p < 0.05$
[b] $p < 0.01$

From table 9 it can be seen that the prediction from commodity theory, that the originally unattainable book is preferred to one that was always attainable, was not significantly supported when tested across all subjects. However, when only subjects attracted to the product category are considered, a strong overall effect appears. An originally unattainable book is significantly preferred ($p < 0.01$) to an always attainable one, so the hypothesis based on the commodity theory is confirmed. This is underlined by the significant difference within the 'popularity plus limited supply' condition. For these, one would expect the strongest 'hard to attain' perception and the largest difference between the originally unattainable good and an always attainable one. It is also evident that the reactance hypothesis has to be rejected. According to reactance theory (Brehm 1966) a reactance effect will only occur when the elimination of a choice alternative is perceived as threatening the subjects' decision freedom. Here the subjects were first informed they would be allowed to choose between three alternatives, and then one of the alternatives was eliminated. The absence of a reactance effect may indicate that this treatment does not induce a threat to the subjects' decision freedom. One may conclude that reactance theory is not applicable here.

Unattainability

Hypothesis 3 is tested by considering the preference for unattainable books relative to always attainable books. Table 10 shows the differences between unattainable and freely attainable books over all conditions as well as within causes of unattainability conditions.

For the group as a whole, there is no preference for freely attainable or unattainable books. For the subjects attracted to the product (recipe books) the attainable book is preferred to an unattainable one ($p < 0.01$).

This finding is contrary to the expectation stated in hypothesis 3, derived from the reactance theory. One possible explanation for this finding is that a demand characteristic is at work in the experimental setting. The subjects for whom a choice alternative was eliminated, might think that they would please the experimenter by indicating that this was not too bad, because it was the least preferred alternative that had been eliminated. But why should this effect occur only for subjects attracted to the product, and especially in the 'limited supply' condition? (In this condition the effect is significant at a 5% level.)

Table 10
The effect of non attainability on product preference

Cause of restricted non-attainability	Attainable vs not attainable (χ^2 with $df = 1$)		
	Total group ($N = 111$)	Attracted group ($N = 60$)	Non-attracted group ($N = 51$)
Accidental	0 33	0 00	0 69
Popularity	0 46	0 52	0 07
Limited supply	1 48	5 97 [a)]	2 41
Popularity plus limited supply	0 07	0 67	0 55
Overall ($df = 2$)	2 58	9 73 [b)]	3 10

[a)] $p < 0\,05$
[b)] $p < 0\,01$

If a demand characteristic caused the low preference for non-attainable books we would expect it to occur in all conditions. However, another explanation is available. Note that the preference for an unattainable book is exactly the reverse of that for an attainable book that was unattainable at first: differences in preference are only obtained for subjects attracted to the product and strongest when the cause of unattainability is limited supply. If we assume that the choice alternative eliminated would have been valued most in these conditions, then unattainability of this alternative may be perceived by these subjects as blocking a desirable choice. So here frustration may in fact be induced.

According to the frustration-aggression hypothesis (Dollard et al. 1939) this might have caused these subjects to devalue the unattainable alternative.

Discussion

Commodity theory argues for a psychological conceptualization of traditional economic variables such as supply, demand and utility. The body of research evidence to support the theoretical skeleton is however very limited. A number of questions arise in applying commodity theory, originally designed for communications, to material consumer goods.

From the experiments reported here it appears that the theory is valid only for those consumers rating the good as attractive. This might be generalized into 'the commodity theory is only valid for recipients who are involved with the product category'. Further research evidence is needed on this point. Another question has been raised as to how and to what extent information about intrinsic product attributes and price interferes with the effect of unavailability on product valuation. There may be a similarity to the price–quality relationship: we can propose the hypothesis that the strength of the effect of unavailability on product preference varies inversely with the number and type of product cues prominent in the choice situation. So the effect of scarcity is hypothesized to be strongest when no other information about the good is available. Further research is needed to test this hypothesis also.

As commodity theory restricts itself to the effects of unavailability, problems arise when deriving hypotheses from the theory with regard to unattainability. From the first part of the second experiment it appears that the hypotheses derived from the commodity theory concerned with 'effort', are applicable to restricted attainability. This raises a more general question. What behavioral mechanism, or mediating process, is involved in the explanation of the effect of unavailability and unattainability on product valuation?

Fromkin (1970) provides evidence that the value increase under restricted availability is due to an 'unicity' motive. He found the strongest effect of restricted availability on value increase in a situation of uniqueness deprivation. Fromkin also hypothesizes that other connotations of unavailability may be accentuated by arousing other motives such as 'competition' or 'social comparison'. For the subjects not attracted to the product category in experiment one, the social setting may indeed have raised an 'altruism' motive. So the situation may mediate the effect unavailability has on product preference.

The findings with regard to complete unattainability from experiment 2 suggests that complete unattainability induces frustration. At least, this may explain the reversal of the effect found there compared with the 'restricted' attainability case. These latter findings lead to the speculation that the commodity theory might be seen as a special case of a more general arousal theory.

To conclude with a general remark: the findings with respect to the effect of supply and demand characteristics on product preference suggests that the micro-economic theory of consumer demand might

gain from a behavioral approach to the supply-demand analysis with which it is concerned.

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Unavailability and the evaluation of goods: a behavioral economics approach.

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February 1984

Abstract

In this paper a positive, experimental approach to the study of consumer demand is advocated. More specifically the relationship of availability and the evaluation of goods is addressed. Psychological theories and experimental evidence on the effects of different types of unavailability and limited availability on choice behavior are discussed. Hypotheses derived from an analysis of these experiments on this topic are tested in an experimental choice situation. The results from this experiment are reported and their relevance for the enrichment and improvement of our understanding of behavioral mechanism underlying central micro economic phenomena is discussed.

1. Introduction

The focus of this article is on how psychological theories can be used to enrich economic demand theory, and more specifically the understanding of the relationship of availability characteristics and consumer preference. Starting from critisism on the micro economic theory of consumer demand a positive, experimental approach to the study of economic behavior is advocated.
Then a discussion follows of psychological theories and experimental evidence that may explain the effect that different types of unavailability and limited availability have on the evaluation of goods. Finally, some hypotheses derived from an analysis of these experiments are tested in an experimental choice situation. The results from this experiment are reported and their relevance for the enrichment and improvement of our understanding of behavioral mechanism underlying central micro economic phenomena is discussed.

1.1. Criticism on the micro economic theory of consumer demand

In traditional economic theory of consumer demand consumer choice is said to be determined by a confrontation of preference with financial means. This traditional form of the economic demand theory (e.g. Hicks, 1959), as can be found in any textbook, has been criticized on both formal and material grounds. The deductive, normative nature of the theory has raised some metatheoretical arguments. Clarkson (1963) argues that as the theory lacks operational rules about how to measure relevant concepts, it cannot be falsified. He further argues in favor of putting this theory aside and directing research efforts to the study of decision making.
Others have not been so eager to sacrifice the rigor and elegancy of the theory, being afraid of 'crass empiricism' (Morgan, 1978). 'Revealed' preferences as introduced by Samuelson (1947) have improved the operational qualities of preferences as integrated in modern treatises of demand theory (e.g. Lancaster, 1971).
Another metatheoretical point of debate pertains to the status of the assumptions in the theory. The statement of Friedman (1953, p. 14) that 'the more unrealistic the assumptions the more significant they are as pillars for theory foundation', has been a topic for discussion for many years.
Musgrave (1981) demonstrates that for all three types of assumptions that can be distinguished: negligibility, domain and heuristic assumptions this standpoint can not be held. The more realistic the assumption the more fruitful it is as a basis for theory formation.
More material criticism has been raised with regard to the content of the assumptions of the traditional consumer demand theory. The rational economic man has said to be a bounded rational man due to Simon's work. The 'complete knowledge' assumption has led to research on the cost of search (e.g. Stigler, 1961; Cross, 1980) as well as to research that shows the relevance of risk and uncertaincy (Tversky and Kahneman, 1981) for decision making (see for reviews Slovic, Fischhoff and Lichtenstein, 1977 and Einhorn and Hogarth, 1981). Criticism on the economic model of behavior has recently been covered most extensively by Schoemaker (1982) and Frey (1983).

Frey when discussing shortcomings of the economic model of behavior advocates the enrichment of both constraints and preferences in consumer demand theory. Such an enrichment could well be attained by experimental work on the behavioral basis of economic man. Recently an uprise in interest in studies based on experimental work in economics can be noted (e.g. Smith, 1979 and 1982[a]). This uprise is related to the increased interest of economists and psychologists in developing common problem areas.(Day and Winter, 1980; Van Raaij, 1981; Van Veldhoven, 1981; Stroebe and Meyer, 1982) and the emphasis placed on a behavioral approach to economics (see e.g. Simon and Stedry, 1969; Katona, 1975; Cyert and Simon, 1983). The experiment has been advocated as a tool for economists for a variety of practical, heuristical or theoretical reasons:

- Laboratory experiments are easier to gather information on economic phenomena than from natural setting in the economy (Stolz, 1981).

- 'Experiments are an alternative, relatively inexpensive and relatively quick source of data...' (Plott, 1982, p. 1524).

- 'In short, we feel that experimental techniques can be of benefit to economics in casting doubt on previously accepted or seemingly logical behavioral results' (Schotter and Braunstein, 1981).

- Mostly, the experimental method has been advocated as an instrument to provide a sound empirical basis for the development of a theory of economic behavior (Kagel and Winkler, 1972, p. 337) as it allows for the study of economic phenomema in controlled situations (Wärneryd and Olander, 1972).

In several areas the experimental method has been widely adopted. Since the pioneering work of Siegel and Fouraker (1960) it has been a common practice tot use laboratory experiments in studies on bargaining and negotiation (Tietz, 1983). In studies on token economies, micro economic systems have been created in the laboratory to study resource allocation processes (e.g. Smith, 1982[b]). Most wellknown are the experimental studies which depart from traditional economic theory of consumer demand (Hicks, 1959) and aim at a renewed reflection on the underlying assumptions about human economic behavior. Since the pioneering work of Simon (1955) on bounded rationality studies that aim at discovering and explaining decision making processes have been recognized as a task for social scientists (Tversky and Kahneman, 1974 and 1981).
Both the normative and the descriptive studies on the boundedness of rationality broaden our view of the economic man (Klein, 1983). Especially in studies on animal behavior, experimental procedures are used to derive demand curves, (Rachlin et al. 1976; Lea, 1978; Rachlin and Krasnoff, 1983) and study labor supply (Battalio et al, 1979) or substitution phenomena (Rachlin et al., 1980). For an overview see Lea (1981).

Similar human experiments on basic economic concepts such as demand, supply and scarcity are very few (Verhallen, 1982[a]). In the following we will discuss these experimental efforts with regard to consumer demand and the availability of goods. More specifically we will focus on choice behavior as dependent of constraints such as price and availability. We will therefore first discuss some micro economic views on this topic. Then we will shortly review experimental work in this area.

1.2. Availability

An assumption of demand theory that has received relatively little attention is that goods are assumed to be readily available. If they are not readily available, the costs to make them available, the acquisition costs, according to modern treatise of demand theory have to be taken as part of the total price (e.g. Becker, 1965; Lesourne, 1968). Recent theorizing on this topic has broadened the scope with psychic costs, such as 'the cost of thinking' (Shugan, 1980) 'sunk costs' (Thaler, 1980) and perhaps most detailed with 'behavioral costs' (Verhallen and Pieters, 1984). It is discussed there that not only financial constraints but also behavioral and social constraints do affect economic behavior

Other economists have stressed quite another aspect of the availability assumption. Hirsch (1976) introduces the concept of 'positional goods'. These 'socially scarce' goods, as opposed to materially scarce goods are in principle available to each of us, but can not in practice be made available to us all. Examples mentioned are e.g. a high social position and an old masterpiece of art. The valuation of these positional goods is said to depend not only on intrinsic product qualities but also on the possibilities to attain such a good. Similarly Leibenstein (1976) argues that in Veblen -, bandwagon-, and snob-effects a non functional demand becomes overt. Non functional demand is defined as that portion of demand that is not a result of intrinsic product qualities. So both authors stress the value enhancing effect of unavailability characteristics, being either product of non product specific.
Summarizing this far we have found a double role of the availability characteristic of goods.
On one hand not readily available goods are considered to cost more in monetary or behavioral terms and hence will be chosen less.
On the other hand, unavailability is said to have a value increasing effect that leads to a preference increase with the consumer.

In the following the effect of unavailability on the evaluation and preferences of goods will be discussed.

2. Unavailability affecting preferences

Two popular expressions can be noted (Elster, 1982) on how unavailability as well as other extrinsic product information affect the preference and the valuation of goods:
(1) The 'forbidden fruit is sweet' saying expresses that the preference for a commodity that is outside ones reach is increased just because it is unreachable.
(2) The 'sour grape' expression implies that when a commodity is not available the individual therefore reduces his preference for it.
These sayings seem to be one another's opposite. A closer inspection of empirical evidence suggests that both of them receive support. The 'forbidden fruit is sweet' saying can be seen as a rudimentary form of the psychological reactance theory (Brehm, 1966). The 'sour grape' expression can be considered as a specific form of frustration theory. Both theories have been connected with the effect of availability on preferences.

2.1. Reactance theory

Worchel, Lee and Adewohle (1975) investigated in a (2x2)x2 design the effect of availability change (change from abundant to scarce, change from scarce to abundant, abundant no change and scarce no change) and the cause of unavailability (accidental vs. popularity) on the valuation of cookies.
This experiment demonstrated that scarce cookies expecially when becoming scarce due to popularity were rated highest on liking and attraction scales. The interpretation of the findings given by the experiments was based on reactance theory (Brehm, 1966). The reactance theory hypothesizes that when a choice alternative is removed from a given set this is perceived by the individual as threatening his decision freedom. This threat is reacted upon by the individual by increasing the perceived value of the removed alternative. In the experimental condition in which an abundantly available cookie, becomes scarce due to popularity, the threat is assumed to be most pronounced and the highest value rating is obtained there is accordance with predictions based on reactance theory. So the 'forbidden fruit is sweet' explanation finds confirmation here.

2.2. Reactance theory versus frustration theory

Verhallen (1982 p. 313-320) describes an availability [1] experiment with 111 housewives choosing between three recipe-books in a simulated product test situation. Three levels of availability (available, unavailable, unavailable changed to available) were varied across the three books. One out of four reasons for non availability was given: accidental circumstances, popularity, limited supply and both popularity and limited supply. So a nested (3x3)x4 factorial design was used. The hypothesis based on reactance theory had to be rejected. The unavailable book was not valued highest over all conditions but valued lowest, especially when having a not-accidental reason for its unavailability. The unavailable book that changed to become available was not rated lowest however turned out to be rated highest [2]. These findings were most clearcut for subjects interested

in the product field under study (recipe book) and in the 'market cause' conditions. Some alternative explanations were discussed.
For the non available good an explanation based on the occurence of frustration in the experimental situation was given. The elimination of a choice alternative, that would have been evaluated as most positive, could be interpreted by individuals as blocking a desirable alternative. So the induction of frustration will then, according to the frustration-aggression hypothesis (Dollard et al., 1939), make subjects prone to devalue the unavailable alternative.

The 'sour grape' explanation is according to this view rooted in frustration. The comparison of the experiments of Worchel et al., and Verhallen's experiment may indicate the conditions that lead to either theoretical explanation. If, as is the case in the experiment of Worchel et al., a choice alternative is firstly offered and there after is removed (made unavailable or threatened to be made unavailable) a reactance effect will occur. However if, as is the case in Verhallen's expriment, an attractive choice alternative is offered as being blocked from the beginning, a frustration effect might be hypothesized. Thus relevant for the effect unavailability has on preference formation are the specific preceeding conditions.
The relationships of the two distinguished types of unavailability with preference are summarized in Table 1.

Table 1. Unavailability and preference

Availability description	behavioral mechanism	preference effect
no longer available	reactance	increase
availability blocked	frustration	decrease

3. Limited availability and preference

From an economic standpoint a completely unavailable good is not very relevant. A good that has been unavailable in the past and now is available or a good that is limited available however is relevant. Then economic exchange processes are still possible.
Let us first consider the case of a good now being available after having been unavailable in the past. In Verhallen's experiment an unavailable book that becomes available was found to be rated significantly more attractive than an always available one.
This finding forces a new look upon us: frustration and reactance theory are not applicable, it is not that a choice alternative is blocked or taken away, the reverse has happened by adding an alternative to the existing ones. Therefore a reversal of a reactance effect was hypothesized: a lower preference for the added alternative as opposed to a higher preference for an alternative taken away. This hypothesis had to be rejected. It was further found in this experiment that in the experimental conditions in which 'market' explanations for prior unavailability (due to popularity and/or limited supply) were offered the value increase of the alternative that becomes available is significantly higher than in the condition in which an 'accidental' reason was offered. So not the change in availability as such but the perceived cause for this change will determine the preference increase. The commodity theory (Brock, 1968) adresses the relationship of limited availability as conveyed in different ways on the valuation of commodities.

3.1. Commodity theory

Brock (1968) states that the valuation of a commodity does not just depend on intrinsic, functional product attributes, but also on supply and demand characteristics. The main premise of the theory is that any commodity will be valued to the extent that it is unavailable, the more restricted and less available a good is, the higher it will be valued.
This general unavailability premise is specified in eight hypotheses grouped into four categories pertaining to: scarcity, restrictions, delay and effort. These hypotheses express that the valuation of a good is dependent on the size of its demand and supply, the restrictions set by the supplier to attain a good and the amount of time and effort necessary to attain a good, the commodity theory restricts itself to information, the effectiveness of messages, as the relevant commodity (Brock, 1968, p. 248). It has also been employed to explain the value enhancing effect of restrictedly available erotic material (Fromkin and Brock, 1971). A problem raised by several researchers is why and how (these) unavailability factors as distinguished by Brock affect the valuation of a good. (Fromkin, 1970; Worchel et al. 1975; Verhallen, 1982).
A unicity motive is hypothesized to explain the value increasing effect of unavailability. Fromkin et al. (1971) demonstrated that a good only available at restricted periods in time is more highly valued than an unrestrictedly available good. Fromkin and his associates argue that such effects of restriction can be best understood from

the arousal of a unicity motive (Zellinger et al., 1975; Snyder and Fromkin, 1980). It is however hard to explain the effect of scarcity due to popularity or the effects of effort and delay on the valuation of a good with a unicity motive. An unicity motive seems to be one out of several possible motives that can be aroused through limited availability.

In Table 2 three different types of limited availability are distinguished: restricted availability, conditional availability and limited availability due to market circumstances.

Table 2. Limited availability and preference

availability limitations due to	condition	behavioral mechanism	preference effect
restrictions (only for)	group belongingness	- unicity arousal - arousal other social motives (e.g. prestige, altruism)	increase depends
conditions (only if)	behavioral - delay - effort (psychic) (physical) financial - price social - service	- cost evaluation	increase
market circumstances (scarcity)	- demand - supply - demand and supply	- cost evaluation - arousal social motives	increase
	- accidental	no	no

Restricted availability was also mentioned in Brock's commodity theory. Restricted availability as used here, refers to the belongingness to a specific group e.g. age group, a member, a participant. Only for individuals belonging to such a group a good is available. Conditional available means that only if certain conditions, task requirements, are met, a good becomes available.
So both Brock's categories 'effort to be spent' and 'time to wait' as well as a financial price to be paid and a service to be rendered are included.
The third type of limited availability refers to market circumstances, factors with regard to demand and supply that lead to the limited availability.
In the following the effects of these three types of limited availability on behavioral reactions and on the preference for goods will be discussed.

3.2. Restricted availability: social values and norms

Fromkin et al.(1971) when discussing the effect of restricted availability mention the possibility that in some situation not a unicity motive but other social motives might arise. The valuation of positional goods, socially scarce goods, as discussed by Hirsch (1977) might well be based on the social prestige that is perceived as being associated with such a good. From the debriefing of subjects after scarcity experiments Verhallen (1982) brings forward the hypothesis that an 'altruism' motive was aroused in some subjects uninterested in the experimental books. This altruism motive could have caused the subjects not to choose the limitedly available alternatives.
So restrictions on the availability of goods may lead to an addition of social value e.g. unicity, prestige, to the commodity or to the elicitation of social norms e.g. altruism, equity, (Lerner, 1981) that inhibit the overt choice. In attitude theory (Ajzen and Fishbein, 1980) a behavioral intention (e.g. a buying intention) is seen as influenced by two types of factors: attitudes toward an object or act and social norms that may inhibit or facilitate the expression of personal preferences in overt behavior.
Both social effects (social prestige and altruism) of restricted availability on the valuation of goods and the effect of social norm elicitation on overt choice need further exploration.

3.3. Conditional availability: delay, effort, service and price as cost factors in availability

In the commodity theory four groups of factors were distinguished that convey unavailability: restriction, delay, effort and scarcity. From a review of experimental research based on the commodity theory it becomes clear that only the effect of restrictions on the valuation of commodities received extensive empirical attention (Fromkin and Brock, 1971). The effect of scarcity on the valuation of goods received little attention (Verhallen, 1982). Empirical research or theoretical elaboration on how and why delay and effort as the other two unavailability cues affect the valuation of goods has not been undertaken in this context [3].

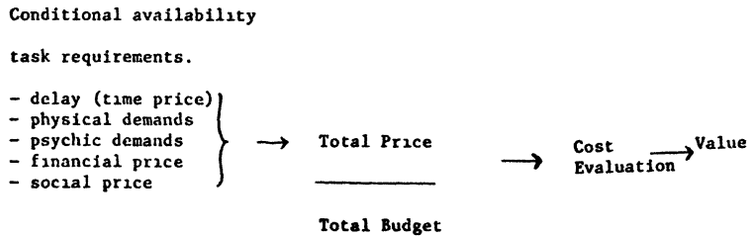
In a first formulation of a behavioral costs theory Verhallen and Pieters (1984) emphasize the importance of non financial costs for the explanation of reasoned action. Financial costs are extended with behavioral and social costs. Behavioral costs include psychic, physical and time demands. Brock's delay and effort, divided in psychic and physical effort, can be recognized as behavioral costs. Social costs such as compliance, instrumental services and acceptance (see e.g. Blau, 1964) can also be distinguished. Apart from a financial price a behavioral or a social price may have to be paid in given situations in order to obtain a good.

After Scitovsky (1945) the possible dependence of value, expressed in product preference, and price has been considered: price may serve as an indicator of quality. Research by e.g. Gabor and Granger (1961 and 1966) confirms this hypothesis on the price-quality relationship. In a similar vein we may extend this relationship into: the 'total' price indicates the value of a commodity to an individual. We may hypothesize that when in a choice situation an alternative is increased in total price (its financial price, time price (delay), effort, social services to be rendered) its attractiveness and consequently the preference for that commodity increases accordingly. To explain the effect of conditional availability information such as delay, effort, service and price on preferences a 'total cost' perception may be at work.

A schematic representation of the hypothesized way conditional availability factors affect preferences is given in figure 1.

In figure 1 it is depicted that a stronger availability requirement leads to a higher perceived total price that (within a given choice situation) leads to a higher cost evaluation. Empirical evidence for the financial form of this cost-value relationship is abundant (see e.g. Olson, 1977; Monroe and Pretroshius, 1981). The behavioral and social cost-value relationship needs further refinement and support from empirical research.

Figure 1. Conditional availability cues and commodity value: the cost hypothesis.



3.4. Limited availability due to market circumstances

In the commodity theory scarcity is said to be a way to convey unavailability. Both the number of co-recipients and the number of suppliers of a good are said to influence the valuation of a good.
Empirical evidence with regard to the effect of increased demand on the valuation of messages is provided by Brock (1968). With respect to tangible goods both Worchel at al (1975) and Verhallen (1982) demonstrate the effect of scarcity on the evaluation of tangible goods to be stronger when scarcity is due to an increased demand than when due to accidental circumstances.
The effect of scarcity due to limited supply on the valuation of tangible goods is hardly experimentally addressed. Verhallen (1982, p. 305-312) reports an effect of limited supply on choice behavior in the expected direction: limitedly available goods were choosen more often. In the aforementioned studies it was shown that accidental scarce goods were not more highly valued than abundant available goods. It is not the mere limited availability but the attribution to its cause that produces the preference increasing effect. The few studies that exist on this topic however only included general dependent variables such as overall liking (Fromkin, 1971), attraction (Worchel et al, 1975) or choice (Verhallen, 1982). We might hypothesize that these market cues are causing an impression of harder to get, more costly or giving the recipient a more unique commodity. The effect of limited availability due to market causes on preference is hypothesized to be mediated by both a cost and a uniqueness evaluation.
This will be tested in the experimental study to be described in the next section. Another factor, the social situation, is also included in this study.
Earlier it was discussed that social motives such as altruism or prestige might arise that intervence on the value increasing effect of unavailability factors (e.g. Verhallen, 1982). In the following experiment the effect is such a social condition is therefore also explored.

4. Design of the experiment

As a cover of this experiment a product test situation was used. Subjects had to evaluate and choose from recipe books. Information about the content of the books was given, as well as information about the availability of the three books in the choice situation. One of the three books was said to be limitedly available. The other two books were described as abundantly available. Limited availability was varied across the three books. One of the following four reasons for limited availability was given: accidental circumstances, popularity of the books in earlier product tests, limited supply or both popularity and limited supply. One half of the subjects were made to feel free to choose between the books. For the other half of the subjects social inhibition was induced by stressing the presence of others.
The design may be summarized as a nested (3x2)x4x2 factorial design. It includes 3 recipe book of which one is limitedly available, 4 causes for the limited availability and 2 different social situations, with and without social inhibition.

Method

Subjects

Each of the 24 cells of the design contained at least 4 subjects. The subjects were 120 respondents from the Tilburg area selected randomly from the telephone directory. Female subjects were used for practical rather than theoretical reasons. Student subjects could not be used as the cover story for the experiment (product tests) caused suspicion among them in a pilot study. Some did not consider this kind of research to be 'scientific' enough to be performed at a psychological laboratory. From this they guessed another purpose of the study. Worchel et al (1975) reported that subjects aware of the experimental availability manipulation to react in contrast to what they considered to be the experimenters'expectation. To prevent this reactance effect housewives were used as subjects. In the debriefing, four subjects showed suspicion (one of them already possessed one of the recipe books) and were excluded from the analysis. Two other subjects skipped some evaluative questions and are therefore missing in some analyses.

Procedure

The subjects entered the experiment in groups of 3 to 5, usually 4. As in the advance information they had received, they were told that this was a research project on how to perform product tests. They would be able to keep the products they chose. They were also told that product tests of this kind were held on a regular basis, and they were therefore asked to indicate their interest in 18 different kind of products in case they might be asked to cooperate in future product tests.
The subjects were then led into the experimental laboratory. In this laboratory cubicles are available, one for each subject. They were informed that this was in order that they should not influence one another, when making their choices among the products to be displayed

before them. The standard instructions were then given to them through earphones and using TV-screens in front of each cubicle. The subjects were instructed to choose between 18 recipe books displayed before them on a table. They could see that all the books were from the same editorial series. They were told that there would be three parts of this particular product test. In each they would have to evaluate and choose between three books chosen at random from the 18. At the end the experimenter would choose, at random, one of the three choice forms the subjects had filled out. The subject would receive the book given as first choice on that form. It was emphasized that they should not see each other as competing, as they each would receive different choice forms. In the social inhibition condition it was now said that this group of subjects was the very first in the particular product test on recipe books. They were asked to 'take into account' that more subjects were going to follow. In the social non-inhibitive condition subjects were told that they formed the very last group of subjects for this product test.

It was stressed they could choose whatever they wanted, it would not matter to anybody else. They were then given the first choice form on which three books were described.

The information was taken from the back cover of the book, discarding the information referring to popularity, uniqueness etc. Besides this 'factual' information the subjects received information about the evaluations and choices in previous product tests. They were told that this was to provide them with some more of the 'real world' kind of information they would receive in bookshops or from friends.

The first experimental situation was the same for all subjects. The information given consisted of the content of the books, the popularity of the books in a previous product test (about equally popular), the number of copies available at the beginning of the experiment (abundant, about 30 copies) and the real world availability (available in the average bookshop). In the inhibition condition ('first group' instruction) no reference was made with respect to previous popularity.

In the second choice, the experimental one, the information about availability within the experiment was varied between the three books. The number of copies available was said to be large enough for two of the books, but 'just a few' of the third book. It was stressed there were just enough copies available for the subjects present at the moment. For the non-inhibitive condition it was said that if other subjects would have followed there would not have been enough copies available. For the social inhibition condition this instruction was slightly changed into 'not enough available for others that will follow'. The reasons given for the difference in available numbers were varied between subjects:

condition 1 - by accident: the subjects were told that by accident, the publisher had sent a smaller numer of one of the three books;

condition 2 - popularity: here it was said that the books had been used in a previous product test which started with equal numers but that one book was chosen so often that only a few copies of that book remained. The others had been less popular, so that more copies of them remained for this product test;
condition 3 - limited supply: the different numers of copies available were attributed to the size of the edition.
One book had a very limited edition so that the publisher would spare only a few copies. The other books had a large edition so a sufficient number was available for this test;
condition 4 - popularity plus limited supply: the subjects were provided with the information form condition 2 and 3 combined.
Thus both limited supply and popularity was said to cause the limited availability of the books.
The subjects were assigned randomly to the conditions. After having received the information on the three books the subjects had to first evaluate the three books in terms of the unicity of the recipes [4] it contained (very unique versus very common, 5 point scale) and the relative [5] price of the books. (rank from 1 to 3).

Then the subjects had to rankorder the books according to their preference. In the debriefing the subjects filled out a short questionnaire concerning:
- possession of the books (as mentioned before one of the subjects possessed one of the 'experimental' books and was therefore excluded from the analysis);
- understanding of the procedure, instructions etc. (two subjects, as was only found out afterwards, did not fill out all the questions and were excluded from analyses on these data);
- and a (leading) question about the correctness of the availability information. Here four subjects, among one of them that also owned an 'experimental' recipe book, showed suspicion and were excluded from the analysis.
The chosen books were mailed to them later.

Hypotheses

In the foregoing section two different type of hypotheses have been discussed, they pertain to:

(1) The effect of limited availability and the differential effect of the perceived causes for limited availability on product evaluation and preference as revealed by choice.
(2) The choice inhibitive effect of the social situation.

Table 3. Unicity, costs and choice scores per experimental treatment* (cell averages)

	Non social situation N = 51			Social situation N = 63			Total N = 114		
Product	Unicity	Costs	Choice	Unicity	Costs	Choice	Unicity	Costs	Choice
Unlimited available (N = 54)	2.74	2.12	2.11	2.76	2.12	2.07	2.75	2.12	2.09
Limited available due to Market cause	2.15 (N=38)	1.72 (N=38)	1.60 (N=38)	2.49 (N=47)	1.71 (N=47)	1.85 (N=47)	2.34 (N=85)	1.71 (N=85)	1.74 (N=85)
Popularity	2.08 (N=12)	1.92 (N=12)	1.58 (N=12)	2.65 (N=17)	1.94 (N=17)	1.83 (N=17)	2.42 (N=29)	1.93 (N=29)	1.73 (N=29)
Limited supply	2.25 (N=11)	1.91 (N=11)	1.73 (N=11)	2.41 (N=17)	1.65 (N=17)	1 59 (N=17)	2.35 (N=28)	1.75 (N=28)	1.64 (N=28)
Popularity plus limited supply	2.13 (N=15)	1.43 (N=15)	1.53 (N=15)	2.38 (N=13)	1.46 (N=13)	2.23 (N=13)	2.25 (N=28)	1 44 (N=28)	1.86 (N=28)
Limited available due to Accidental circumstances	2.85 (N=13)	1.85 (N=13)	2.31 (N=13)	3.00 (N=16)	1 88 (N=16)	1.88 (N=16)	2.93 (N=29)	1 87 (N=29)	2.07 (N=29)

The cell averages are computed over the three products (randomized within treatments)

Unicity scale: 1 = very unique / 5 = very common
Costs scale : 1 = most expensive / 3 = least expensive
Choice scale . 1 = first choice / 3 = last choice

Numbers between brackets are cellnumbers

The general form of hypothesis (1) is:

H(1)	$L > UL$	Unicity, costs, choice.
more specifically:		
$H(1^{a})$	$L_{mc} > UL$	Unicity, costs, choice.
$H(1^{b})$	$L_{mc} > L_{ac}$	Unicity, costs, choice.
$H(1^{c})$	$L_{ac} = UL$	Unicity, costs, choice.

In which L = limitedly available
UL = unlimitedly available
L_{mc} = limitedly available due to market causes
L_{ac} = limitedly available due to accidental circumstances.

Thus a book that is limitedly available due to market causes (demand and/or supply) will be rated as more unique and more costly and will be choosen more often than an unlimitedly available alternative or a book that is accidentally limitedly available.

We also expect an L_{mc} to be chosen less in the 'social situation', when the presence of others is stressed. We may express this as:

$H(2^{a})$	If no Sc	$L_{mc} > L_{ac}$ or UL	Choice
$H(2^{b})$	If Sc	$L_{mc} = L_{ac} = UL$	Choice

If there is no 'social situation' than subjects are expected to more often choose the (attractive) alternative L_{mc}, in a social situation they will not.

With regard to the differences between books that are limitedly available due to market causes we expect the strongest evaluative and preference effects when limited availability is due to both demand and supply factors.

$H(3^{a})$	$Lps > Lp$ or Ls	Unicity, costs, choice If no Sc
$H(3^{b})$	$Lps < Lp$ or Ls	choice If Sc

in which L_{ps} = limitedly available due to both popularity and supply
L^{p}_{s} = limitedly available due to popularity
= limitedly available due to supply

So if there is no social constraining situation L_{ps} will be rated as more unique and costly and will be choosen more often than either L_{p} or L_{s}. If there is a social constraint L_{ps} will not be choosen that often as a L_{p} or a L_{s}. The valuation of an L_{ps} may however remain more positive.

Results

To provide the reader with a general overview of the results, the average score on unicity, costs and choice within the different experimental treatments are presented in Table 3.

The hypotheses have been tested by using analyses of variance for the unicity data and conjoint analyses on the costs and choice rankorder data[6]. We will first present the analysis results on the choice data. The average rankorder for the L_{mc} (the book limitedly available due to market causes) is lower (1.74 versus 2.09) than the average rankorder for the UL (the book unlimitedly available). To examplify the results obtained from conjoint analysis the choice rankorders analysed with a (3x3) design with factors "product" (three levels) and "availability" (three levels) are presented in Table 4.

Table 4. The overall effect of availability on preference: (N = 114)

Factor	Factor level	Part worths	X^2	Significance
Product	P1	.25	7.29 df = 2	p .01
	P2	.50		
	P3	0		
Availability	L_{mc}	.51	8.13 [1]	p .01
	L_{ac}	-.10	8.23 [2]	
	UL	0		

P1, P2, P3 = the three different books
L_{mc} = book limitedly available due to market causes
L_{ac} = book limitedly available due to accidental circumstances
UL = book unlimitedly available.
1) X^2 when testing L_{mc} vs UL
2) X^2 when testing L_{mc} vs L_{ac}

The parts worths in Table 4 show a significant effect of the factor 'product' on choice rankorders: P2 and P1 are preferred to P3 (the utility, part worth of P3 is arbitrarily set on zero). The L obtains a significantly higher part worth ($p < .01$) than L_{ac} or UL_{mc} (.51 versus -.10 and 0 respectively).
The average rankorders for L_{ac} and UL (2.07 and 2.09 with parth worths -.10 and 0 respectively) do not differ significantly, so all three hypotheses (1): Hl_a, l_b and l_c receive support: only if the limitations in availability are attributed to market causes that alternative is choosen more often. The results with regard to hypothesis 2 are presented in Table 5.

Table 5. Social conditions and the choice of limitedly available books.

availability	no social constraint		social constraint	
	R	U	R	U
L_{mc}	1.60	.89	1.85	.28
L_{ac}	2.31	-.22	1.88	.38
UL	2.11	0	2.07	0

R: Average rankscores (from Table 3)

U: Part-worths (utilities) from conjoint analysis

L_{mc} = book limitedly available due to market causes
L_{ac} = book limitedly available due to accidental circumstances
UL = book unlimitedly available

If there are no social constraints the L_{mc} is prefered to both L_{ac} and UL. ($x = 9.39$ and 9.66 respectively with $df = 1 : p < .01$), However under social constraints these preferences revealed through choices disappear. Stressing the presence of others in the choice situation inhibits the choice of otherwise preferred alternatives. The strength of the inhibitance to choose the limitedly available alternative depends on the cause for the limited availability as is shown in Table 6.

Between the social constraining condition and the 'non social' condition there is no difference in preference for the choice alternatives that are limitedly available due to either popularity (L_p) or to limited supply (L_s). Both remain to be choosen significantly ($p < .05$) more than an unlimitedly available alternative. However when the limitations on availability are more stressed as is the case for the alternatives that are limitedly available due to both popularity and limited supply (L_{ps}), the presence of others clearly reverses the revealed preferences. The partworths for L_{ps} change significantly (1.08 versus -.51, $p < .001$).

Table 6. The effect of social constraints and causes for limited availability on the preference for goods. Part-worths (utilities)

Factor	Factorlevel	no social constraint	social constraint
Product	P1	.24	.25
	P2	.81	.30
	P3	0	0
Limited availability	Lp	.74	.44
	Ls	.80	.80
	Lps	1.08	-.51
	L_{ac}	-.03	.39
	UL	0	0

P1, P2, P3 = the three different books
Lp = book limitedly available due to popularity
Ls = book limitedly available due to limited supply

Lps = book limitedly available due to both popularity and limited supply
L_{ac} = book limitedly available due to accidental circumstances
UL = book unlimited available.

In conclusion we may remark that all three hypotheses receive support: an L_{mc} is chosen more often than an L_{ac} and UL. The presence of others inhibits this effect. In Verhallen (1982) was found that subjects not interested in the product category did not choose the alternative that was preferred most by interested subjects. From the debriefing phase of that experiment it was indicated that these subjects did not choose the limitedly available alternative to leave it to other more interested subjects. The arousal of an altruism motive was mentioned as a possible explanation for this phenomenon. As will be recalled the interest in the product category, recipe books, was assessed in the very begin of the experimental procedure (7-point scale). For both social conditions separately the difference in L_{mc} choices between interested and not-interested subjects was tested.
Non of the differences were significant, this indicates that not interest in the product category as such but the sensitivity for social pressure intervences on the effect of limited availability on overt choice.

Unicity and cost evaluation

The results with respect to the unicity and the cost evaluation are in general agreement with the choice-findings and support hypothesis (1). A L_{mc} is evaluated as more unique ($z = 2.3.$; $p < .05$) and more costly ($x^2 = 1.44$; $df = 1$; $p < .001$) than an UL, as well as an L_{ac} (uniqueness $z = 2.6$; $p < .01$; cost evaluation $x^2 = 16.9$; $df = 2$; $p < .01$). A book limitedly available due to accidental circumstances (L_{ac}) is considered equally unique to an unlimitedly available alternative (UL) however indicatively ($x^2 = 3.18$; $p < .01$) more costly.
With respect to hypothesis (2) on the effect of the social condition on the uniqueness and cost evalution:
Table 3 shows the limitedly available books to be evaluated as more unique in the non social condition than in the social constraining condition. ($L_{mc} = 2.15$ versus 2.49 $p < .01$).
In the no constraint condition the differences between L_{mc}, L_{ac} and UL with respect to the uniqueness evaluation and the cost evaluation are similar but somewhat more pronounced than for the total group (L_{mc}, L_{ac}, UL). In the 'social constraint' condition these differences in uniqueness evaluation are somewhat smaller. The uniqueness scores for L_{mc}, L_{ac} and UL are 2.49, 3.00 and 2.76 respectively that is only 'indicative differently $p < .10$). The cost evaluation however was not affected by the social constraints: the scores of L_{mc}, L_{ac} and UL remain about equal (1.72, 1.85 and 2.12 respectively in the 'constraint' condition versus 1.71, 1.88 and 2.12 in the 'no constraint' condition). So a L_{mc} in the 'social constraint' condition was also evaluated as more costly than L_{ac} and UL.
Hypotheses (3) with respect to unicity and cost evaluations were formulated as null-hypotheses as no theoretical reason existed to expect differences between L_p and L_s and L_{ps}.
In Table 3 the unicity and costs scores of goods limitedly available due to different market causes were presented for both social conditions. As remarked earlier, stressing the presence of others, the social situation, leads to a decrease in uniqueness valuation for a limitedly available good. This effect is most outspoken for L_p. The uniqueness difference, 2.08 vs. 2.65 is significant ($p < .05$). For the other limitedly available books, L_s and L_{ps} the difference is in the same direction however not statistically significant. L_{ps} is viewed by the subjects as more costly than an UL (in the social situation $p < .05$ in the non social condition $p < .01$) the change in cost evaluation due to the social condition are however non significant.
In conclusion: Overall the hypotheses (1) and (2) receive support. A book limitedly available due to a market cause is evaluatd as more costly and more unique than an unlimitedly available alternative. When the presence of others is stressed, in social situations, the cost evaluations do not change however the limitedly available books are no longer to the same degree considered to be unique, especially not when the reason for limited availability is the popularity of the book in previous occasions. This latter fnding suggest the unicity and cost evaluations of subjects to be very sensitive to changes in the specific cause for limited availability of goods.

Discussion

In this article the relationship between availability and preference has been elaborated.
An enrichment of concepts within the micro economic theory of demand is aimed at by considering social constraints in addition to financial constraints and by including 'extrinsic utility', that part of preference that is due to market circumstances, within the utility concept.
The discussion of the effect of different kinds of limited availability on the preference for goods may shed new light on long standing exceptions within demand theory such as Veblen- and snobeffects. The experiment that has been conducted studied the effects of limited availability due to different market causes on the uniqueness and cost evaluation and the preference for tangible goods. The results show that both a unicity and a cost assessment is being made by the subjects that depends on the specific reason for limited availability.
Future research may elaborate the behavioral basis for the availability preference relationship by studying conditions that may arouse other social motives and conditions that influence cost evaluations and consumer choice.

Notes:

*) The author wishes to thank W.Fred van Raaij (Erasmus University), Gery M. van Veldhoven (Tilburg University) and Karl-Erik Wärneryd (Stockholm School of Economics) for their comments on an earlier version of this paper.

1) In the originel text (Verhallen, 1982) the term attainability is used to express that a choice alternative is not available within the choice situation for the subject.

2) All these findings are based on statistical significant differences.

3) Brock (1968) uses the terms delay and effort. This is a mix-up of a price element (delay equals time price) and a cost sort. (effort is a relative task difficulty). A given task (e.g. a decision task) requires both psychic and physical activities. The effort associated with it depends on the person's abilities. Other factors related with sacrifice and opportunities relevant for the difference between a behavioral price and behavioral costs have been elaborated elsewhere (Verhallen and Pieters, 1984).

4) This 'projective' method was chosen to avoid the subjects reaction that this sort of book is never 'unique'.

5) This ranking task was chosen again to avoid the 'easy' reaction of subjects to scale all the three books in the middle, as equally expensive. Note further that equal rankorders were not excluded.

6) The rankorder data of the booklets, the dependent variable in the study, are decomposed into part worths of the different experimental treatments. As the TRIRANK analysis employed, based on Luce's choice theorema, uses maximum likelyhood estimators, the second derivate of the part worths is an unbiased estimate of their variance. Using these variances differences between factorlevels (part worths) in the experimental design can be tested. The analysis procedure followed resembles closely a traditional analysis of variance: the part worths expressing differences between factorlevels are determined within subject differences between observed and expected rankorders are tested with a Walt-test, from the X^2 family. For between subject differences a z-test is employed. The analyses have been cross validated by performing X^2 tests on the direct rank orders, F-tests on differences in variance as well as conjoint analyses. As no substantial differences between test procedures were found, the results reported are from the more appropriate conjoint measurement analyses.
The author wishes to thank Dr.M.Croon, Tilburg University, for developing the computer program TRIRANK to test the effect of treatments in a full rank design on rank data. A program listing is available upon request.

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CHAPTER 3.

SCARCITY OF MEANS: behavioral costs

3.1 Attitude theory and behavioral costs.
Journal of Economic Psychology, 5, 1984, in press,
(with Rik G.M. Pieters).

3.2 A behavioral model of residential energy use.
Journal of Economic Psychology, 3, 1983, 39-63,
(with W.Fred van Raaij).

3.3 Retail attribute sensitivity and shopping patronage.
Journal of Economic Psychology, 2, 1982, 39-55,
(with Gert-Jan de Nooij).

Journal of Economic Psychology 5 (1984) JEP00115
North-Holland

ATTITUDE THEORY AND BEHAVIORAL COSTS *

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Received November 1, 1983, accepted January 17, 1984

The Fishbein and Ajzen reasoned action model is briefly introduced and some theoretical aspects of the model are discussed Based on a critical analysis of the act and behavioral category concepts in their model an alternative concept 'behavioral field', is introduced. A behavioral field is defined as 'the total of acts that are perceived by the acting individual as leading to a common goal or valued state' Then a distinction is made between goal acts and instrumental acts. Goal acts lead to goal attainment. Instrumental acts will bring the individual into the direction of his goal It is argued that for acts that are predominantly instrumental other substitutable acts are available. The choice between substitutable instrumental acts is governed by both expected outcomes and the behavioral costs attached to the acts Behavioral costs are defined as the behavioral price relative to the behavioral budget The behavioral price is determined by the time, psychic and physical task demand The behavioral budget is a function of the goal importance of the behavioral field Some further aspects of behavioral costs are then discussed Several arguments to treat costs and outcomes separately in the explanation of behavior, are elaborated Then some implications from the behavioral cost concept are drawn for attitude theory Finally the entangling of costs and value is briefly discussed

1. Introduction

Since the often cited finding of LaPiere (1934), that restaurant owners with a negative attitude toward receving Chinese quests nevertheless did

* For comments and many helpful suggestions based on an earlier version of this article, the authors are indebted to Frans L Leeuw and Cees J.H Midden (Leyden University), Gery M van Veldhoven, Karl-Erik Wärneryd, Thijs A.M. Poppe and Theo B.C. Poiesz (Tilburg University), W Fred van Raaij (Erasmus University) and two anonymous reviewers.

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receive them, there has been an abundance of studies on the relationship between attitudes and behavior (See e.g., Heider 1946; DeFleur and Westie 1963; Fishbein and Ajzen 1972; Gross and Niman 1975; Silberer 1982). The Fishbein and Ajzen model on reasoned action can be seen as a culmination of this development. The model has stimulated a lot of research efforts. In the present article a number of issues with regard to the Fishbein and Ajzen model will be discussed. From an analysis of the content of acts versus behavior, the concept of behavioral costs is introduced and some consequences for attitude research are delineated.

2. The Fishbein and Ajzen model: some theoretical issues

Fishbein and Ajzen's model has the purpose of contributing to the understanding and prediction of behavior. It can be represented in the form of three formulas (Fishbein and Ajzen 1975):

$$B \sim BI = w_1(A_{act}) + w_2(SN) \tag{1}$$

$$A_{act} = \sum_{i=1}^{n} (b_i \times e_i) \tag{2}$$

$$SN = \sum_{j=1}^{m} (nb_j \times mc_j) \tag{3}$$

In the model it is supposed that the intention (BI) to perform a certain behavior (B) is a function of the weighted (w_1) attitude (Fishbein and Ajzen define attitude as affect) toward performing a behavior (A_{act}) and the weighted (w_2) Subjective Norm (SN) (formula 1). A behavioral intention is seen as consisting of a personal and a social component.

The attitude toward a behavior is a function of the expected consequences or outcomes of behavior (beliefs $= b_i$) and the evaluations of these expected consequences or outcomes (e_i) (formula 2).

The Subjective Norm in the model is a function of social norms to perform a behavior (nb_j) and the motivation to comply with these norms (mc_j) (formula 3). If no unanticipated circumstances occur, a behavioral intention will be converted into corresponding behavior.

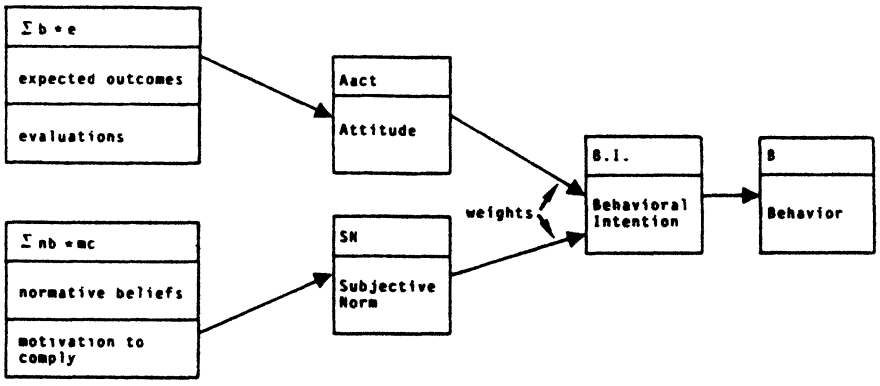

Fig. 1. The Ajzen and Fishbein model of reasoned action.

In the manifold applications of the model convincing evidence is provided of the predictive and explanatory power of the model (see for a review Ajzen and Fishbein 1980). Several issues with regard to the application of the model have been raised: problems with regard to theoretical assumptions underlying the model, operationalization problems with concepts in the model and a number of analysis problems. For a further treatment of the latter two types of problems we refer to Wilkie and Pessemier (1973) and Ryan and Bonfield (1975). The topic of the reliability and validity of attitude scales has not been addressed very often in the Ajzen and Fishbein research tradition. For a discussion on this point see e.g., Bettman et al. (1975); Bagozzi (1981b); Burnkrant and Page (1982). We will concern ourselves here with some theoretical issues.

2.1. Attitude as antecedent of behavior

It is assumed that the attitude toward an act precedes the performance of an act. For non-intentional behavior stochastic models have been proposed (Bass 1974). However, even for the object of the Fishbein model, intentional behavior, the necessity of preceding attitudes is doubted (Bettman 1979: 210; Lastovicka and Bonfield 1982). Others doubt the causality, (e.g., Lutz 1977). Sarver (1983) discusses the causal properties of the Ajzen and Fishbein model. He argues that a 'context of opportunity' is a necessary requirement for an attitude and its

corresponding behavioral intention to be expressed in overt behavior. If a context of opportunity is present the causal sequence is 'on', a term used by Sarver, a positive attitude will be expressed in overt behavior. Without a context of opportunity the causal sequence is blocked ('off'). Although we agree with Sarver that the Ajzen and Fishbein model needs a concept that can take the effect of changes in situational circumstances into account, we object, among other things, to the dichotomous character of the proposed solution (see Verhallen and Pieters 1984). A behavioral cost concept, as will be elaborated in this article, is offered as a better alternative.

The order of attitudes and behavior has also been discussed. Bem (1967, 1972) proposed the reverse order: attitudes following behavior. Fishbein and Ajzen (1975) state that past behavior can only influence future behavior via the beliefs or the motivation to comply. Bentler and Speckart (1979) and Bagozzi (1981a, b, 1982) demonstrate that this assumption is not correct. These studies show a direct effect of past behavior on the future behavior. As the Fishbein model only attempts to predict and to explain intentional behavior under volitional control (reasoned acts). these findings cannot be taken as a criticism of the model. It can be argued that this direct effect represents the influence of habits. It does however weaken the position that most behavior that is important to social scientists is not influenced by habits (Fishbein and Ajzen 1975: 371). This problem of behavior being influenced by reasoning or not, is solved by some authors by including other factors in their attitude-behavior model.

Seth (1974) adds a separate habit-controlled mechanism; Van Raaij and Verhallen (1983a) distinguish situational and behavioral contingencies to explain conserving behaviors. Another variation on this 'other variable' approach is that the relation between attitude and behavior is moderated by other variables, such as 'direct experience' (Fazio and Zanna 1978) and 'vested interest' (Sivacek and Crano 1982). For a review of this 'other variable' approach, see Wicker (1971) and Falbo and Becker 1980).

In the following we will focus on the behavoiral part of the attitude-behavior relationship [1].

[1] In an earlier paper version of this article (Verhallen and Pieters 1983) a discussion of the relationship between concepts in the Ajzen and Fishbein model and its additive linear-compensatory combination rule is included.

In studies on attitude-behavior relationships the behavioral part has received almost no attention. There is some discussion on self-reports of attitudes and behavior. Nisbett and Wilson (1977) and Geller (1981) present results that raise doubt on the validity of self-reports as an instrument to investigate intra-individual antecedents of behavior. Rip (1980) and Wright and Rip (1980) do however hold a remarkably more positive opinion in this respect. In 'other-variables' studies there has been discussion on the behavioral side of the attitude-behavior relationship (Wicker 1971; Sheth 1974; Van Raaij and Verhallen 1983b).

The place and status of behavior within the theoretical framework of Fishbein and Ajzen has however not been singled out as a topic of discussion.

Starting from an analysis of the behavior concept in the Fishbein model, the necessity to incorporate a behavioral cost concept in the model is stressed.

3. Behavior in attitude-behavior relationships in Fishbein and Ajzen's Reasoned Action Model

Behavior is used to refer to observable acts that are studied in their own right (Fishbein and Ajzen 1975: 13). Ajzen and Fishbein (1980: 29) stress that in many studies often no distinction is made between behavior and the outcome of behavior. E.g. the amount of energy conserved by a household within a specific time period is the outcome of behavior (and other factors) and not referring to the behavior itself. Behavior is divided into single acts and behavioral categories (Ajzen and Fishbein 1980).

A single act is a specific behavior that is performed by the individual. A behavioral category is a set of actions which have at least one consequence or outcome in common, e.g., recreation behavior, dieting. Ajzen and Fishbein (1980) discuss three general criteria to study behavior: a single action criterion, a multiple choice criterion and a behavioral category criterion. A single action criterion comprises the measurement of a single act. A multiple choice criterion can be treated as a set of acts of which only one can be performed. A common example is voting on either the Republican party or the Democratic party. Behavioral categories cannot be observed directly. They have to be inferred from specific acts. It is for instance not possible to observe

recreation behavior directly. A number of acts have to be selected and combined into one general measure, an index. Such a multiple act index is a criterion for a behavioral category.

3.1. Behavioral elements: action, target, context and time

Ajzen and Fishbein (1977) describe the conditions for the observation of a significant relationship of attitudes and behavior. Attitudes and behavioral entities consist of four elements: (1) the action, (2) the target at which the action is directed, (3) the context in which the action is to be performed and (4) the point in time when the action is performed. The content of these elements might be either general or specific. A significant relationship between attitude and behavior could not be observed unless both the attitude and the behavioral entity correspond with regard to those four elements.

For a single act at least the action and target have correspond with the attitude. The other two elements preferably do correspond too. They are however not necessary. Some behavioral elements are diffult to distinguish.

For instance context and target or target and action elements are mentioned by Ajzen and Fishbein (1977: 911). Take for instance the attitude toward having an extensive breakfast. What is the object here? In such a case time, context and target are intertwined. In fact a fifth element is sometimes distinguished. The reference to the person himself, the actor should be taken into account. Such a reference is considered as essential in cases of attitudes toward brith control, smoking and drinking (Ajzen and Fishbein 1977: 912). Ahtola (1977) suggests that such a reference always should be made.

3.2. Some issues with regard to the Fishbein and Ajzen's concept of behavior

3.2.1. The specification–generalization dilemma

By specifying the four behavioral elements (action, target, context and time) in order to achieve a maximum correspondence between attitudes and actions, possible disturbing factors in the attitude-behavior relationship are defined in such a specific way that the amount of overlap between the mental and the corresponding behavioral level is minimized. In this view as soon as an aspect of the context changes, the attitude may not be relevant anymore.

The generality, stability and the enduring character of the attitude concept is sacrificed to gain predictive power.

A problem associated with specifying an attitude is how to deal with the context in which the attitude-act relationship is valid. Should the context be defined in an exhaustive way, for instance according to Krupat (1977) as social, physical and temporal or according to Belk (1975) as comprising a task definition, a temporal perspective, antecedent states, a physical and a social environment, then the measurement of the attitude and the corresponding act almost becomes identical. The attitude-act relationship is reduced to a mere tautology.

A second aspect of the attitude-act specification requirements should be mentioned. If we have to measure an attitude for each of the thousands of acts (see Barker 1980) an individual performs each day, we should be endlessly repeating attitude-act studies, every time with a somewhat different act. Olshavsky (1982) criticizes such an approach of Warshaw (1980).

Thirdly, it is questionable whether such a specific act is still an object of human reasoning. For example Ehrenberg (1974) and Lastovicka and Bonfield (1982) assert the non-existence of brand attitudes in many instances.

3.2.2. Multiple choice act

A multiple choice act is a specific form of a single act. The different choice alternatives are presented as possible targets or actions. The main difference between a multiple choice act and a single act is that in the latter case both target and action are defined while in the first case only the action or the target is defined. The different possibilities are offered as substitutes. As it is not clear whether there are differences in the theoretical model, with regard to both kinds of acts, we consider them as mere operational differences.

3.2.3. Behavioral category

A behavioral category can be studied with the help of the multiple act criterion. The single acts in a behavioral category have at least one consequence in common. This common consequence, for instance dieting, is what we label as the behavioral category. It is often difficult to assess whether an act has a certain consequence. The consequence of an act might only be inferred from the context in which it occurs. Picking up a wallet is only altruistic if it belongs to someone else, and is

returned, if there was no large reward for giving it back, and if there was no strong social pressure.

To ascertain whether an act belongs to a behavioral category a number of criteria can be used. Ajzen and Fishbein (1980) remark that a sufficient level of interrater reliability should exist to determine whether an act belongs to a specific behavioral category.

What we however need is a content criterion to determine whether an act belongs to a behavioral category. Ajzen and Fishbein (1980: 32) agree that the consequence of an act has to be recognized by the individual himself. They also add that this intentionality must be present when performing that act. A person drinking coffee without sugar because he likes coffee better in that way cannot be considered to be dieting. It will be necessary to assess the individual intention instead of relying on judges before concluding that an act belongs to a specific behavioral category.

Ajzen and Fishbein (1980) combine several single acts into a multiple act index by simply counting them. This multiple act index represents the behavioral category.

Some questions can be raised with regard to the multiple act index.

(a) Counting single acts implies that all acts are considered to be equally important. To take the example of dieting: Does it make sense to add the act 'skipping lunch' to acts such as 'not taking sugar in coffee or tea'?

$$B = \sum_{j=1}^{n} (\text{act}_j \times \text{weight}_j) \qquad (4)$$

The formula (4) closely resembles the evaluation × belief formula for attitudes. The weights in formula (4) are commonly set equal to one. In discussions with regard to the behavioral category criterion, the same issues may be raised as with regard to the additive linear-compensatory character of the Fishbein model.

In our opinion the acts have to be weighted with either an intra-individual criterion or an extra-individual criterion. An intra-individual criterion might be e.g. perceived importance of the act of the effort needed in performing. As an extra-individual criterion for dieting the amount of calories saved could be taken.

(b) By simply adding acts, uni-dimensionality is implied. It is assumed

that acts do not covary. Especially in cases like dieting specific patterns of behavior do occur. The different acts within a diet will strongly covary. Since people normally behave in a coherent, pattern-like way, we should focus on trying to explain these patterns of behavior (Van Raaij and Verhallen 1983b).

4. Toward a behavioral field approach

From the foregoing discussion of behavior in the context of attitude-behavior relationships two related problems emerge. The specification–generalization dilemma with regard to the prediction of acts and the wish to find more enduring and longer lasting relations, point in the direction of studying larger behavioral entities. In studies on personality, concepts at an intermediate level of abstraction are considered to be most parsimonious (Mishell 1979). Among others Olson (1982) and Verhallen and De Nooij (1982) advocate a more holistic approach in the study of consumer behavior.

In studies on attitudes the broadening of the scope of the behavior measure is also advocated. Weigel and Newman (1976) find the attitude-behavior correspondence to be higher for broader behavior measures than for specific acts. However Monson et al.'s (1982) study suggests that it would be premature to abandon the attempt to predict single acts. It has also been argued that the study of attitudes should encompass both specific as well as general measures. 'Both specific and general attitudes ought to be included in a study to predict behavior, and the entire causal model from general attitudes to specific attitudes to behavior ought to be charged' (Heberlein and Black 1976; 479).

In the behavioral model of Van Raaij and Verhallen both specific and general attitudes are represented. Justifying this inclusion they mention (Van Raaij and Verhallen 1983a: 52): 'general attitudes may provide a general context shaping more specific and critical factors'. In the following we will discuss the type of behavior entity that corresponds with a broader attitude measure. We start from Ajzen and Fishbein's concept of a behavior category but introduce a new concept 'behavioral field' which leads to a distinction of different kinds of acts. It will further be argued that the distinction between these types of acts leads to the inclusion of a behavioral cost concept in attitude research. The relevance of this behavioral cost concept is further discussed.

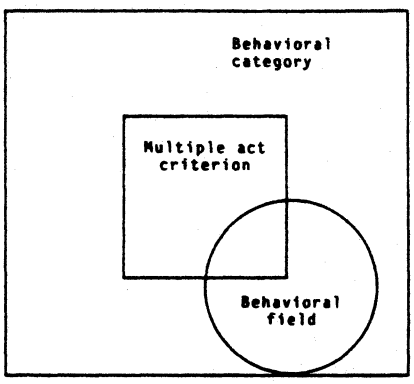

Fig. 2. Behavioral category versus behavioral field.

Finally the implications for a attitude research in general, and more specific consequences for the Fishbein and Ajzen model are elaborated.

4.1. Behavioral category versus behavioral field

Ajzen and Fishbein (1980) do not make an attempt to define a behavioral category. By way of the multiple-act criterion a number of acts are counted. Which are considered by judges to belong to the same category. The examples given, e.g., dieting, imply that the selected acts share a common goal or valued state. Whether individuals strive toward the particular goal or valued state and whether that is the reason why they act as they do, can only be stated by the individuals themselves. 'Drinking coffee without sugar' may be a goal in itself, desirable for the individual: 'the best taste of coffee'. However it might as well be an act directed at the goal 'dieting'. We will therefore define a behavioral field as: 'the total of acts that are perceived by the acting individual as leading to a common goal or valued state' [2]. The difference between a behavioral category and a behavioral field is depicted in fig. 2.

A behavioral category, as mentioned by Ajzen and Fishbein (1980), is the total of acts that have a common label or that are related to a

[2] This definition of a behavioral field resembles the conception of an "evoked set". Two additional specification elements have to be taken into account when comparing an evoked set with a behavioral field. That is a behavioral field can be defined as an evoked set of behavioral alternatives with comparable goal valences.

common goal or valued end state. The multiple-act criterion is then defined as the subset of acts that is considered, with a certain level of interrater reliability, to represent the behavioral category.

A behavioral field is that subset of acts within the behavioral category which is defined by the acting individual as leading to the same goal. What is the relevance of this distinction? As we assume that a behavioral category *as defined by the individual* will be guiding his or her behavior, several other factors now become relevant: the knowledge of actions that lead to this goal will determine which acts will be performed by the individual. De Jonge and Oppedijk van Veen (1982) speak of cognitive events as intervening between behavioral intentions and actual behavior to include 'change of mind' or forgetting. The occurrence of these cognititve events will be a function of the knowledge [3] of which act belong to the behavioral category. The more complete the knowledge, the less likely the occurrence of such cognitive events will be, as there will be less room for surprises.

Furthermore it is possible that the individual is valuing a certain state (e.g. energy being conserved) and not acting as outside judges would expect. If the valued state is located outside the individual, as with energy conservation, a person may follow an indirect way, for instance, if the individual is not saving energy himself in order to force others, e.g. the government, to act. So the valued state will be attained by not performing energy conservation acts.

When having to predict the occurrence of an act within a behavioral category, when comparing with a single act, it is relevant whether the person is aware that the act under study leads to the goal or valued state that governs the behavioral field. When comparing behavioral categories with a goal directed as a state outside the individual, such as 'energy conservation', with behavioral categories with a goal directed at a state inside the individual, such as 'dieting', it is relevant whether the person accepts the responsibility to perform certain acts in this behavioral field.

The acceptance of responsibility might be of importance in studying, e.g. helping behavior (Schwartz 1977) or ecological behavior (Van Raaij and Verhallen 1983a). A behavioral field approach in studying attitude-behavior relationships may explain the relevance of factors

[3] Knowledge is here to be defined as the sum of relational descriptive beliefs (Fishbein 1967).

such as 'past of personal experience' (Bentler and Speckart 1979; Scott 1981; Borgida and Campbell 1982) and 'locus of control' (Zanna et al. 1980). It also brings forward the question whether acts as single acts are identical to acts within a behavioral category.

4.2. Goal acts versus instrumental acts

In the discussion of the behavior concept of Ajzen and Fishbein (1980), no reference is made toward a distinction of kinds of acts. The differences discussed are only differences in formats. In animal psychology a distinction is made between consummatory responses and instrumental responses (Premack 1971). For reasoned action a similar distinction in goal acts and instrumental acts can be made. This distinction has been made in a preliminary way by Thibaut and Kelley (1959: 11).

Goal acts are then to be defined as 'acts which by performing lead to a state of the organism which is desirable for the actor and which makes that the goal ceases to exist'. Pure consumption is such a goal act. Instrumental acts are 'acts that are performed in order to reach a goal, which in itself remains after the performance of this act'. It is obvious that the two types of acts are ideal types. 'Pure' goal acts or instrumental acts will be quite rare. Many acts will be directed at subgoals and contain varying degrees of both goal and instrumental elements. The dominance of goal and instrumental aspects is relevant. Whether an act is predominantly a goal act or predominantly an instrumental act is to be defined by the individual himself. Drinking coffee without sugar may be a goal in itself, desirable for the individual. It might also be an instrumental act if the person is doing so for dieting reasons. Single acts, according to Ajzen and Fishbein (1980), can be either goal acts or instrumental acts. For an instrumental act there are by definition other possible acts that lead to the same behavioral goal. Especially in choice situations, e.g. between brands, such a situation occurs.

4.3 Substitutability of acts

The stability of the relationship between the attitude and the specific act will be influenced by the possibility to perform similar acts (Laroche and Brisoux 1981). Substitutability refers to the degree an act can be replaced by other acts with similar outcomes.

If the substitutability of an act is large, then there are many acts all possibly leading to the same valued state. The change that a 'cognitive event' occurs, is then larger and hence the robustness of the prediction will be lower. For instrumental acts substitutability refers to the possibility to perform other acts that lead to the same goal. This is referred to by Abelson (1978) as equifinality. For goal acts substitutability refers to their goal gradient. The more similar acts are with respect to a common goal, the better substitutes they are. For goal acts the evaluation of outcome states will be of importance, i.e., if and to what extent a goal is achieved and whether other goals are in conflict at the same time. For instrumental acts the costs of performing an act, the behavioral costs, in relation to the valued outcomes are relevant.

The same act can be both a goal act and an instrumental act, e.g. drinking coffee without sugar. The relevance of behavioral costs for the performance of an act will thus depend on the individual's intention. In the following sections this point will be elaborated.

5. Behavioral costs

From an economic standpoint criticism has been formulated on the attitude behavior debate.

As measurement of attitudes doesn't seem to cath the relevant (non-zero) opportunity costs of an action, it cannot be used as a reliable predictor of behavior (Meyer 1982: 88).

Two elements form the basis of this criticism:

(1) In order to behave an individual has to make use of his behavioral resources (sacrifice);
(2) For each act there is a comparable act which produces similar outcomes (as advocated in the previous section this is relevant for instrumental acts) (opportunity costs).

The choice of an act to reach the goal that governs the behavioral field will thus be a function of the expected relative outcomes and the relative costs of acts. The beliefs times evaluation model expresses the expected outcomes of an act. There may be considerable differences between alternative acts with respect to the costs the individual has to

incur to perform the act in a certain context. In a buying situation these costs are primarily of a financial nature, the price to be paid. In choosing between different actions the costs to perform an act, the behavioral costs, will be traded off against the expected outcomes. Such a translation of economic concepts to psychological phenomena is becoming normal practice when explaining the effects of reinforcement schedules in animal psychology (Lea 1978, 1981; Rachlin et al. 1976; Rachlin et al. 1980). However for human behavior a psychological conceptualization of traditional economic concepts such as scarcity and costs is rarely discussed (Brock 1968; Verhallen 1982a). Only in the social exchange theory (Homans 1958, 1961) an attempt has been made to apply economic principles to explain social behavior. It is argued that although it seems difficult to apply the economic principles of maximizing utilities to social exchange as social benefits have no exact price, it is worthwhile to do so (Homans 1961: 72). In the traditional economic theory of consumer demand as stated by Slutzky and Hicks (Hicks 1959), a confrontation of financial means, that is price and budged on the one hand and the preference for goods on the other hand, leads to the optimal choice. In some modern economic theories, time has been added as a scarce resource (Becker 1976). That is in choosing between goods the individual has to take both the price and the time needed into account. We may expand this view into: in order to perform an act an individual has to make use of the totality of his behavioral resources at hand: his physical and psychic energy, spendind time and possible money (Verhallen 1982b).

We may distinguish three types of behavioral costs: time costs, psychic costs and physical costs.

A cost figure is always relative: it refers to the amount needed for a specific act (e.g. price for a product) in relation to the amount allocated for a specific behavioral field (e.g. money budget). We may define behavioral costs (BC) as in formula (5):

$$BC = \sum (TC, PsC, PhC), \tag{5}$$

in which

CC = Time Costs = Time needed /Time budget
PsC = Psychic Costs = Psychic demand /Mental budget
PhC = Physical Costs = Physical demand/Physical budget.

'Time needed' refers to the expected time needed to perform the act

under study. The psychic and/or physical demand express the perceived task requirements. Psychic costs include opportunity costs, the costs not to behave otherwise. Note, that psychic costs (Shugan 1980) and physical costs, psychic and physical effort, are relative. This latter characteristic has not been emphasized in other conceptions (Wofford 1982). When having to choose between different acts within a behavioral field the budget available is constant, hence neutral for the alternative acts. The preferred act will be the one which contributes the most to the goal governing the behavioral field, relative to the behavioral costs involved. We may formally express this as:

$$Pa1 - Pa2 = w_1(Oa1 - Oa2) - w_2(BCa1 - BCa2), \quad (6)$$

in which
$Pa1 - Pa2$ = the relative preference of act 1 to act 2,
$Oa1, 2$ = the outcome evaluation resulting from act 1,2,
$BCa1, 2$ = the behavioral costs to be made for act 1,2,
w_1, w_2 = weights.

So the act will be selected for which the weighted difference between outcomes and costs is most positive. The process by which costs and benefits are perceived and compared between alternative acts in case more than two acts are feasible will need further exploration. Several issues will require research attention.

(1) The perception of task demands as types of costs will be influenced by distortive mechanisms. It is well known that the marginal utility of marginal costs of increasing amounts eventually diminishes. Individual differences will be of influence on the perception of costs and outcomes and will be reflected in the weights given to differences in outcomes and costs.
(2) The choice rule to be used by an individual may well be not an additive linear one, other might be more realistic (Hagarty 1980). Research on information processing shows that depending on a variety of factors such as time pressure, number of choice alternatives, formats, differences between alternatives etc. different decision rules are used. (see e.g., Tversky 1969; Wright 1974, 1975; Bettman 1979; Wahlers 1982; Van Raaij 1983a).

It will in many instances not be necessary to measure costs and

outcomes directly to ascertain whether they have an influence. We may simply infer them from differences in choosen acts, similar to the application of revealed preferences in micro-economics. If all potential acts have negative results (e.g. a higher cost than outcome figure) the individual will not act, unless the preference for not acting is even lower (Kukla 1982).

5.1. Energization, behavioral budget and behavioral stock

The question may arise, 'why not include individual social costs in a behavioral cost figure'? Individual social costs might be expressed as a social price divided by a social budget. Apart from the difficulty of defining 'social price' in operational terms (Blau 1964: 94–95) the definition of a social budget calls our attention. Suppose, you ask a friend to do something for you inorder to reach a personal goal. This, in other words, means that you ask for the behavioral and/or financial means of someone else to reach your goal. This exemplifies that individuals may use a 'stock' of behavioral resources outside oneselves. A 'behavioral stock' may be defined as 'the total of psychic and physial capacities an individual has at this disposal'. So an individual has the disposal of a financial, a behavioral and a social stock.

A social stock refers to the individual's position in society, one's place in social networks. Materially it consists of the total available social help, advise and information. A second, normative, component of social stock refers to the social control that can be excerted on the individual. As both the financial and social stocks are located outside the individual, they are not considered to be of direct influence on behavioral costs. From their total stock individuals may energize a part, their behavioral budget. This behavioral budget expresses the magnitude of the goal valence of the behavioral field. The behavioral cost formula presented earlier may be rewritten, for convenience, as:

$$BC = \sum \left(\frac{T}{TB}, \frac{Ps}{PsB}, \frac{Ph}{PhB} \right) = \frac{\text{behavioral price}}{\text{behavioral budget}} \qquad (7)$$

Premack's (1971) 'theory on instrumental responses', states that the value of a consummatory response (a goal) is to be expressed as the total amount of instrumental responses. From this we may expect the total budget for a behavioral category to depend on the goal impor-

tance of this behavioral category for the individual (Cardozo 1965).

Brehm et al. (1983) demonstrate the energization of behavioral means to depend on the attractiveness of a goal. The more important a goal, the more budget will be allocated to this goal and the less the costs of a specific act to reach this goal will be.

The relationship of product involvement with consumer effort (Clarke and Belk 1979) may be considered to be a specific form of the relationship of goal importance and behavioral budget. Verhallen and De Nooij (1982) demonstrated in a shopping behavior study, the mix of the behavioral budget elements to depend on differences in personal characteristics. A price-sensitive consumer, in their terminology, is often a person with a low money budget. And a time-sensitive individual was often found to be a housewife with young children.

We expect that the time budget for shopping for this type of housewife is relatively low. The goal importance of daily shopping is expected to be lower for the group of housewives with young children than for a comparable group of housewives without young children. Verhallen and De Nooij (1982) found that persons with different personal characteristics attach a different mix of behavioral budget elements, referred to as sensitivity patterns, to a behavioral category. The measurement procedure, a conjoint analysis approach, could be useful in exploring the behavioral budget mix for other behavioral areas. The nominator of the cost formula referring to the behavioral price as perceived by the individual, will depend on the different instrumental acts available in the behavioral field. This means that when predicting instrumental acts the *perceived* behavioral price will be especially important. These behavioral prices will thus be subject to changes due to context and situational alternations.

The ratio of a cost category, for instance, price/financial budget, will be of relevance for explanations and predictions of behavior. Thaler (1980) departing from Kahneman and Tversky's prospect theory, stresses the importance of the ratio of a price difference. So a price difference of say 5 dollars has different meanings for a budget of 10 dollars, for a small expenditure, than for a large financial budget, a large expenditure, It is implied here, that for other cost categories similar findings are to be expected [4].

[4] Note the analogy with the Weber-Fechner law of just noticeable differences.

5.2. Behavioral costs: some further aspects

In formula (6) the relative benefits are computed separately from the relative behavioral costs to determine the relative preferences for acts within a behavioral field. This implies that costs and benefits do not necessarily add up as is assumed in expectancy-value models. They may be traded off or perhaps treated in a non-compensatory way. There are several arguments that support such a separate treatment of costs and benefits.

5.2.1. Individual versus societal consequences

For many acts consequences both for the individual as well as for the society as a whole can be identified.

Review studies on energy behavior (Winett and Neale 1979; Van Raaij and Verhallen 1983a) show that attitudes have frequently been emmployed in explaining and predicting energy behavior. Factor analyses on attitude items as performed in many studies generally show two types of factors: (1) Factors revealing energy or ecology concern or energy related problem recognition, and (2) Factors referring to personal costs and benefits of energy saving (see e.g., Hass et al. 1975; Seligman et al. 1978; Leonard-Barton and Rogers 1979; Verhallen and Van Raaij 1981; Midden and Ritsema 1983).

These structural analyses on (attitudinal) belief statements reveal that the perceived consequences of behavior cluster together, thus are interdependent. Some beliefs are clustered around societal consequences and related to reaching a certain goal e.g., longer lasting energy resources. Other beliefs are connected to certain personal consequences, e.g., monetary gain, loss of comfort or are related to the usage of certain instruments, e.g. spending time, money or effort, to reach these goals, by actually saving energy. This distinction between goal and instrumental beliefs reflects a means-end distinction which can be made in the functions of attitudes (Katz 1960; Lutz 1981). In this example part of the positive consequences, benefits are collective and located outside the individual. The costs, mostly behavioral costs, are for the individual.

This distinction between individual costs and societal benefits makes it possible and desirable to use them as separately studied predictors of ecological behavior. Adding both factors leads to obscuring the differential weights individuals may attach to individual costs and societal

benefits. A score resulting from the summated belief × evaluations may not reflect different costs–benefits structures and hence different attitudinal change possibilities.

5.2.2. Time dimension

Thaler (1980: 56) makes a distinction between positive and negative investment goods. A positive investment good is a good whose benefits accrue later than their costs, such as education. A negative investment good has an opposite time structure. In this terminology energy conservation is a positive investment good. We might hypothesize that the consistency of attitude-behavior relationships depends for a large part on the time structure of costs and benefits.

Two time structure elements are relevant: the time *order* of costs and benefits and the *proximity* in time of future behavior.

Time order. People may be 'trapped' (Platt 1973) into performing behavior with positive consequences coming first or reversely avoid behavior that has behavioral costs coming first.

For example, Bronner (1982) reports that people travel by car although their attitude toward travelling by train is more positive. Several explanations can be suggested for this finding: (a) The costs for car trips are not as easily assessed as for trips by train. Some behavioral costs may not have been covered in studies on travelling-mode choice. (b) It might also be argued that behavioral costs for taking the train, such as looking for the time table, planning ahead, changing vehicles, etc. are coming first. Travelling by car is simply easier to start with.

Time proximity Attitudes toward behavior that is far away in time may be dominated by an 'approach-tendency', i.e., the tendency to strive to certain goals with specific positive outcomes or benefits. When the time for behavioral performance is coming nearer the 'avoidance-tendency', the costs, might become more relevant. This analogy with 'approach-avoidance' conflict situations might be useful in forming hypotheses on the relative importance, over time, of future costs and benefits as related to specific behavior.

5.2.3. Costs and benefits in a prospect-theoretical perspective

The prospect thoery of Kahneman and Tversky (1979) originates from game-theoretical research. There it is consistently found that

losses are weighted more heavily than gains. This differential weighting might, according to Thaler (1980), be extended to costs and benefits. The problem of what a person perceives as costs and benefits does not yet seem to be resolved (Yates and Aronson 1983). However we may hypothesize in similar vein that costs and outcomes, as referred to in formulas (5) and (6), are weighted differently. In the foregoing some dimensions were shortly introduced, in which consequences of behavior can be projected: individuals vs. societal; time order and the time proximity of costs and benefits. An approach disentangling behavioral consequences along these dimensions will improve the explanation and prediction of behavior.

6. Discussion

6.1. Some implications

From an analysis of the behavior concept in Ajzen and Fishbein's theory of reasoned action a distinction is made between goal and instrumental aspects of behavior. It is further argued that these goal and instrumental aspects stem from a person's general behavioral intention. This implies that a consequence of behavior such as 'being tired' will be evaluated as positive or negative (cost or benefit) depending on the act. As a consequence of 'running to catch a train' it will generally be evaluated more negatively than as a consequence of 'jogging'. A typical evaluation statement from Ajzen and Fishbein's theory such as:

being tired is:

+3	+2	+1	0	−1	−2	−3
very good						very bad

should be made act specific:

being tired after jogging is:

+3	+2	+1	0	−1	−2	−3
very good						very bad

A similar suggestion has been by Ahtola (1977) with respect to 'motivation to comply'.

As positive and negative outcomes will be weighted differently, as

discussed earlier, costs and positive outcomes should be treated separately.

A more general implication from the analysis here refers to the relationship between concepts in the Ajzen and Fishbein model. The assumption that affect is determined by the summated beliefs, cognitions, is brought into another perspective. Recently, the assumption that affect follows cognition, as implied in the Fishbein model, is seriously doubted (Zajonc 1980; Zajonc and Markus 1982; Wright 1981; Bettman 1981; Kroeber-Riel 1983). Van Raaij (1983b) argues that a primary, general affect is followed by cognitive elaborations which leads to a secondary, revised affect.

Research on halo effects show that a general attitude toward a certain behavior has an influence on the beliefs and the evaluations associated with those beliefs (Johansson et al. 1976; Beckwith and Lehmann 1976; Laroche 1978). The introduction of the behavioral field concept implies a goal setting reflecting a general affect or attitude toward performing behavior within a behavioral category.

The performance of specific acts is dominated by cost-outcome considerations which in our analysis do not need to include attitudes or affects nor need a linear compensatory decision rule. This is in line with the findings of e.g. Lastovicka and Bonfield (1982) 'Do consumers have brand attitudes?'. In our analysis they do not need to develop affects in an instrumental situation for (highly) substitutable choice alternatives. The choice will be determined by cost aspects, price and convenience. Foxall (1984) holds a similar position. He advocates, for consumer choice settings, the replacement of an attitude, as a supposed inner latent process, by the adoption of a research pardigm in which situational factors, especially the contingencies of reinforcement which inhere in them, can be studied.

The approach advocated here stresses the importance of studying acts from a broader perspective. By starting from behavioral fields in contrast to starting from acts. 'other' variables such as 'knowledge' and 'acceptance of responsibility' find a more natural place. Next to the aforementioned, other variables such as 'vested interest' (Sivacek and Crano 1982) can be incorporated. This latter concept refers to the behavioral cost component. 'Vested interest' might be considered to be a 'proxy' for the 'behavioral budget' allocated to a behavioral field. A more parsimonious conceptualization of attitude-behavior relationships might be attained.

6.2. General discussion

In this article an attempt is made to express the economic cost concept in behavioral terms. The relevance of a behavioral cost concept for attitude-behavior theorizing has been discussed. Elaborating this behavioral cost approach might shed new light on the person by situation debate. We might hold that situational changes can be reflected in financial, behavioral and social prices, while personal goals and values can be reflected in the behavioral budgets allocated to specific behavioral fields. Behavioral budget mixes of different individuals may reflect their personal capacities and interests in different behavioral fields.

The question can be raised whether the term social stock relates to the 'motivation to comply' concept from Ajzen and Fishbein. It might be hypothesized that persons with a large social stock have more freedom to deviate from social norms. The problem related to this topic is how to operationalize the concepts introduced here. Verhallen and De Nooij (1982) follow a conjoint analysis procedure to capture the essence of retail mix sensitivity, that may be considered as a behavioral budget mix for a specific behavioral category, daily shopping. This does not exclude that other measurement procedures can be used.

Goal importance or the attractiveness of the valued state is said to determine the behavioral budget.

The more important the goal, the larger the behavioral budget allocated to this goal. On the other hand, Brehm et al. (1983) argue that the more difficult an outcome is to attain, the more it is perceived as attractive. Brock's commodity theory (Brock 1968) might also be said to specify the cost-value hypothesis in this order. In the price-quality research tradition, starting with Scitovsky (1945), price is found to indicate quality (see e.g., Gabor and Granger 1966; Taylor and Wills 1970). The relation of costs and value, whether they are financial and/or behavioral, is so entangled that the order of causation may depend to a large extent on the task definition in the behavioral setting under study.

In some situations all cues related to intrinsic and/or extrinsic behavioral costs will be used by the individual to infer the relative value of alternatives e.g. in brand choice situations. In other situations, personal goals will determine the amount of budget and individual will allocate. This 'causal order' discussion resembles the revived discussion on the order of affects and cognitions (Zajonc 1980; Zajonc and Markus 1982; Van Raaij 1983b.)

After the above discussion we feel that it is premature to abandon Ajzen and Fishbein's reasoned action model as some argue (Sarver 1983). Attitude theory can be enriched by including concepts that reflect the limitations put by individual resources (Meyer 1982). A behavioral cost concept has that potential.

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Journal of Economic Psychology 3 (1983) 39–63
North-Holland Publishing Company

A BEHAVIORAL MODEL OF RESIDENTIAL ENERGY USE *

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Received October 14, 1981, accepted November 15, 1982

The energy use in the residential sector is an important area for campaigns to conserve energy In the first section of this article, a model is proposed that relates personal, environmental (e g home) and behavioral factors to energy use. This model is instrumental in relating variables that determine energy use in the home.

In the following these determinants of household energy use: socio-demographic factors, family life-style, energy prices, energy-related behavior, cost–benefit trade offs, effectiveness and responsibility, feedback, information, home characteristics are discussed.

In the third section several options for energy-saving campaigns and related research are discussed.

Introduction

About 30 percent of the total energy demand in The Netherlands comes from the residential sector. Home heating constitutes three-quarters of residential energy use, water heating about 15 percent, and the use of electricity for equipment and lighting about 10 percent. It is clear that most energy saving can be attained in home heating. If household members accept lower thermostat settings and avoid heat losses through windows and doors as much as possible, considerable savings will be attained.

Energy saving in the home creates benefits for the household itself in

* The authors are indebted to Bernward Joerges and Gordon McDougall for their helpful comments on an earlier version.

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the form of lower energy bills, and for the community at large in the form of lower imports of oil from the OPEC countries. Why do not all consumers behave in a more energy-conscious way? First, energy conservation is not seen as a problem that concerns them. Many consumers hold others (e.g. the government) to be responsible for the supply of energy. Second, consumers do not behave in an energy-conscious way due to their social environment. Third, consumers do not always know the energy costs of many household behaviors. They do not consider a behavioral change to be effective to conserve energy. Fourth, the feedback information of the energy bills comes too late to make people aware of energy wasting types of behavior. Fifth, some homes and heating systems are energy wasting and cannot be managed in an energy-conscious way by the household members. Sixth, many consumers are unwilling to give up the comfort of high home temperatures. And finally, energy-conscious behavior asks for some involvement with thermostat settings, closing curtains, turning off radiators. This means that you have to put effort and concern in the energy area, additional to your other concerns and efforts.

In the first section of this paper, we propose a model of energy behavior and in-home energy use. This model is an extension of the model proposed in Verhallen and Van Raaij (1981). Several groups of variables are considered as they influence energy use. These groups are the energy-related household behavior, energy-related attitudes, home characteristics, sociodemographic and personality variables, energy prices and feedback information about energy use.

In the second section of this paper, the groups of factors influencing residential energy use are elaborated, and the relevant literature is discussed.

In the third section, recommendations are made derived from the proposed model for energy conservation policy and research. This research may ascertain the relationships in the model and is directed to find effective ways of influencing household members to conserve energy in the home.

The behavioral model: an overview

In the model we propose relationships between groups of variables (fig. 1). The core groups are *energy use* and *energy-related behavior.* The

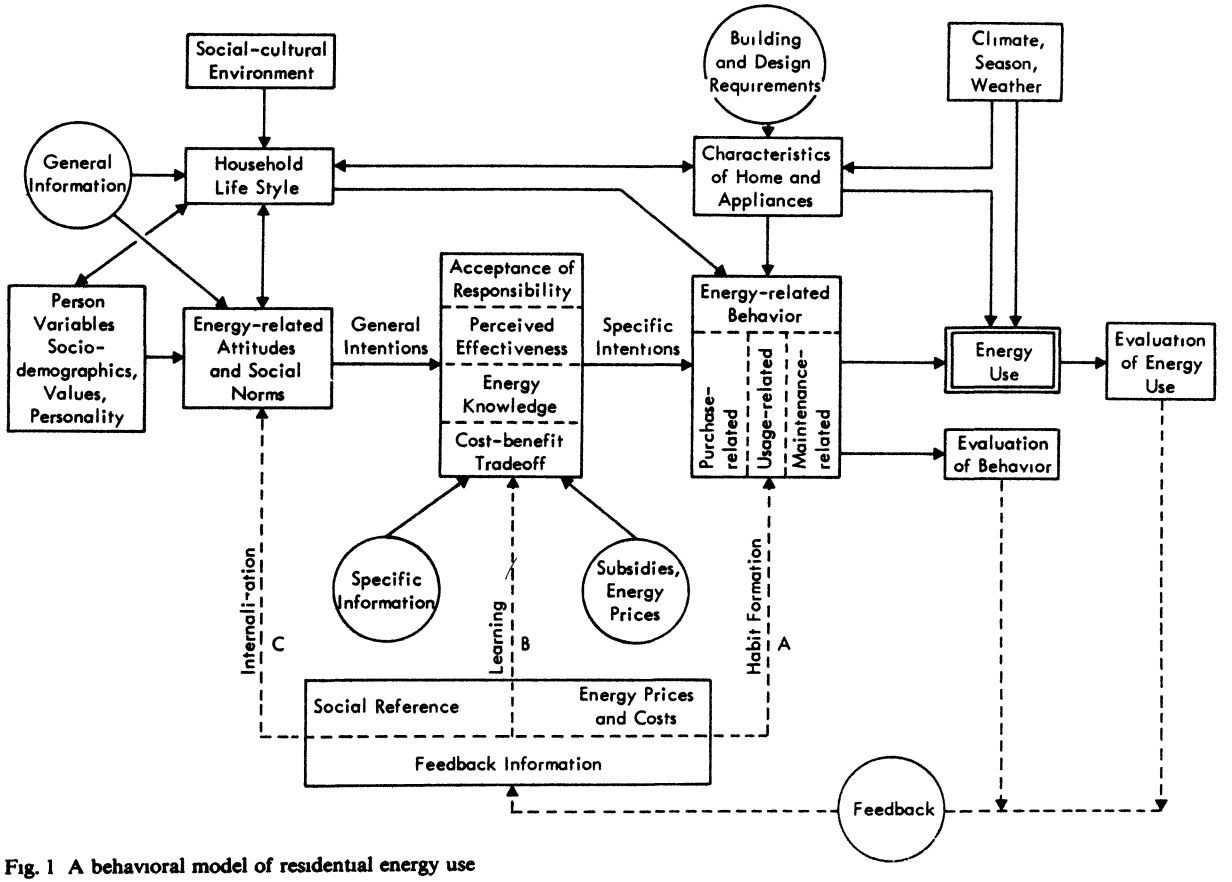

Fig. 1 A behavioral model of residential energy use

energy use of a household is influenced by energy-related behaviors. We distinguish between purchase, usage, and maintenance-related behaviors.

Purchase-related behavior has to do with the purchase of household appliances, heating equipment, and ventilators, and the relative importance and usage of the energy attribute of the products in the choice process.

Usage-related behavior refers to the day-to-day usage of appliances in the home and the home itself. It is the frequency, duration, and intensity of the use.

Maintenance-related behavior refers to the behavior to maintain the in-home heating system and appliances. This includes servicing, small repairs and small home improvements.

To take the familiar example of the automobile, purchase-related behavior pertains to the consideration of the energy efficiency of the car in the purchase process; usage-related behavior pertains to the driving style, intensity, duration, and frequency of use; while maintenance-related behavior pertains to servicing of the car and regular engine inspections.

Home characteristics have a direct influence on energy use because homes differ in their number of rooms, degree of insulation, wind exposure, and other characteristics. Home characteristics may also influence household behavior and, thus, energy use. We postulate that interactions exist between home characteristics and household behavior (matching of persons and homes related to energy use), or that household behaviors reduce or increase the effects of home characteristics.

Energy-related *attitudes* are price concern, environmental concern, energy concern, health concern, and attitudes toward personal comfort. Attitudes are related to behavior but do not necessarily cause behavior. We assume that persons try to maintain consistency in their attitudes and behaviors. If we change behaviors in a more energy-conserving direction, we may expect that persons develop energy-conscious attitudes. The reverse is not always true. Energy-conscious attitudes do not always lead to energy-conserving behavior. Attitudes may lead to good intentions but social norms, lack of knowledge on the energy use of certain behaviors and on the energy-conservation effects of behavioral change, and situational factors may block the intention to be realized in actual behavior. In the model we state four intervening factors between attitudes and behavior: acceptance of responsibility, energy knowledge,

perceived effectiveness of one's contribution, and (expected) cost–benefit trade-offs.

A number of *person variables* may influence energy-related attitudes and behaviors. Personality values are related to interests and opinions, which generate activities that may require more or less energy. Household life-style is determined by these person variables and social-cultural factors. Household life-style consists of enduring overall patterns of activities, e.g. leisure, hobbies. The combination of age, marital status and family size is the family life-cycle. Family size and composition, presence or absence from home have a direct effect on energy behavior and energy use. Household income, educational level and employment are also related to energy use.

Energy *prices* are an important factor. Price increases tend to reduce demand by the price elasticity of energy may be small for some segments of the population. Large price increases tend to reduce demand at least temporarily, while consumers adapt more easily to small price increases.

General information refers to information on the energy problem in our society at large: the supply of energy, the energy-inefficiency of cars and appliances, political questions on the OPEC countries. *Specific information* refers to the information on energy costs, the energy usage of certain behaviors, and the effects of energy-conserving behavioral change.

The model contains *feedback* loops from the evaluation of energy use and behavior to the intervening factors between attitudes and behavior, and to energy-related attitudes. Feedback information is information about energy use in a particular period, for a particular activity, or momentary energy use. The shorter the feedback period or the better related to a specific activity, the more effective the feedback information will be.

The factors that can be influenced in an energy-conservation campaign, are given in circles: (1) general information, (2) specific information and behavioral advice, (3) subsidies and energy prices, (4) building and design requirements, and (5) feedback information. The model shows how these five factors are related to energy use. General information has the longest path to energy use and will probably be the least effective as compared with the other influencable factors.

Factors influencing residential energy use

In this section we review the research on the groups of variables that influence energy use in the home. It is impossible to cover all literature in the area of residential energy use. For a more complete coverage we refer to the bibliographies by Joerges (1979b) and McDougall and Anderson (1982).

Energy use

Energy use and the evaluation of energy use are the dependent variables in the proposed model. The best measures of energy use are the differences of meter readings for natural gas and electricity at two or more occasions. Other energy sources, such as heating oil, coal, wood, and bottle gas create some measurement problems, because of the lack of continuous measurements. In these cases, especially for coal and wood, we have to estimate volumes. In most studies (Verhallen and Van Raaij 1981; Midden et al. 1983), the investigators/field workers read the meters. Self-reports of meter settings by household members might be an alternative way of measuring energy use.

Most reliable and easy estimates can be attained with one energy source for home heating (natural gas, oil) but one should exclude the use of natural gas for cooking and include the use of electric stoves and wood burned in fireplaces. The energy source for summer air conditioning is mainly electricity. Here, one should subtract the electricity used for lighting and household equipment. The energy contributions of household appliances and human bodies are relatively small and are not considered in most studies.

Energy behavior

We distinguish three types of energy-related behaviors: purchase-, usage- and maintenance-related behavior.

Purchase-related behavior refers to the consideration of the energy attribute in the purchase of consumer durables (stove, refrigerator, air conditioning or heating system, car). Energy-efficient equipment may be more expensive at the point of purchase but less expensive in use. Box and Hermans (1977) conclude that the energy attribute is relatively unimportant in the purchase decision process. The more the appliance

is deemed necessary, the less important seems to be the energy attribute. Anderson and Claxton (1982), and Redinger and Staelin (1981) study the effect of the energy label for major household appliances. The labels have a low impact on the choice process, unless salespersons emphasize and explain the energy label to their customers. Hutton and McNeill (1980) provide an overview of current energy labeling research.

Hanna (1978) compared a number of disclosure methods for energy saving investments. The rate of return method (initial investment and annual benefits) is both easy to understand and valid, and corrects for the expected future energy prices.

While purchase-related behavior pertains to a one-time investment in energy saving, *usage-related behavior* involves the day-to-day energy conscious behavior of setting thermostats, using ventilation systems. Usage-related behavior is very much interrelated with behavioral patterns and habits, and, in general, harder to change.

One of the few studies investigating household behavior is Verhallen and Van Raaij (1981). They find six factors in energy-related household behavior, plus two specific factors:

(1) Bedroom temperature while sleeping (**).
(2) Thermostat setting during absence (**).
(3) Thermostat setting while at home (**, except in summer).
(4) Use of window curtains.
(5) Airing of rooms.
(6) Use of bedrooms for studying/playing.
(7) Use of hall-door (**, except in summer).
(8) Use of pilot flame (**).

These behavioral factors explain 26% of the energy use for home heating. The factors marked with '**' contribute significantly at $p < 0.01$. Factors 3 and 7 do not contribute in the summer period. Household behavior proved to be a better determinant of energy use than personal attitudes.

Household behavior and home characteristics do not only separately determine energy use in the home but also interactively. Residents of well-insulated homes have lower thermostat settings (saving energy) but air out their dwellings more often (wasting energy), especially if they prefer to have a low bedroom temperature (Van Raaij and Verhallen 1983). Home characteristics, thus, have both positive and negative effects on energy conservation. Similarly, home insulation increases the

personal comfort perceived by the household members and this leads to lower thermostat settings. Home improvement and retrofitting not only save energy by improved insulation but also by changed behavior of household members. However, Edelson and Olsen (1980) find that after a better home insulation has been installed, some residents increase their consumption of heating fuel by 40 to 50 percent, presumably on the assumption that now their home is well-insulated, they can keep it as warm as they want. Van Raaij and Verhallen (1983) find a similar increase of energy use in the "cool" segment in their study. The "cool" segment of residents are characterized by low thermostat settings and a high level of ventilation. Additional insulation has no effect on their energy use for home heating. For the other four segments in their study, a better insulation leads to a lower energy use. Hamrin (1979) compared the energy use of the residents of homes in two Californian suburbs "Blue Skies Radiant Homes" and "Village Homes". The first type of homes have active solar energy systems and conservation facilities. The second type of homes have passive solar energy and conservation systems, requiring the residents' active involvement by closing shutters and setting thermostats. Contrary to expectations, in the Village Homes less energy was used than the Blue Skies Radiant Homes. The Blue Skies Radiant Homes residents perceive their homes as a way to conserve energy without changing their life-style (purchase-related behavior) and are less involved in energy-conservation behavior. The Village Home people were much more active day-to-day energy conservers (usage-related behavior) and actually used less energy. This means that active involvement in energy conservation leads to a lower energy use, and also that one should "match" the type of home with the life-style of the residents.

Energy-conscious persons conserve more effectively with a solar energy and conservation system requiring their active involvement, while less energy-conscious persons conserve more effectively in home with solar energy and conservation system not requiring their involvement.

Maintenance and operating behavior is added as a third category of energy-related behavior, drawing a parallel with other man-machine systems (Clemens 1983). Research on this category of behavior is almost non-existent but relevant for future research on residential energy conservation.

Stern and Gardner (1981) conclude that more energy can be saved

with increased efficiency (purchase- and maintenance-related behavior) than with curtailment (usage-related behavior). They state that psychologists are generally unaware of the technical aspects of energy use and potential conservation.

Life-style

The concepts of life-style and behavioral routines are crucial to energy conservation. In a process of socialization and in reference with other persons (friends, neighbors, relatives, colleagues) households develop their life-style and habits, partly as a consequence of housing, family composition, and income conditions, and partly as a way of self-expression and self-realization. Life-style is connected with a number of products (e.g. hobbies, sports), membership of clubs, and subscription to magazines. This means that life-style and behavioral routines are hard to alter or change only gradually over time. Attitudinal changes are in general easier to accomplish than behavioral changes. Many persons claim energy-conscious attitudes, but have not yet changed their behavior accordingly.

Characteristics of the home and appliances

Home characteristics such as wall-cavity insulation, double glazing, energy efficient heating and ventilation systems, are important contributions to energy conservation. The attributes of energy-using equipment, the number and kind of household appliances, from freezer to dishwasher and hot-water boiler, are important for the energy use of the household. A detailed discussion of the purchase, usage, and maintenance of these appliances goes beyond the scope of this article. Here we focus on the technical qualities of the home in relation to the behavioral patterns and life-style of the residents.

As already shown, a "matching" of homes and residents (Hamrin 1979) or a matching of appliances and residents (Darley 1977–78) provides the possibility of energy conservation.

Rosson and Sweitzer (1981) emphasize the following physical housing factors determining energy consumption in the home:

(1) temperature difference between inside and outside of the house,
(2) heat losses through wall, glass, ceiling, and roof transmission,

(3) air infiltration (one-half air change per house for houses without weather strips or storm windows),
(4) efficiency of the furnace, depending on its age and maintenance/service.

While wall, glass, ceiling, and roof insulation are purchase-related consumer investments, the furnace requires periodical attention and care (maintenance-related behavior).

Verhallen and Van Raaij (1981) and Van Raaij and Verhallen (1983) find as important technical home characteristics:

(1) home-insulation,
(2) home attachment (appartment vs bungalow),
(3) energy use of neighbors in attached homes,
(4) wind orientation,
(5) temperature difference between living room and bedrooms on the second floor.

Sociodemographic factors

A number of sociodemographic factors influence energy use and conservation. *Household income* is one of the most important factors. Newman and Day (1975) already concluded that the poor use less energy and that their energy use is non-discretionary (for essentials only). The better-off spend 40 percent more on natural gas for home heating, because their dwellings are larger and the energy price constitutes a relatively small proportion of their budget. The poor in the U.S.A. are generally older, have small families (children have left home), have a lower educational level, are more often black; their families are more often incomplete (husband or wife absent) and they do not own but rent their homes. Their homes are generally of a poor quality, with a poor insulation and a less efficient heating system. They conserve energy as much as they can, but their poorly insulated home is energy-wasting. Low-income earners cannot easily reduce their energy use any further.

Cunningham and Joseph (1978) conclude that low-income consumers cannot reduce their energy use, while high-income consumers are unwilling to reduce their energy use. Middle-income consumers are the most likely conservers. Verhage (1980) finds that early adopters of

energy conservation measures are relatively higher represented in the middle-income category (between Dfl. 25,000.00 and Dfl. 50,000.00), while late adopters are relatively higher represented in the high-income category (over Dfl. 50,000.00). This might mean that the first to start energy conservation in the home are the middle-income consumers, while the high-income consumers will follow. The low-income consumers do not adopt energy-conservation measures, because they are unable to reduce their energy use any further.

Household income strongly affects investment behavior of households with regard to home insulation and solar energy. Low-income consumers accept only short payback periods, while high-income consumers are willing and able to accept longer payback periods (Cunningham and Joseph 1978).

Low-income consumers are more often renters rather than owners of a house. For renters the financial cost–benefit ratio is different. After home insulation the house-owner may increase the rent, reducing the benefits for the renter. Expected future energy prices have a specific effect on the situation of low-income consumers. In The Netherlands, it has been calculated that in 1980 both low- and high-income consumers spend about 4 percent of their income on energy. It is expected that in 1985 these percentages will be 10 and 7 percent for the low- and high-income consumers, respectively. Joerges (1979a) also concluded that the poor pay more, at least for energy.

Other socio-economic factors have some influence on energy use and conservation, although research is not very conclusive here. Verhage (1980) finds that early adopters of energy conservation are not significantly different from other respondents with respect to *age* and *educational level.* Fritzsche (1981) and Verhallen and Van Raaij (1981) find that *household composition* (number of persons in household) is a determinant of energy use. A construct that combines age and household composition is *family life-cycle.* Energy use tends to fluctuate over the family life-cycle. Young households without children and both partners working outside the home tend to have a low level of energy use. Households with children at home have a higher use of energy. After the children have left home, the energy use decreases, but gradually increases with age, because older persons need a higher temperature.

Regional differences are another determinant of energy use. Northern countries and even northern parts of a country have a higher energy use

per household. Rural areas have a higher energy use than urban areas. Hemrica (1981) find that Dutch households in the rural areas use an average of 3200 m^3 natural gas for home heating, while households in large cities need an average of 1550 m^3 per year. These regional differences reflect the different types of houses (bungalows *vs.* appartments), differences in life-style, and differences of the exposure of the houses to the wind.

Energy-related attitudes

Energy-related attitudes include the (cognitive) beliefs about an object and the (affective) evaluations of those beliefs. Fishbein and Ajzen (1975) employ the expectancy-value formulation of attitudes. A person has a number of salient beliefs about an object, knowledge about the characteristics or attributes of that object. These beliefs are evaluated on a favorableness dimension. The summation of evaluations × beliefs constitutes the personal attitude toward the object. Similarly, social norms multiplied by the motivation to comply with the norms constitute the second component influencing behavioral intention (subjective probability of performing a behavior). Behavioral intention determines behavior, along with unanticipated situational constraints. For instance, a person may have a favorable attitude toward energy conservation (the attitude object); subjective norms also support energy conservation. Both components create a strong behavioral intention to conserve energy, and, if no situational constraints occur, actual energy conservation behavior. In this model, personal attitudes and/or subjective norms trigger the behavior. Changing a person's attitude or changing subjective norms will finally lead to the desired behavior.

Fishbein and Ajzen (1975) are not opposed to the reverse order that behavioral changes may create attitude change. This possibility is stronger represented in the model of Bentler and Speckart (1979). In this model, not only attitudes and subjective norms, but also prior behavior determine behavioral intentions.

Behavior is partly habit formation. Prior behavior leads to repetition (habit formation) and to complementary behavior. In a test of the Bentler-Speckart model more relationships between the concepts proved to be significant. This means that not only changes in attitude or subjective norm but also changes in earlier behavior may trigger the desired behavioral changes. The Bentler-Speckart model also shows that

relationships exist between prior behavior, attitude, and subjective norm. Persons tend to be consistent and avoid large divergence between these factors.

Seligman et al. (1978) find a relatively high predictive value of attitudes predicting electricity consumption for summer air conditioning (55 percent). The important attitude factors in their research are:

(1) Attitude toward personal comfort and health.
(2) High effort, low pay-off: "Conserving energy in the home requires a great deal of effort for too little dollar savings".
(3) Individual contribution to alleviate the energy crisis.
(4) Concern with the legitimacy of the energy crisis.

In a second study by Seligman et al. (1979) the same factors emerged with an additional factor "belief in science and technology". Attitudes in the studies of Seligman et al. predict the use of electricity very well (59 percent variance explained). For many American households, more energy is used for home air conditioning in summer than for home heating in winter.

Verhallen and Van Raaij (1981) obtain a lower predictive value for attitudes predicting home heating in winter. The attitude factors are:

(1) Energy concern;
(2) Home comfort;
(3) Price concern.

These three factors explain less than 5 percent of the respondents energy behavior. Verhallen and Van Raaij (1981) conclude that household behavior and home characteristics are more important determinants of energy use than attitudes.

Rosson and Sweitzer (1981) find that the excessive energy users have fairly traditional consumption attitudes and try to pass on the responsibility to others to avert an energy crisis. The conserving group can be described as "socially conscious" and "ecologically minded" in the same way as Webster (1975). These consumers are more sensitive and worried about the energy situation. They are younger, with larger families, better educated and more family-centered.

Geller et al. (1979) conclude that educational efforts to change

attitudes in an energy conserving direction are less effective than action-oriented efforts to change behaviors.

Leonard-Barton and Rogers (1979) also find specific attitudes and beliefs about the consequences of energy conservating actions to have more influence on conservation behavior than general beliefs, e.g. with regard to the energy crisis. In recent discussions on the attitude–behavior relationship in energy conservation (Ellis and Gaskell 1978; Olsen 1981; Ritchie et al. 1981) it is argued that specific attitudes will be better predictors of energy conservation than general attitudes. In our model both general and specific attitudes are represented, for three reasons:

(1) The distinction between general and specific attitudes is not only a matter of degree but also of difference in content. General attitudes are operationalized as energy-concern, price-concern, ecological-concern, and attitudes on comfort and health. Specific attitudes are defined as e.g. beliefs about the consequences of energy-conservation actions (Leonard-Barton and Rogers 1979) or claimed knowledge, and the importance of individual efforts (Ritchie et al. 1981).
(2) General attitudes may provide a general context shaping more specific and critical factors. General energy concern may lead to a higher sensitivity for specific behavioral recommendations.
(3) Specific intervening constructs are perhaps non-attitudinal. Olsen (1981) argues for a separate concept of behavioral intention in recognition of the fact that such an intervening construct may arise from non-attitudinal factors. In the model, these external factors are "specific information and behavioral advice" and "subsidies and prices".

Responsibility, effectiveness, and knowledge

Modifying Schwartz' (1970, 1975) theory of the activation of moral norms, we postulate two intervening constructs between attitude and behavior: acceptance of responsibility and perceived effectiveness of one's contribution.

Acceptance of responsibility is the attribution of responsibility for energy conservation to oneself as a consumer and not away from oneself to the government, industry, or ecology groups. Denying one's own responsibility means that there is no need to change one's behavior

or life-style. Hummel et al. (1978) study the "perceived blame" of the energy crisis. They find that self-blame of consumers coincides with a higher willingness to conserve energy. Blaming the environmentalists for the energy crisis concurs with less willingness to conserve.

Perceived effectiveness of one's contribution refers to the personal efficacy one perceives. Does your own energy conservation contribute to alleviate the energy crisis? Does a lower thermostat setting really contribute to energy saving? While each consumer's contribution may be marginal, the total energy conservation of all consumers is enormous. Consumers who perceive that their marginal contribution is ineffective, are less inclined to save energy. Through feedback mechanisms persons learn about the effectiveness of their contribution.

Energy knowledge is the knowledge of energy costs, energy conservation behaviors, and the energy consequences of these behaviors. Perhaps the most striking gap in consumer information on the energy problem is which behaviors have which effect on the use of energy. Although this cannot be answered in a general sense, because prior behavior and home characteristics will influence the size of this effect, this knowledge will affect not only the perceived effectiveness of one's contribution, but also the cost–benefit tradeoffs.

Cost–benefit tradeoff

Not only economic *costs* and *benefits* are involved in energy conservation but also behavioral costs and benefits. The behavioral costs are a decrease in personal comfort, the efforts of lowering thermostats and closing shutters, the lower status of the non-carowner, and the unattractiveness of change. The behavioral benefits are only minor compared with the behavioral costs; we may mention the pride of having visible energy-saving equipment and being a "socially conscious" person. In the economic and behavioral cost–benefit tradeoff, the behavioral costs may be too high for many consumers. In the model, the cost–benefit tradeoff has been placed between attitudes and behavior, because this economic and behavioral cost–benefit tradeoff is an important intervening construct between favorable attitudes and good intentions at one hand and the behavioral realization at the other hand.

For purchase-related behavior the financial cost–benefit tradeoff, e.g. the rate of return on a certain investment, is relevant. For usage-related and maintenance-related behavior the behavioral costs may dominate the cost–benefit tradeoff.

The intervening constructs between attitude and behavior lead to the following hypothetical conditional roles:

(1) Assuming a positive personal attitude and subjective norm toward energy conservation:
(2) If consumers have the (physical, financial) possibility to perform energy-conscious behavior (no constraints),
(3) If consumers accept their responsibility for energy conservation,
(4) If consumers have sufficient knowledge on the energy consequences of behaviors,
(5) If consumers perceive their contribution to energy conservation to be effective,
(6) If the economic and behavioral costs–benefits for energy conservation are positive,
(7) Then consumers will perform energy conservation behavior in accordance with their attitudes.

Energy prices

The price of natural gas, fuel oil, or electricity plays an important role in the energy use of consumers. We distinguish three aspects of the energy price.

(1) *Knowledge* of energy prices is generally poor. Most consumers do not exactly know the price of one m^3 natural gas or 1 liter fuel oil. Van Helden and Van Broekhuizen (1977) summarize the problems. The unit price of electricity, for instance, varies with usage. Large users pay a lower unit price than small users. Many utility companies have day and (cheaper) night rates. Consumers in many countries pay one bill for their natural gas, electricity and water. They pay monthly advance bills for an estimated standard amount and an annual settlement to correct for their actual use. These factors lead to obscure the direct relationship between energy use and energy costs, and, thus, price knowledge.
(2) *Price elasticity* is related to price knowledge. We may distinguish discretionary and non-discretionary energy use. Discretionary energy use is the energy use that may be postponed, reduced, or curtailed, for instance, by not heating all rooms of the home or not using electrical equipment.

Non-discretionary energy use is the energy used for essentials such as cooking or heating at least the living room at 16°C. Non-discretionary energy use if very much price insensitive, even for low-income consumers. Discretionary energy use is more price sensitive, because the consumer has more alternatives in this case. Van Helden and Van Broekhuizen (1977) obtain an overall short term price elasticity of 0.15 for electricity. A price increase of 10% leads to a short term reduction of 1.5 percent.

Middle-income households have a higher price elasticity (0.18) compared with low- and high-income households, 0.12 and 0.14, respectively. This confirms that middle-income consumers are most willing and able to conserve energy.

(3) Price, thirdly, constituted a *feedback mechanism.* Paying the energy bill may increase one's energy consciousness, price knowledge or sensitivity. The shorter the time interval between energy use and payment, the more effective the feedback mechanism will be. Annual settlement bills for energy are a very poor feedback mechanism for consumers: the relationship between usage and payment is almost lost.

Price rates. Progressive rates with a lower unit energy price for the heavy user do not stimulate energy conservation. Proportional rates or even degressive rates tend to reduce energy use, especially the discretionary energy use. However, with a degressive rate we discriminate against large families, rural areas and poorly insulated houses. We should correct the basis non-discretionary energy quota for these factors, if we should follow this policy of energy conservation.

The price mechanism may not only reduce discretionary energy use but may also spread out peak loads, especially for electricity. A (lower) night rate for hot water heating in electrical boilers will stimulate a better distribution of electricity consumption over the day. Consumers may change the timing of their household work (e.g. washing at night) to avoid peak loads. Kohlenberg et al. (1976) experimented with a peak load signal as feedback information for household members. A combination of feedback plus incentives was most effective and reduced peaking about 50 percent, but removal of experimental treatments resulted in a return to pre-treatment consumption patterns. Obviously, it takes time and effort to change established behavioral patterns in an energy-conscious way. Degressive and peak load rates may stimulate

these behavioral changes. Heberlein and Warriner (1983) conclude that attitude, knowledge and commitment have stronger effects on behavior than price and ability. The behavior is the shift of residential electricity use from on- to off-peak periods.

Feedback information

Feedback is the information persons obtain about the consequences of their behavior. Feedback about energy-related behavior involves monetary information about energy costs of the expired periods (energy bill), numerical information about kWh's electricity or cubic meters natural gas, and social information from referent persons about one's behavior. In general, the shorter the feedback period the more effective the feedback will be. In that case one can easily relate the costs to a certain behavior of wasting or conserving energy.

Feedback information on energy costs is more effective to reduce energy consumption than general information on energy conservation and information prompts. Additional financial rewards increase the effectiveness (Kohlenberg et al. 1976; Hayes and Cone 1977; Winett and Neale 1979; Battalio et al. 1979). Seaver and Patterson (1976) recommend to add social commendation to the feedback information to increase effectiveness. Most experiments on feedback have used small and biased (volunteer) samples, which makes a generalization of the results dubious. In may experiments, the energy use returned to the pre-experimental baseline level after finishing the experiment and removing the feedback information, rebates, or rewards.

This may be attributed to three different feedback functions (see the model):

(A) The feedback information may not have been specific enough for the household to learn which behaviors have energy relevance and no learning has occurred on the energy effects of these behaviors.
(B) The feedback period was not long enough for the households to establish new patterns of energy-conservation behavior and no habit formation took place.
(C) No internalization of the behavior in terms of personal attitude and subjective norm.

The latter condition may be explained by Bem's (1967) theory of *self-perception.* Through feedback information, rewards, or rebates new

energy-conserving behaviors are elicited. After a while, the persons adapt their attitudes in a way to become consonant with their behavior. The new energy-conserving attitudes remain after the experimental conditions have been removed. The energy-conserving behavior has been triggered externally through a reward system. The energy-conserving attitude has been formed through an internalization or self-perception process. In the model, the external feedbacks (A and B) and the internal feedback (C) are given with a dotted line. Social feedback information pertains to the information about the energy use of social referent persons (neighbors living in the same type of house; colleagues with the same occupational status; people of the same social class). Crucial is that the referent persons are perceived as true referents, with which one wants to compare oneself. Otherwise, differences in energy use are easily discounted as uncomparable cases.

Russo (1977) investigated the effect of feedback information about the energy use in the same period the year before, corrected for weather differences. This type of information has a small but stable effect. Note that the energy prices have increased and that it is not unlikely that consumers pay more now for less energy use compared with a year ago.

Feedback information provides the consumer with knowledge about the quantity and costs of the energy used. If the consumers are able to relate this information with their usage behavior, a learning process and behavioral adaptations toward an energy saving life-style may be stimulated. Internalization toward energy conscious attitudes and knowledge about energy-efficient *vs.* energy-wasting ways of behaving should be stimulated. Rewards and rebates may stimulate conservation behavior during the experimental period. Attribution of one's behavior to the rewards and rebates may inhibit internalization and, thus, a long-lasting effect.

Social reference and community approach

The network of social contacts with friends, neighbors and colleagues is important for the dissemination of information about energy conservation, and for social comparisons.

Communication occurs in social networks of cliques (homogeneous subgroups) and liaisons (persons connecting cliques). The strength of the liaisons is crucial for the dissemination of new information through personal contacts. While communication through the mass media is

important to provide facts and figures, personal communication is more convincing to change attitudes and behaviors (Nan Lin 1973).

Warren and Clifford (1975) found that energy saving innovations and behavioral changes have a stronger diffusion in "integrated" neighborhoods, i.e. neighborhoods with many social contacts, memberships of organizations, and outside contacts (liaisons). Diffusion is slower in neighborhoods without social contacts. The social structure reinforces the diffusion of energy-saving innovations. This reinforcement may be positive or negative. In the case of negative reinforcement, the social contacts derogate the innovation or the source of the information.

We may expect that the visible forms of energy conservation will have a stronger social-reference effect. Double-glass windows are more popular than wall-cavity insulation (Meyer and Vlieg 1979), because of the visibility of double glass. Many consumers feel the need to show others their energy-conscious behavior.

The supportive function of the social reference and community to stimulate the adoption of energy-conserving home improvement and energy-conserving behaviors and life-style, is much neglected in research.

Discussion

The main purpose of the model is to collect and to structure the determinants of residential energy use. This provides researchers and policy makers with a comprehensive review of factors relevant for the explanation of energy use and a means for evaluating the effects of different policy options. In the model, it is shown that some options, e.g. general information campaigns, will have very general and indirect effects. The path from general information to energy-related behavior is too long. Other policy actions, e.g. behavioral advice, have a shorter path to energy-related behavior and will probably be more effective.

Two other characteristics of the model should be mentioned. First, the model is not a process model. Processes mediating the effects on energy use, e.g. socialization, attitude change, and learning, are not described in full detail. Second, the model may be applicable for other energy-related behaviors. With minor modifications it may be used for the explanation of automobile use. "Characteristics of home and appli-

ances" becomes "characteristics of the car". "Building and designs requirements" also pertain to automobiles. The "structure of roads and public transit" should be added. The model may also be used for environmental behavior, e.g. recycling behavior and garbage separation.

Recommendations for energy conservation

Although the number of behavioral energy conservation studies is rapidly growing, several factors and relations within the model have not yet received much attention.

Behavioral evaluation. Studies have mainly focussed on energy use as the dependent variable. Other evaluation standards have received relatively less attention. Rohles (1981) mentions seven aspects of thermal comfort: air temperature, relative humidity, radiant temperature, air velocity, clothing, physical activity, and time. He discusses how these factors may be modified to conserve energy. Psycho-physiological research will be needed to create further insights. Other possible evaluation standards are perceived health, effort, convenience. In many instances, these evaluation standards are traded off against energy use.

Maintenance and operating related energy behavior. Research on this type of behavior is scarce. Especially for new types of energy producing or conserving equipment (solar and wind energy, energy-efficient furnaces), we need to know more about how consumers handle and service these appliances.

Energy knowledge. It has been found oftentimes that although consumers hold energy-conscious attitudes, they do not behave in an energy-conserving way. Specific knowledge of the effects of different energy-related behaviors or behavioral patterns is needed in order to behave according to one's general attitudes.

Cost–benefit tradeoff. Research on the willingness to change specific behaviors and the factors relevant for costs and benefits of behavioral change may lead to better insights into the effects of behavioral recommendations.

More general options for energy conservation programs and research are discussed in the following paragraphs.

Attitudinal change. Many traditional energy conservation campaigns have educational, informational or attitude-change purposes. It is assumed that attitude change leads to behavioral changes in the direction

of energy-conserving behavior. We assume that positive attitudes toward energy conservation are only materialized in energy-conservation behavior under the conditions that the economic and behavioral trade-offs are favorable for energy conservation, and/or that persons accept their responsibility for energy conservation and judge their contribution to be effective. Positive attitudes plus the mentioned conditions may lead to energy-conserving behavior. Research is needed to ascertain whether all conditions are necessary or only a subset, because some conditions may be substitutes for each other.

Behavioral change. Through recommendations, information, prompts, and information about the energy costs of certain behaviors we may change behavior directly without changing attitudes first. Feedback methods are promising for behavioral change. Most persons do not want to give up their preferred life-style, habits, and behavioral routines. More research is needed to study the interrelationships of behaviors: sequential patterns, co-occurrence of behaviors, traditional ways of doing household work, and preferred hours of the day for household work. Research is needed to relate household behavior patterns and life-style to socio-demographic characteristics (age, income, family composition, occupation, education), and to study the effect of changing one type of behavior on the other behaviors (substitution, complementarity).

Home improvement. Energy-efficient equipment, and home retrofitting have their impact on household behavior. Residents may reinforce or counteract the energy-conserving technical facilities. Research is needed, how to introduce energy-conserving innovations (Van Raaij 1981), how to adapt the innovations to household behavior, and how to match technical innovations and home characteristics to the life-style of the household.

Continuous innovations ask no or little change of household behavior and are easier to introduce than discontinuous innovations that require considerable changes in household behavior, and are, consequently, more difficult to introduce. Examples of research on the interaction of technical equipment, home characteristics, and household behavior are Darley (1977–78), Hamrin (1979), Verhallen and Van Raaij (1981).

Feedback. Feedback information is effective in teaching consumers the energetical consequences of their behavior. Several types of feedback are already mentioned in this article. The shorter the feedback

period, the more effective the feedback will be. Momentous feedback is possible with the (Canadian) Energy Use Display Meter (Mauser et al. 1979). The content of feedback information may be (1) the quantities used, (2) the financial costs of used energy, (3) a comparison with earlier and comparable periods, and (4) a comparison with the energy use of referent households. Rebates and rewards reinforce the effects of personal feedback, but are difficult to realize outside experimental settings.

Self-monitoring is a type of feedback, in which the residents record their own energy use by reading the meter regularly. Self-monitoring requires the active involvement of the residents and is only successful if this involvement has been realized.

A final criterion for the evaluation of feedback procedures is the degree of energy conservation realized during or after a feedback period. In order to assess the stability and nature of these results, the criteria mentioned in the model should be taken into account. This means that the degree of internalization (attitude change), learning (increased energy knowledge), or habit formation (behavioral change) determine the success of the feedback treatment. This corresponds with C, B, and A types of feedback, respectively. The distinction of these different types of feedback criteria will strongly improve our understanding of the feedback process and effects.

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Journal of Economic Psychology 2 (1982) 39–55
North-Holland Publishing Company

RETAIL ATTRIBUTE SENSITIVITY AND SHOPPING PATRONAGE

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Received July 15, 1981, accepted November 4, 1981

Using conjoint analysis the sensitivity for the four most important retail attributes price, quality, assortment and locational convenience for food stores is measured for a sample of 400 consumers in Tilburg, The Netherlands In a second wave the actual shopping behavior is measured using a self-administrated questionnaire The sensitivity scores are used separately and in conjunction, as sensitivity patterns, to explain patterns of shopping behavior as well as separate shopping characteristics The relationships found, suggest the usefulness of this kind of approach as it gives in-depth insight into shopping behavior and choice of grocery store

Introduction

Investigations concerning retail patronage and store choice have followed many lines. Retail shopping behavior has been predicted by means of objective variables like distance, traffic patterns, population density and store size (see Alpert 1971). Such research has relatively low predictive value in trade area situations where many alternative stores exist and where distances among stores do not vary greatly (see Stanley and Sewall 1978). A second line of research employs consumer variables to predict store patronage. Rich and Jain (1968) investigated social class and life cycle as explanatory variables for shopping behavior. Other studies have included socio-economic product risk (Prasad 1975), personality related variables (Dash et al. 1976), personnel interest

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0167-4870/82/0000–0000/$02.75

(Bellenger et al. 1976–1977), media usage (Bearden et al. 1978) and self-ascribed occupational status (Hirschman 1980).

Although all of these variables are weakly related to shopping behavior and/or store choice, managerial implications are often unclear or difficult to implement. This consideration led us to explore personal characteristics more closely related to actual shopping and store attributes. Specifically, sensitivity for retail attributes are investigated. These express the individual cost benefit structure of shopping and are directly related to store attributes.

The choice of retail attributes

In a review of 26 empirical and theoretical papers on the importance of store attributes in retail store selection, Lindquist (1974) observed that the four marketing mix elements, price, quality, assortment and locational convenience were mentioned most frequently. Lindquist suggests that this relative frequency of mention is a "valuable indicator" of the importance of these attributes. In a review of 12 studies on the importance of retail store attributes, Arnold et al. (1978) performed a comparative analysis on attribute importance for supermarkets.

For seven studies on grocery shopping behavior the response to the question "All things considered, what is the single most relevant reason you shop at (name supermarket) for most of your food shopping?", was coded into nine categories. Five reasons, covering the four attributes: price, assortment, locational convenience and quality (general and for meat specifically) were considered by the respondents (total $n = 7.000$) as most important. For these seven studies an average of 75% of the sample considered one of these four attributes as most important. In the foregoing studies the importance of the attributes is deduced from questions about the single most important reason for retail store choice. In a study by Hansen and Deutscher (1977–1978) an importance rating on 41 attributes for retail stores by 485 subjects was assessed. In a study by James et al. (1976) a multi-attribute model was used to assess the importance of six attributes for men's clothing stores: price, assortment, personnel, atmosphere, service and quality. The importance ratings for quality, price and assortment found, were the highest. Locational convenience, however, was not included in this latter study.

In the above studies, the implicit conclusion has been that attributes which are rated as being important determine the actual retail store choice. However no attempts have been made to validate this against actual shopping behavior. Secondly no attention has been given to the influence of the interaction or combination of these attributes as reasons for choosing specific retail stores.

In this study an attempt is made to measure the sensitivity pattern of housewives on the four retail attributes (price, quality, assortment and locational convenience) considered as most important for predicting actual food shopping behavior.

Measuring retail attribute sensitivity

The trading area confronts the consumer with a wide variety of shopping alternatives with varying retail attributes. It is not likely that one alternative is clearly better than another for every retail attribute. The consumer has to trade-off between retail attributes.

By trading-off the individual tries to choose the alternative with highest utility. Utility can be defined as a function of retail attributes.

$$U_{ijk} = f(a_i, b_j, c_k)$$

In which U_{ijk} is the utility for the alternative for which i, j, k are the levels of the attributes a, b, and c. By varying retail attribute levels and holding other attributes constant the change in utility can be taken as a sensitivity indicator for that particular retail attribute. Formulating retail attribute sensitivity in this way directly links the sensitivity concept to the conjoint measurement model.

Table 1
Trade-off matrix.

Price level	Distance		
	a_1 (5 min.)	a_2 (10 min.)	a_3 (15 min.)
b_1 (Dfl 100.00)	1	2	5
b_2 (Dfl 110.00)	3	4	7
b_3 (Dfl. 120.00)	6	8	9

The trade-off process is illustrated in table 1, an example of a trade-off matrix with only two attributes distance and price at three levels: (1) is the most preferred combination, (9) is the least preferred combination. These preference rankings are the input for estimating the utilities of the attribute levels of distance (a_1, a_2, a_3) and price (b_1, b_2, b_3).

The conjoint measurement model can be specified as a linear additive as well as a linear multiplicative model or a combination of these models.

$$z_{ij} = a_i + b_j \tag{1}$$

$$z_{ij} = a_i b_j \tag{2}$$

The objective of the conjoint measurement algorithm is to estimate the parameters (utility values) a_i and b_j, in such a way as to minimize the rank difference of z_{ij} with $\hat{z}_{ij}$, which is a monotonic (order preserving) transformation of the observed ranks. The algorithm is iterative, minimizing a stress coefficient as a measure of goodness of fit. In this study Kruskal's stress coefficient S was used:

$$S = \left[\frac{\sum (z_{ij} - \hat{z}_{ij})^2}{\sum (z_{ij} - \bar{z})^2} \right]^{\frac{1}{2}} \tag{3}$$

$\bar{z}$ = mean of z_{ij}'s. The summation is over all the attribute levels.

Table 2
Distance and price utilities

Price	Distance		
	0 923 (5 min)	0 185 (10 min)	−1 108 (15 min)
1 292 (Dfl 100 00)	1 (2 215)	2 (1 477)	5 (0 184)
0 185 (Dfl 110 00)	3 (1 108)	4 (0 370)	7 (−0 923)
−1 477 (Dfl 120 00)	6 (−0 554)	8 (−1 292)	9 (−2 585)

Using an additive model to estimate the utility values of price and distance on the data from table 1 we obtain for price $b_1 = 1.292$, $b_2 = 0.185$, $b_3 = -1.477$ and for distance $a_1 = 0.923$, $a_2 = 0.185$, $a_3 = -1.108$. These utility values produce the original preference ranking (see table 2). The most preferred combination has the highest ($2.215 = 1.292 + 0.923$), the least preferred combination has the lowest utility ($-2.585 = -1.477 - 1.108$). In this example the price sensitivity for this consumer would be 2.769 ($= b_1 - b_3$), his distance sensitivity 2.031 ($= a_1 - a_3$).

Design of the study

The study was conducted in two waves with a sample of 400 housewives in Tilburg (The Netherlands). The sample was drawn randomly within district strata. In the first wave, respondents had to trade-off price, distance, assortment and quality for food shopping. These attributes were measured at three levels (see table 3).

The conjoint measurement data were collected by a pair-wise method (Johnson 1973; Jain et al. 1979) and the utilities were estimated with MONANOVA (Kruskal and Carmone 1969). In a four attribute design each attribute is evaluated three times. This yields for each respondent three scales for each attribute. The final attribute scale is the mean of

Table 3
Shop attributes

	Price	Distance	Assortment	Quality
Level 1	Weekly purchases at a price of 100 guilders	5 minutes distance	Food products	Once a week a spoiled food product
Level 2	Weekly purchases at a price of 110 guilders	15 minutes distance	Food products, household articles	Once a month a spoiled food product
Level 3	Weekly purchases at a price of 120 guilders	25 minutes distance	Food products, household articles, cosmetics, periodicals	Once half a year a spoiled food product

the three scales (Oppedijk van Veen and Beazley 1977).

The retail attribute sensitivity scores for each respondent have been calculated as the difference between the two most extreme utility values. For price, distance and quality the sensitivity has a unique interpretation, while the extremes of the utility scales were always at the extremes of the price, distance and quality scales. However, for the assortment scale some respondents had high utility for a small assortment and low utility for a wide assortment, others had opposite utility values. So a distinction was made between sensitivities for a small assortment (−signs) and sensitivities for a wide assortment (+signs). In the second wave, four months later, using a self-administrated questionnaire, store patronage and daily shopping behavior was measured for the same sample, for six food product categories (bread, vegetables, milk, meat, softdrinks and beer, and groceries). The response was 66%. The remaining sub-sample has the same sociodemographic and attribute sensitivity structure as the total sample.

Three perspectives on the retail attribute sensitivity construct

In three phases, each building upon the other, an insight into the validity of the sensitivity construct will be developed.

- In the first we follow a simple univariate approach. Retail attribute sensitivities are taken separately and related to store choice. Within the six different food product categories the predictive validity of the sensitivities are tested.
- In the next section the effect of combinations and interactions of retail attribute sensitivities is taken into account. Profiles of retail attribute sensitivity are taken and validated against store choice.
- As a sensitivity profile reflects the individual's overall shopping strategy they may not only be expressed via specific store choice but perhaps more clearly by general behavioral shopping patterns. For instance people who are both price sensitive and quality sensitive might buy their low perishable food products at a discounter and meat and vegetables at the butcher and the greengrocer. So finally patronage profiles are constructed and used as criterion for the validation of retail attribute sensitivity profiles.

Table 4
Analysis of variance: retail attribute sensitivities by store choice

Product category	Where bought	*n*	Price	Assortment	Quality	Distance
Bread	Supermarket	28	1.918	1.622	3.042	1.901
	Discounter	26	2.328	1.050	2.749	2.044
	Bakery	137	1.991	1.126	2.988	1.938
	Baker's van	62	2.181	1.028	2.900	1.978
	Total	253	2.064	1.152	2.947	1.954
			$F=2.38$	$F=0.92$	$F=2.29$	$F=0.32$
			$\alpha<0.10$	*n.s.*	$\alpha<0.10$	*n.s*
Vegetables	Supermarket	36	1.852	1.604	2.943	2.123
	Grocer	5	1.779	1.682	3.118	1.758
	Discounter	19	2.388	1.349	2.737	1.939
	Market	105	2.149	1.103	2.916	1.918
	Gr. grocer	71	1.985	1.009	2.999	1.943
	Gr. grocer's van	21	2.099	0.830	3.023	1.952
	Total	257	2.068	1.159	2.942	1.956
			$F=1.88$	$F=0.98$	$F=1.14$	$F=0.74$
			$\alpha<0.10$	*n.s*	*n s*	*n.s*
Milk	Supermarket	85	2.114	1.097	2.971	2.020
	Grocer	10	1.586	1.004	3.018	2 442
	Discounter	59	2.253	1.399	2.947	1.760
	Mobile-shop	22	2.045	1.052	2.872	1 773
	Milkman	79	1.947	1.027	2.962	2.010
	Total	255	2.067	1.138	2.956	1.952
			$F=2.61$	$F=0.49$	$F=0.22$	$F=4$ 14
			$\alpha<0.05$	*n.s*	*n.s*	$\alpha<0.01$
Meat	Supermarket	52	2.089	1.295	2.883	2.145
	Discounter	35	2.414	0.989	2 765	1.787
	Butcher	169	2.012	1.106	3.006	1.937
	Total	256	2.067	1.128	2.948	1.958
			$F=4.39$	$F=0.40$	$F=4.12$	$F=3.93$
			$\alpha<0.01$	*n.s*	$\alpha<0.01$	$\alpha<0.05$
Softdrinks and beer	Supermarket	100	2.051	1.135	2.944	1.983
	Grocer	12	1.687	0.597	3.057	2.188
	Discounter	105	2.187	1.307	2.947	1.828
	Mobile-shop	7	1.682	0.132	3.202	1.954
	Milkman	11	2.032	0.595	2.932	2.165
	Victualer	22	1.982	1.332	2.905	2.137
	Total	257	2.072	1.148	2 953	1.949
			$F=1.65$	$F=1.25$	$F=0$ 52	$F=2$ 02
			n.s.	*n.s.*	*n.s*	$\alpha<0$ 10
Groceries	Supermarket	117	2.037	1.191	2 948	2 067
	Grocer	15	1.650	0.499	2.973	2.119
	Discounter	124	2.163	1.226	2.940	1 839
	Total	256	2.067	1.129	2.951	1.958
			$F=2.98$	$F=3.39$	$F=0.66$	$F=3$ 36
			$\alpha<0.01$	$\alpha<0.01$	*n.s.*	$\alpha<0$ 05

The retail attribute sensitivities and store choice

By measuring the retail patronage for six food product categories – outlet most frequently shopped for each product category – we test the predictive validity of the sensitivities. In table 4 the results are shown of the analyses of variance for the four attribute sensitivity measures within each food product category. For five out of the six product categories the price sensitivity differs among the respondents doing their shopping at the different types of stores represented in the table. The differences are significant (at a 1% level) for the store choices for meat and groceries, as one would expect given that these product categories constitute the largest expenses in daily shopping.

Assortment sensitivity differs only for the stores chosen for groceries. As the range of assortment for the other product categories is not really different among the different outlets we would not expect to find differences there. The differences between stores for quality sensitivity are significant only for meat and for bread. These differences are all what we would expect. For milk, drinks and groceries, none or only small differences in quality are assumed to exist among the different types of outlets. As most supermarkets and discounters have a separate fruit and vegetables department which generally does not differ from an independent green grocer's shop, no differences were expected in this regard. For four out of six product categories significant differences, between retail outlets in distance sensitivity are found. Distance insensitive consumers shop more frequently with discounters, which corresponds with the retail structure of Tilburg: in the city of Tilburg there are only eight discounters. So the mean real distance to be covered in visiting a discounter is relatively large. Undoubtedly the retail structure of the city influences the relationship between distance sensitivity and store choice. The retail structure will be taken into account by performing an analysis by district.

Retail attribute sensitivity profiles

In this section a further exploration of retail attribute sensitivities is undertaken to examine how a combination of retail attribute sensitivities might add to our understanding of the construct- and predictive validity of the sensitivity concept. A McRae cluster analysis is performed on the retail attribute sensitivity scores (McRae 1971). Ten

Table 5
Retail attribute sensitivity clusters

Clusters	*n*	Price	Distance	Assortment	Quality
1 Very price sensitive	39	*3 153*	2 270	1 195	*2 010*
2 Service-oriented	48	2 189	1 956	*−1 567*	3 063
3 Wide assortment	36	1 599	1 671	*3 085*	2 473
4 Quality good choice	67	1 615	1 551	*2 329*	*3 268*
5 Price insensitive, Service oriented	29	*1 370*	2 261	*−2 208*	2 973
6 Nearby quality	27	1 572	*2 598*	1 416	*3 165*
7 Distance insensitive	37	2 507	*1 244*	1 956	3 142
8 Value for money	31	*2 617*	1 910	1 094	*3 207*
9 Distance sensitive	22	1 769	*2 995*	1 485	2 513
10 Average	55	2 122	2 074	1 490	3 130
Total	391	2 081	1 953	1 101	2 928

Note The significant scores for each cluster are italicized

well-interpretable clusters are obtained. The sensitivity patterns are given in table 5. All but the average cluster differ at least on one element from the overall mean sensitivity scores. Half of the clusters have a pattern which is characterized by two significant sensitivity scores. The very price sensitive cluster accepts less quality for lower prices and the price insensitive service oriented group is willing to pay more for additional service. Three other clusters have a combined sensitivity pattern: the value for money, the good choice and the nearby quality clusters. Four other clusters can be typified on one dimension.

The clusters are different in terms of socio-demographic characteristics. The price sensitive (1) and the distance sensitive (7) clusters contain lower income families. The service oriented clusters (2) and (5) contain either young or old women (sign. $\alpha < 0.01$) with a high educational level (sign. $\alpha < 0.05$). The women in the distance sensitive clusters (6) and (9) have young children (sign. $\alpha < 0.05$) while the wide assortment cluster (3) contains large families (sign. $\alpha < 0.05$) with old children (sign. $\alpha < 0.05$). Taking the rather small sizes of the clusters into account, the overall pattern of differences supports the content validity of the clusters.

To test predictive validity of the clusters, we look at the characteristics based on each food product category separately and the general characteristics based on the total of all six food product categories (see

Table 6
Shopping characteristics of the retail attribute sensitivity clusters

Cluster	n	Shopping characteristics				
		Discounts	Service-shops	Super markets	Special shops	Trips
1 Price sensitive	39	More products [b]	Less [c]		TORRO [c] EDAH	Less [a]
2 Service	48			Less [a]		
3 Assortment	36				FAMILA [b]	
4 Good choice	67					
5 Price insensitive – service	29	Less [b]	More [a]			
5 Nearby quality	27	Less [(a)d]				
7 Distance insensitive	37			Less products [b]		
8 Value for money	31		Less [c]			
9 Distance sensitive	22	Less [(a)d]	Less [b]	More [b]		Less [b] Less shops [c]
10 Average	55					

[a] $\alpha<0.10$ [b] $\alpha<0.05$ [c] $\alpha<0.01$ [d] Both distance sensitive clusters taken together
Note – sign (superscript) differences are tested by taking a cluster against the rest

table 6). Among the general characteristics, the number of products bought in three kinds of shops – discounters, supermarkets and service-shops – are given. Two other characteristics are computed over all product fields: the number of shopping trips a consumer makes during a week and being a customer at some well known large discounters. For the six product fields separately, stores are presented where one cluster buys these products more or less often than others. Again only the significant differences between clusters are reported.

People in the price sensitive cluster (1) who visit discount stores, buy significantly more products there. They visit less service shops and go more frequently to the city's discounters. They make fewer shopping trips and buy the different products more often at discounters than others. Vegetables are bought at the open air market. The difference of

Product category					
Bread	Vegetables	Meat	Milk	Drinks	Groceries
Disc [c]	Open market [a(a)]	Disc [a(b)]	Disc [(b)]		
Baker [a]				Victualer [(a)]	
	Superm [a(−a)]			Victualer [(a)]	
		Butcher [a]			
Greengrocer [(a)]	Butcher [a]	Milkman [(b)]	Milkman [b]	Grocer [c]	
				Milkman [a(b)]	
	Less superm [c]				Disc [a]
		Superm [a]			
Door [a(a)]	Superm [a]	Superm [b]			Superm [a]

this cluster with the rest of the sample even increases if only respondents are considered from those districts where a free choice between the different outlets within the own neighborhood is possible. Then the differences in traveling time for the different kinds of stores is strongly reduced. The changes in significance are indicated in table 6 by superscript a, b, or c within brackets. For example, for the total group the difference between the price sensitive cluster and the rest of the sample in buying meat at a discounter is only significant at the 10% level. Taking only the respondents into account within those districts where all three kinds of outlets are available, this difference becomes significant at the 1% level. In general, differences between clusters become more dramatic if the retail structure is taken into account.

The service sensitive cluster (2) buys less at supermarkets but not less

at discounters. This may be due to the presence of separate in-store selling points for vegetables and meat at most discounters.

For cluster 5, the service sensitiveness score is even higher than for cluster 2 and respondents from this cluster buy more often at service shops. This is significant for five of the six product fields. Again some of the differences become more dramatic by taking the retail structure into account.

A further remark on the results in table 6 is that the distance sensitive group (9) buys more in supermarkets, while the distance insensitive group (7) buys less there. This may indicate that buying at the supermarket is perceived to be an easier and quicker way to do the shopping. All the findings in table 6 lead to the conclusion that the clusters do differ in their shopping behavior in directions one would expect as based on the earlier findings. Segmentation on attribute sensitivities seems to be worthwhile. As it relates behavioral mechanisms directly with marketing instruments, it has more direct strategic implications than traditional socio-economic or psychological segmentation.

Patronage profiles

As already mentioned, people may have different shopping strategies as a result of their specific sensitivity profile. Here these shopping strategies are analyzed in relation with the sensitivity patterns.

To construct the patronage profiles a hierarchical binary cluster analysis was performed (procedure Johnson, Jaccard similarity coefficient, nearest neighbor linkage with relocation) based on a product × outlet binary string (see Clustan Manual from D. Wisehart 1978). Each respondent is characterized by a string of 72 binary attributes (6 products × 12 types of outlets). This resulted in an interpretable as well as distinct (in terms of within/between variances) five-group cluster solution. For the five clusters two indices are given. The absolute percentage gives the number of respondents within a cluster buying a specific product category at a specific type of store. Whereas this is a function of the general occurrence of this type of shopping behavior, a second index, the "ratio", is given. The ratio expresses the percentage of respondents within a cluster buying a specific product at a specific outlet divided by the overall occurrence of that type of shopping behavior. To illustrate this: buying meat at a discounter is done by 83%

Table 7
Patronage profiles

	Ratio [a]	Abs % [b]
Cluster 1: Overall discountshoppers ($N=41$)		
Meat at discounter	6.3 [c]	83
Bread at discounter	5.5	54
Vegetables at discounter	4.8	34
Milkprod. at discounter	3.9	85
Groceries at discounter	2.3	98
Drinks at discounter	2.2	88
Cluster 2: Overall supermarket shoppers ($N=53$)		
Meat at supermarket	4.9	96
Bread at supermarket	3.1	33
Vegetables at supermarket	2.9	42
Milkprod. at supermarket	2.0	65
Groceries at supermarket	1.9	94
Drinks at supermarket	1.9	71
Cluster 3: Once a week discount, rest small retailer ($N=71$)		
Groceries at discounter	2.3	97
Drinks at discounter	2.1	83
Vegetables at greengrocer	1.7	47
Meat at butcher	1.4	89
Milkprod at discounter	1.3	30
Milkprod at milkman	1.1	34
Bread at bakery	1.2	28
Bread at baker's van	1.2	61
Cluster 4: Small retailer shopper ($N=53$)		
Drinks at grocer	3.4	15
Drinks at milkvan	3.2	13
Drinks at supermarket	1.4	55
Groceries at grocer	2.7	13
Groceries at supermarket	1.6	79
Vegetables at greengrocer's van	2.6	21
Vegetables at greengrocer's shop	2.3	62
Milkprod at mobile-shop	1.6	13
Milkprod. at milkman's van	1.6	47
Meat at butcher	1.4	93
Bread at bakery	1.3	68
Cluster 5: Once a week supermarket, rest small retailers ($N=53$)		
Vegetables at open market	2.0	77
Groceries at grocer	1.9	9
Groceries at supermarket	1.7	87
Drinks at supermarket	1.8	70
Drinks at victualer	1.4	11
Milkprod. at supermarket	1.8	57
Meat at butcher	1.6	100
Bread at baker's van	1.2	28
Bread at bakery	1.1	55

[a] Ratio: the % of respondents within the cluster buying a specific product at a specific outlet divided by the % the respondents in general buying a specific product at that specific outlet

[b] Abs. %: The % of respondents within the cluster buying a specific product at a specific outlet

[c] A ratiovalue of 1.5 expresses a difference with the other clusters which is significant at a 1% level.

of the "Overall discount shoppers" (cluster 1). This percentage is 6.3 as much as for a random chosen group of housewives. So the occurrence of buying meat at a discounter and not elsewhere is 83:6.3 = 13.2%. To put it another way, the overall discount shopper, 15.4% of the sample, accounts for 97% of the times meat is bought at a discounter. In general, a ratio value of 1.5 expresses a difference with the other clusters significant at a 1% level.

Finding these distinct shopping clusters suggests that a segmentation based on shopping behavior is promising for retail marketing, more than segmentation studies based on images and attitudes already reported in the literature (Stone 1954; Enis and Paul 1970; Webster 1965; Kelley and Stephenson 1967; Stephenson 1969; Anderson 1971; Darden and Reynolds 1971; Darden and Ashton 1974; Reynolds et al. 1974; Moschis 1976; Williams et al. 1978).

The relationship between retail attribute sensitivity segmentation and patronage profile segmentation is tested to ascertain the predictive power of the combined sensitivity concept. Specific hypotheses about the correspondence between sensitivity patterns and patronage patterns are formulated. For instance the first hypothesis reflected in table 8 is whether price sensitive consumers have more often a discount shopping pattern than another shopping pattern. For these hypotheses a x^2-test with one degree of freedom is appropriate (corrected for discontinuity

Table 8
Relationship between sensitivity patterns and patronage profiles

Sensitivity pattern	H_1	Patronage profile	χ^2
Price sensitivity (1)	More	Discountshopper (1)	8 3 ($p<0$ 01)
Service oriented (2)	More	Retailshopper (4)	*n s*
Price insensitive Service oriented }(5)	More	Retailshopper (4)	3 9 ($p<0$ 05)
Wide assortment (3)	Less	Retailshopper (4)	2 1 (*n s*)
Good choice (4)	More	[Discount + retailshopper (3) Supermarket + retailshopper (5)	3 5 ($p<0$ 10)
Nearby quality (6)	Less	Discountshopper (1)	*n s*
Distance insensitive (7)	More	Discount + retailshopper (3)	3 1 ($p<0$ 10)
Value for money (8)	More	Supermarketshopper (2)	4 8 ($p<0$ 05)
Distance sensitive (9)	More	Supermarketshopper (2)	6 5 ($p<0$ 05)
Average (10)	Average	No expected differences	

and checked with an exact probability test) in which the expected correspondence of both patterns (*Ho*) is based on the marginal totals, the cluster sizes. The overall correspondence of sensitivity patterns and patronage profiles suggest the validity of the attribute sensitivity concept as well as its relevance for retail marketing.

Discussion

The relationships found between retail attribute sensitivity and shopping behavior suggests the usefulness of the sensitivity concept for retail studies. The operationalization of sensitivity by means of conjoint measurement seems promising as a data collection method. In our opinion it will, however, be an improvement for the predictive power of the sensitivity concept to conceptualize the assortment sensitivity differently than has been done in this study, that is, into a width assortment sensitivity and a depth assortment sensitivity. A larger sample will also be needed in order to take the retail structure into account. It will then be possible to do within-district analysis to increase the predictive power of the sensitivity concept and to do between district analyses in order to form a better understanding of the influence of different forms of retail structures, especially in rural districts. Extending the study to concern variables such as perceived risk and store images might also provide more detailed information on the behavioral mechanisms involved in food shopping behavior.

The distinctiveness of the food shopping patterns found, with differences in behavior significant at a 1% level, suggest the usefulness of this approach for backward segmentation. As these patterns of behavior differentiate between, for instance, overall discount loyalty and more specific forms of discount shopping as found in the "discount + retail shopping" patterns, they may prove to give more insight in store loyalty. A longitudinal approach to test the stability of these patterns seems worthwhile.

The resemblance of the conjoint measurement procedure in assessing the retail attribute sensitivities with the actual trade-offs made by consumers may prove to be a useful tool in forming insights into the motivations involved in shopping behavior. Further research into the psychological make-up of consumers with different sensitivity patterns may provide information on the behavioral mechanisms of shopping

behavior. Finally, the similarity of the retail attributes to actual retail mix elements is an advantage in using sensitivities for practical applications.

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CHAPTER 4.

EPILOGUE

4. EPILOGUE

In this dissertation an attempt is made to extent the scarcity concept as traditionally used in micro economics, the scarcity of goods as expressed in prices and the scarcity of means as expressed in a financial budget restriction, with behavioral aspects.
Starting form an analysis of the commodity theory (Brock, 1968) that concerns itself with the effect of limited availability on the valuation of communications, some observations on the scarcity of goods are made. As noted earlier (Fromkin et al., 1971; Worchel et al., 1975; Verhallen, 1982) a behavioral mechanism on how unavailability 'cues' affect the evaluation of goods is lacking in the commodity theory. Fromkin et al. (e.g. Snyder and Fromkin, 1980) propose the arousal of a unicity motive to explain the value increasing effect of limitedly available goods. The experiments described in Verhallen, 1982, however, demanded tentative explanations such as the occurence of reactance and frustration mediating the effect of limited or non availability on the valuation of goods. In Verhallen, 1984, a more systematic effort is made to investigate the effect of different types of limited availability and related situational characteristics on the valuation of goods. As some of these unavailability conditions have not been researched at in great detail their effects remain hypothetical. Future research may enlighten and refine the limited availability effects as discussed in Verhallen, 1984.
In experimental research it is consistently found that pure physical availability or non-availability can not explain the value enhancing effects reported (e.g. Verhallen, 1982, 1984). A limitedly available good will only be valued more than an unlimitedly available alternative when the limitations on its availability are not due to accidental circumstances. The causes for the limited availability will determine the attributions people will make. If group belongingness or other 'social' restrictions are said to be determining the limited availability, the arousal of a unicity motive or other social motices (e.g. prestige) may rise and determine the value changes and choice effects.
The hypothesis that has been posed and partially tested in experiments (Verhallen, 1984) is the 'behavioral cost' evaluation mediating the effect of task conditions to be met, such as delay and effort, or the effect of market circumstances on the valuation of goods. The analogy with the price-quality relationship has been made. Price is ofteh found to be used as an indicator

for quality especially when other intrinsic product information is lacking in choice situations (Olson, 1971; Monroe and Pretroshius, 1981). It has been hypothesized that the aforementioned availability conditions delay, effort and market circumstances will affect the valuation of goods as they arouse a cost assessment by the choosing individual. This hypothesis has been depicted in Figure 1.

Insert Figure 1 about here

In order to attain a good one or more task demands, prices to be paid, may have to be fullfilled. Dependent on budget characteristics (financial, behavioral, social) and situational and personal factors, influencing the saliency and perception of these cost factors, a corresponding valuation effect for the higher 'priced' choice alternative will occur. The experiments performed show that the more explicite the behavioral 'price' information in the test situation the higher the goods were valued. This additional 'extrinsic' value can be added to functional value such as usage value. As the different choice alternatives are offered within a given setting the budgets, dependent on the individuals goal importance, are constant.

This hypothesis generalizes the price-quality relationship (e.g. Gabor and Granger, 1966; Olson, 1974) by including other than pure financial prices and specifying the condition that only if a (behavioral, financial, social) price increase leads to a perceived cost increase a value increase will occur. Factors influencing the price-cost relationship are the individuals (behavioral, financial, social) budget (Verhallen and Pieters, 1984) and perception factors that may inhibit or facilitate a 'price'difference or change to be taken as, or attributed to, a real cost change. When alternatives have to be evaluated, factors such as prior experience and reference prices (see e.g. Monroe and Pretroshius, 1981) will influence cost evaluations and choice behavior.

In Verhallens' (1982b) experiment, subjects in a simulated product test had to choose between three books from which one (randomized) has a higher financial price. The higher priced item was choosen more often conform expectations based on the price-quality hypothesis. Two payment conditions were also run in the experiment. In these conditions the subjects were given a money budget. In one condition this budget equals the lowest price, in the other condition the budget was equal to the highest price of the choice alternatives in the simu-

lated product test. When having to pay in addition to receive the highest priced alternative it was choosen more often than a lower priced alternative. This difference in preference was about equal to the difference between high and low priced alternatives from the no payment condition. When money could be received back when choosing a lower priced, alternative the 'back payment' condition, the highest priced alternative was choosen more often than the lower priced alternative. The difference in preference was larger in this condition than in the no payment condition. So having to pay extra for a higher priced alternative in the form of not receiving an extra amount of money led to a further value increase. This finding can not be explained in a traditional economic, that is purely financial way. A possible explanation in terms of 'cost saliency' might be offered. In the payment conditions the price difference could have been emphasized as a real cost difference. This perception of a real cost difference might cause a preference increase for the more expensive good. In the 'additional payment' condition this preference increase could have outweighted the additional financial price to be paid. To account for the results from the 'back payment' condition a somewhat more complex explanation is given. Receiving money back could have been considered by the subjects as a 'gain', while an additional payment, out of pocket, may have been perceived as a 'loss'.
As losses are weighted heavier than gains according to the prospect theory (Kahneman and Tversky, 1979) getting a (small) amount of money back will not receive an 'utility' value as high as when this amount of money has to be paid in addition (see also Thaler, 1980). This may explain why the money difference in the 'back payment' condition did not outweight the increased preference due to the occurence of a cost evaluation.
This experiment, not part of this dissertation, may demonstrate that the effect of financial price changes do not necessarily lead in a mechanical way to a perceived cost change.

We may stress the necessity to study the relationship of prices (task demands) and cost perceptions and the conditions that influence this relationship.

Preferences are not always expressed into overt choices even if there are no financial constraints. The effect of social circumstances has been demonstrated in Verhallen (1984). The occurrence of social norms inhibiting preferences to be expressed in overt choice may even be more important than

financial budget constraints (Lindenberg, 1983).

In chapter 3 of this dissertation, the relevance of a non financial cost concept, bahavioral costs, has been stressed. In 'active' behavioral settings, that is when an individual seeks to achieve a specific goal(s), acts as opposed to evaluates, the budget part in Figure 1 becomes more relevant. In Verhallen and Pieters, 1984, it is treated that a budget is not fixed but variable, depending on the goal importance of the behavioral field under study.
A budget mix, the composition of the financial, behavioral and social means allocated to a specific goal, will depend on the persons social position and his psychic and physical capabilities.
Housewives with small children in general will spent less time to other then child care activities such as daily shopping when compared with housewives without small children (see Verhallen and De Nooij, 1982) and will pay less in time but more in money for their food bracket. Essential here is not that consumer choices are made under more constraints than pure financial ones (see e.g. Lesourne, 1979, p. 33) but that the constraints are a function of a persons capabilities (behavioral and social stock) and of the goal importance of the field to choose within.

To recapitulate the behavioral interpretation of scarcity discussed:

- Scarcity of goods does not only imply they have a financial price but also behavioral and social prices (task demands) to be paid in order to make the good available;
- Restricted and limited availability may convey social and behavioral costs that influence the valuation of goods;
  The valuation of goods does not only depend on functional intrinsic factors but also on perceived (behavioral, social and financial) costs that adhere in them;
  Scarce means do not only encompass financial but also behavioral and social means;
  The size of a budget in consumer choice settings depends both on the goal importance of the behavioral field (e.g. the product class) as well as on a persons' financial, behavioral and social stock (see Verhallen and Pieters, 1984).

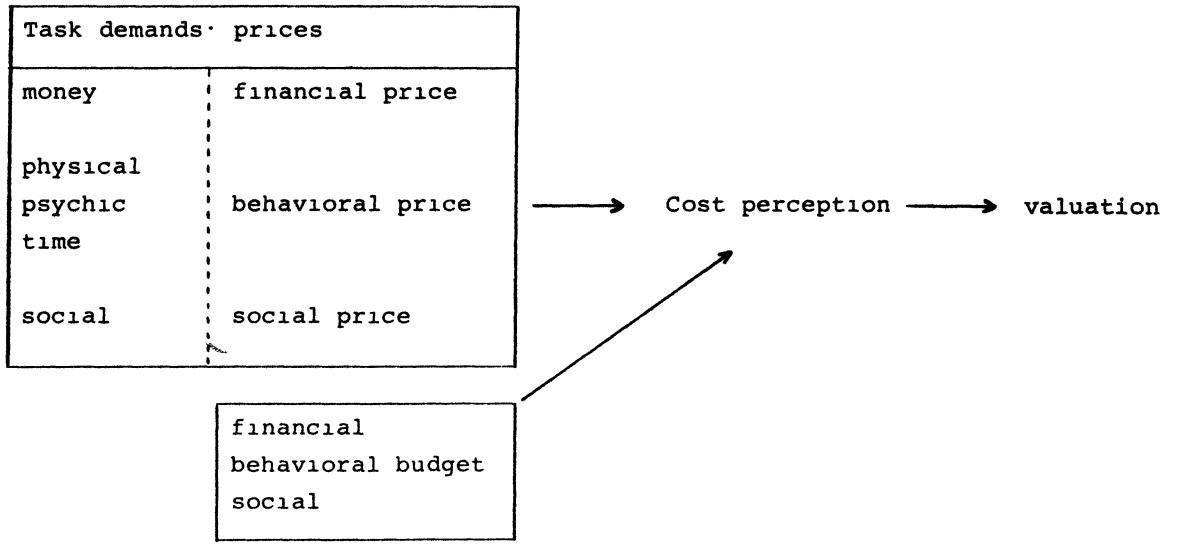
lthough the general outlines given here need theoretical refinement and

supporting empirical evidence (see discussion sections of the separate articles), several remarks with respects to economic expected utility models, psychological attitude theory and sociological exchange theory can be made.

- Economic consumer demand theories need to be extended with behavioral and social cost factors. Prices and budget restrictions are not only financial but also behavioral and social. A budget size that depends on the goal importance of the behavioral field. The recognition that the valuation of goods do not only depend on intrinsic but also on extrinsic and social factors such as social norms and motivation to comply to these norms as in attitude theory (Ajzen and Fishbein, 1980);
- Attitude theories and perhaps other psychological theories (e.g. equity, Adams, 1965) need to incorporate a cost concept as is common practice in economic models. Therefore the economic cost concept needs to be extended with behavioral and social cost categories;
- The commodity theory (Brock, 1968) needs to extend the factors that influence value by conveying unavailablity (delay, effort, restrictions and scarcity) with price. The effect of budget sizes will have to be incorporated as well.
- The social exchange theory (see Homans, 1961) states that social prices such as compliance, instrumental services, and social acceptance have to be paid (Blau, 1964) to give the receiver an intrinsic or unilateral social reward. The dimension that could be added to this social exchange theory is the equivalent of a social budget, ones social means allocated to a particular goal. This implies that the valuation of a social good or a good with social benefits will not only depend on the social prices bestowed on it but also on the social characeristics (importance, prestige, etc.) of the rewarding individual.

The economic psychological interdisciplinary approach that has been advocated in this dissertation may lead to a further integration and crossfertilization of economic (utility) models, psychological (attitude) theories and perhaps sociological (exchange) theories.

Figure 1. The 'total' price-value relationship.



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SUMMARY

This dissertation consists of six articles about scarcity in particular 'scarcity and consumer choice behavior'. The influence of scarcity, the availability, of goods on the valuation and choice of these goods is treated in chapter two, while the employment of scarce means, financial, social and esspecially behavioral means, is dealt with in chapter two.

In the traditional economic theory of consumer demand the opinion is generally held that the scarcity of goods is reflected in the relative prices of goods and that the scarcity of means is expressed in a budget restriction. These two factors together with the valuation of goods determine the consumer choice. In that, the valuation of goods (their utility) is supposed to be independent of prices and of the consumers budget.The laboratory experiments, described in the articles of chapter two and the epilogue, demonstrate the (limited) availability to influence the valuation of goods.Not just the physical limited availability leads to an increased valuation of goods, however the cause for limited availability (an increased demand or an decreased supply), the nature of the limited availability (limited, restricted a.o.) and social characteristics of the choice situation appear to influence the unicity, the cost and the value assessment and also the final choice. Some existing psychological theories with regard to reactance, frustration and unicity together with the commodity theory are discussed in chapter 1.2 to explain the valuation of different forms of scarcity. In the literature it is known that under specific circumstances the financial price is used as an indicator of quality. The scarcity experiments mentioned suggest scarcity characteristics other than price to be used as indicators for the value of products.The hypothesis is put forward, and partially tested, that the price-quality relationship should be broadened to a cost-value relationship. Costs are than to include all financial, social and behavioral costs that have to be made in order to obtain a good.

The behavioral costs concept is elaborated further in chapter three. In chapter 3.1 it is explicated that psychological theories do not incorporate the equivalence of the economic concept of costs. Reasoned action is not only a function of the evaluation of possible outcomes of behavior, it is also determined by the costs to perform a behavior within a given context. These behavioral costs are a function of task demands (time-, psychic- and physical

prices) and personal goals and capacities (budgets). The necessity to incorporate behavioral costs in the Fishbein and Ajzen attitude model is argumented. In chapter 3.2 changes with regard to attitude theory, as proposed in the aforementioned article, are built in a holistic interdisciplinary approach for the study of behavior i.c. residential energy behavior. The behavioral field approach, as advocated in the aforementioned article, is there brought into practice. The model includes, among others, how general attitudes with regard to the behavioral field energy conservation is to be related to specific energy conservation acts. The attitude-behavior relationship includes the factors: knowledge about the relatedness of specific acts with energy use, the acceptance of responsibility and the perceived effectiviness of the own contribution to the solution of the energy problem and an act specific cost-benefit trade-off that includes behavioral costs. In chapter 3.3 a fieldstudy on shopping behavior is reported ,that consists of two measurement waves, in which the relevance of costs aspects (time and money) is explicated for the behavioral field 'doing the shopping'.
In the introduction and the epilogue the two main points of this dissertation are adstructed: the relevance of a behavioral extension and foundation with help of psychological theories, of scarcity as a central concept within economics and the relevance of the scarcity of means and the related concept of behavioral costs for the explanation of behavior.

SAMENVATTING

Dit proefschrift bestaat uit zes artikelen rond het thema 'schaarste' in het bijzonder 'schaarste en consumentenkeuzegedrag'.
De invloed van de schaarste, de beschikbaarheid, van goederen op de waardering en keuze van deze goederen wordt in hoofdstuk twee behandeld terwijl de aanwending van schaarse middelen, financiële maar ook sociale en vooral gedragsmiddelen, in hoofdstuk drie belicht wordt.

In de traditionele economische theorie van de consumentenvraag bestaat de algemene opvatting dat de schaarste van goederen gereflecteerd wordt in de relatieve prijzen van goederen en dat de schaarste van middelen tot uitdrukking komt in een budgetrestrictie. Deze beide factoren bepalen tesamen met de waardering van goederen, de consumentenkeuze.Daarbij wordt de waardering van goederen (hun nut) onafhankelijk verondersteld van prijzen en van het consumentenbudget. De laboratoriumexperimenten beschreven in de artikelen van hoofdstuk twee en in het nawoord, tonen aan dat (beperkte) beschikbaarheid de waardering van goederen beinvloedt. Niet de fysieke beperkte beschikbaarheid als zodanig leidt tot een verhoogde waardering van goederen, echter de oorzaak van de beperkte beschikbaarheid (door een vergrootte vraag of een geringer aanbod), de aard van de beperkte beschikbaarheid (begrensd; aan voorwaarden gebonden e.d.) alsook sociale karakteristieken van de keuzesituatie blijken de uniciteits- , kosten- en waardebepaling alsook de uiteindelijke keuze te beinvloeden. Enige bestaande psychologische theorieën, met betrekking tot reactantie, frustratie en uniciteit worden in aansluiting op de "commodity" theorie als verklaring voor de waardering van verschillende schaarstevormen in hoofdstuk 1.2 besproken. Uit de literatuur is bekend dat, onder bepaalde omstandigheden, de financiële prijs als indicator voor kwaliteit gehanteerd wordt. De genoemde schaarste experimenten wijzen erop dat ook andere schaarste karakteristieken dan de prijs als indicatoren voor de waarde van produkten worden gehanteerd. Daarbij wordt de hypothese gesteld (en gedeeltelijk getoetst) dat de prijs-kwaliteit relatie verbreed dient te worden tot een kosten-waarde relatie. Onder kosten worden daarbij verstaan alle financiële, sociale en gedragskosten welke voor de verkrijging van een goed gemaakt worden.

Het gedragskosten concept wordt in hoofdstuk drie verder uitgewerkt. In hoofdstuk 3.1 wordt uiteengezet dat in psychologische theorieën geen equivalent bestaat van het economische kostenbegrip. Beredeneerd gedrag (reasoned action) is niet alleen een funktie van de evaluatie van mogelijke uitkomsten van gedrag, het wordt medebepaald door de kosten om gedrag in een gegeven context uit te voeren. Deze gedragskosten zijn een funktie van taakvereisten (tijd-, psychische- en physieke prijzen) en persoonlijke doelstellingen en capaciteiten (budgetten). Beargumenteerd wordt de noodzakelijkheid om gedragskosten in het Fishbein en Ajzen attitude model op te nemen.
In hoofdstuk 3.2 zijn de veranderingen met betrekking tot de attitude theorie zoals in het voorgaand artikel voorgesteld, verwerkt in een holistisch interdisciplinaire benadering voor de studie van gedrag i.c. huishoudelijk energie gedrag. De gedragsveld benadering welke in het voorgaand artikel is bepleit, is hier toegepast. Het model licht onder andere toe, hoe algemene attitudes omtrent het gedragsveld energiebesparing gerelateerd kunnen worden aan specifieke energiebesparende handelingen. De attitude-gedrags relatie omvat de factoren: kennis omtrent de relatie van specifieke handelingen met energieverbruik, de acceptatie van verantwoordelijkheid en de waargenomen effectiviteit van de eigen bijdrage aan de oplossing van het energie probleem en een handeling specifieke kosten-baten afweging waarin gedragskosten zijn inbegrepen.
In hoofdstuk 3.3 wordt een veldstudie over winkelgedrag gerapporteerd, met twee opname momenten, waarin de relevantie van kostenaspecten (tijd en geld) voor het gedragsveld "het doen van de boodschappen" wordt verduidelijkt.
In de inleiding en het nawoord worden de twee kernpunten van dit proefschrift nader toegelicht: de relevantie van het gedragswetenschappelijk uitbouwen en met behulp van psychologische theorieën onderbouwen van schaarste als centraal begrip uit de economie alsmede de relevantie van de schaarste der middelen en het daarmee samenhangend gedragskosten concept voor de verklaring van gedrag.

NAME INDEX

STELLINGEN

1. In de commodity theorie dienen de genoemde factoren welke de goederenwaardering beinvloeden (schaarste,inspanning,uitstel en beperkingen) uitgebreid te worden met de prijs van een goed.

2. De prijs-kwaliteits relatie kan gegeneraliseerd worden tot een kosten-waarde relatie, waarbij de kosten en waarde niet alleen financiële, echter ook gedrags, en sociale componenten kunnen omvatten.

3. De waardering van een goed wordt niet door de beperkte beschikbaarheid op zich medebepaald echter de perceptie van de oorzaken voor de beperkte beschikbaarheid is medebepalend voor de waardering.

4. Een budgetrestrictie gerelateerd aan het doelbelang van een beslissing is voor veel consumentenkeuzen een noodzakelijk complement op de budgetrestrictie gerelateerd aan het inkomen zoals opgenomen in de traditionele micro-economische theorie van de consumentenvraag.

5. Een uitbreiding van het attitude model van Fishbein en Ajzen met een gedragskostencomponent zal het voorspellend en verklarend vermogen van dit model ten goede komen. (I.Ajzen en M.Fishbein "Understandi ; attitudes and predicting social behavior" Prentice Hall Inc. 1980)

6. Het verdient aanbeveling de evaluatieve component van het attitude model van Fishbein en Ajzen handelingsspecifiek te formuleren, waarmee tot uitdrukking wordt gebracht dat de waardering van een gedragsuitkomst afhankelijk is van de context waarbinnen deze tot stand is gekomen

7. De 'Law of Minimum Effort' van Tsai (1932) : 'Among several alternatives of behavior leading to equivalent satisfaction of some potent organic need, the animal, within the limits of its discriminative ability, tends finally to select that which involves the least expenditure of energy' (Op. cit. G.K. Zipf 'Human behavior and the principle of least effort' p.14. Addison-Wesley Press, Inc. 1949) mag ook toegepast worden om doelgericht gedrag van mensen te verklaren.

8. Een moeilijkheid bij het tot oplossing brengen van bestaande milieuproblemen is, dat buiten de directe en vaak omvangrijke kosten daaraan verbonden de opbrengsten vaak moeilijk in geld uitdrukbaar, collectief van aard en pas op lange termijn zichtbaar zijn.

9. Het brood-wisseldieet van dr.C. de Vos is een goed voorbeeld van gedragskostenminimalisatie.

10. "Een door de overheid te kiezen benadering welke gericht is op een verandering van de kosten-baten balans van huishoudelijke energie gedragingen of gedragspatronen, kan zeer wel een totaal andere zijn dan de traditionele attitude beinvloedingscampagnes" Op. cit. Th.M.M.Verhallen "Schaarste en economisch gedrag" uit K.A.Soudijn (Ed.) "Psychologisch onderzoek in perspectief" Lisse: Swets & Zeitlinger,1982. p.125

11. De termen Economische Psychologie, Psychologische Economie en Gedragseconomie mogen ter aanduiding van het gezamelijk kenobject: economisch gedrag, onderling uitwisselbaar gebruikt worden.

12. Milieubeleid en milieuonderzoek dienen zich niet alleen te richten op afvalverwerking maar tevens op afvalpreventie.

13. Het onder een aas uitkomen is bij bridge zelden goed, het met een aas starten evenmin.

14. De beste stelling is een schijnbare tegenstelling.

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Stellingen behorend bij het proefschrift "Scarcity: unavailability and behavioral costs" Theo M. M. Verhallen Katholieke Hogeschool Tilburg
29 juni 1984