

Marketing Health and Nutrition Claims; Their Subjective Importance, Attitudinal Influences and Cognitive Representation

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Abstract

This thesis analyses the subjective importance, attitudinal influences and cognitive representation of marketing health and nutrition claims. Examining the importance of claims to choices of members of the public revealed that claims were accorded the highest subjective importance, despite low visual attention. This finding was replicated with students and staff of a Food Science department, an indication that relatively higher knowledge does not alter their perceived importance.

The attitudinal influence of claim information was measured by ratings on attributes, previously generated specifically for the study, for packages shown with and without claims on computer. Packages with-claims were perceived as significantly more informative, easier to purchase and influenced participants to believe that others, whose opinion is important to them, would think that they should buy them. Data reduction of the attribute scores produced three factors; enjoyment, nutrition and surface appearance. Enjoyment was twice as important to participants' attitude to purchase than nutrition. With French participants, the results showed that the claims only influenced the perception of flavour, which was thought to be worse in the with-claims condition. There was no replication of the finding that others would be significantly more likely to think they should buy the products that displayed claims. Both population samples thought the provision of information on food labels to be highly important.

The cognitive representation of claims was explored using recognition and recollection tests. The first experiments revealed that British consumers have an expectation that claims will be worded in implication form to avoid legal infringements. Food and vocabulary related knowledge differences did not alter this finding. Testing long term memory showed an increased effect with British participants, but no effect with the French owing to their lack of experience of such claims. Finally, no distinction between the meaning of the implied and asserted forms of the claims were shown in a test conducted using only British participants.

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1. Introduction

1.1 The Role of Food Health and Nutrition Claims

This thesis examines the use of food label health and nutrition claims. Food labels often contain such claims. How do customers perceive them and what general effects do they have, if any, on attitudes and behaviour?

Food selection is potentially problematic. The intake of the thirty plus nutrients needed for an adequate diet requires variety in food consumption, whilst avoiding injurious foods. In relatively recent times, meeting this need has become potentially more difficult, partly because of an increased emphasis upon convenience. Although customers can now buy a wider variety of foods, the traditional patterns of meal consumption have probably diminished (Keane & Willetts, 1995). Families less often eat together at fixed meal times because of this tendency for individuals to eat when it is convenient to them (National Food Survey, 1994).

There has therefore been an increase in the consumption of ready prepared convenience meals and snacks taken as meal replacements. This pattern of consumption, termed grazing, has coincided with increased questioning about which foods are best to eat from a health perspective. In part, this may be due to a perception that the more traditional diet was reasonably healthy in that no 'junk' foods were consumed.

Additionally, because convenience meals are prepared in factories consumers may be less sure about the ingredients of the food they are eating.

Increased longevity and the use of health claims as marketing tools are other factors that can contribute to diet related health concern. Partly because the average life expectancy has increased over time (Department of Health, 1994 & Gray, 1993), more diseases associated with old age have become prominent in public concern. Diseases like cancer and cardiovascular disorder have been linked to certain types of diets, particularly those high in fat (Gray, 1993). Dietary modifications to avoid these life threatening conditions have been generally agreed by health professionals (Eves, Kipps, Noble and

Noble, 1994). Initiatives aimed at promoting dietary changes (Committee on Medical Aspects of Food Policy, 1984) have followed from reports by such professionals to government. However, statistically, the main risk factor for cardiovascular disease and cancer is age and not consumption of potentially problematic foods (Department of Health, 1993).

Nonetheless, certain foods have been drawn to the public's attention as unsuitable for frequent and or heavy consumption. For example, unsaturated has been recommended over saturated fat consumption. Significant shifts from consumption of butter to consumption of margarine have resulted from this change in viewpoint (Gray, 1993). Therefore, food manufacturers now often seek to stimulate demand for products on the basis of their potential health benefits. Such benefits are often drawn to the customers' attention by proclaiming them boldly using flash bands (see Figure 1).

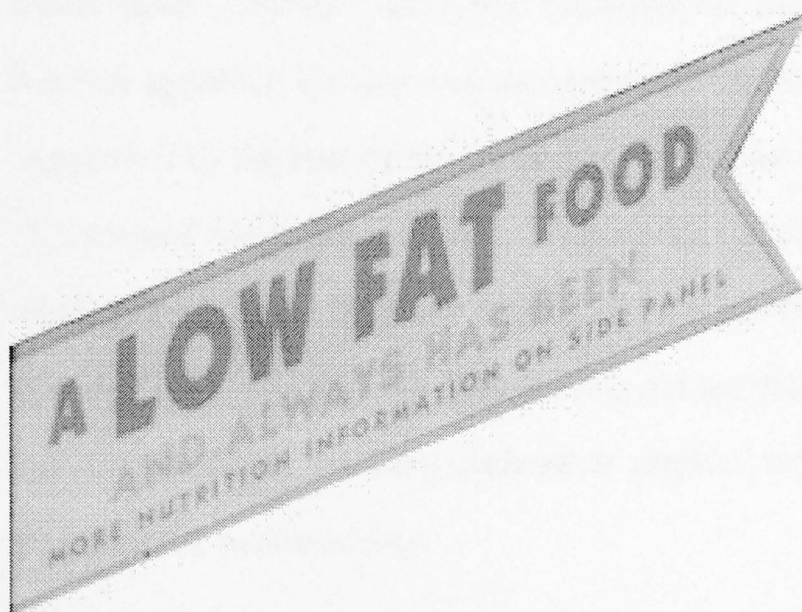


Figure 1 Example of a marketing flash band

Although the use of health claims may contribute to marketing success potential problems can arise from their usage. First, the claims may be misleading and second, competitors may feel compelled to use them to avoid losing market share, even when the potential benefits are questionable. In fact a review of nutrition articles in magazines and newspapers has indicated that there have been significant increases in the use of nutrition claims. However, claims for taste and quality were still predominant (Lord, Eastlake and Stanton, 1987).

In Britain, the government requires that any product making nutritional claims must display a nutritional table showing the relative quantities of fat, protein, energy and carbohydrate (Ministry of Agriculture Fisheries and Foods, 1995). Claims should not be of a direct medical nature as the product could then be classified as a medicine and be subject to the stringent regulations that apply to drugs. As a result of these regulations most health benefits are qualified with the use of hedge words or phrases and are usually implied rather than asserted.

For example, on a breakfast cereal the use of a hedge phrase ‘...when eaten as part of a low fat diet’. Or, ‘X’s recipe dishes are low in fat to help control the calories, low fat foods can be good for your body and your figure’. The implication is that because X’s recipe dishes are low in fat they *will* be good for your body and figure. Other types of claims may incorporate graphic figures, for instance a circular claim made from the words ‘tasty - healthy - satisfying’ enclosing the outline of a female figure exercising. Another approach is using endorsements that emphasise positive health values, e.g. ‘Approved by the Family Heart Association as part of a low fat diet’, or less directly, ‘Y’s toasted whole grain oat cereal bars contain whole grain. Dieticians recommend whole grain because the body converts the energy they contain slowly, the way nature intended’. Reference to expert opinion is not uncommon nor is reference to naturalness both in ingredients, cooking methods or graphics that depict vignettes of bygone traditional or nature scenes.

The problem facing the customer is whether they should take any notice of the information presented by these devices and if they do, which of the claimed benefits should be important to their decision making. For example, some brands market products as having a low quantity of a negatively evaluated ingredient. This can be misleading as the claim may refer to the absence of an ingredient that is not generally present. Others may stretch the truth. For instance, claiming breakfast cereal flakes are ‘a low fat food and always have been’, even though the fat level depends upon the type of milk with which they are consumed.

These examples show that scope exists for confusing customers by using less than honest marketing. Although customers may ascertain the relative nutrient levels of different brands by using the nutrition-table information, they may not do so because of time pressures and difficulty of comprehension. While increased information provision on labels has been shown to be preferred, it has also been shown that relatively little use is made of it (National Consumers Council, 1985). Moreover, with some consumers there may be scepticism about expert opinion. For example, carbohydrate intake was once recommended by experts as in need of reduction, but currently is recommended for increased consumption.

1.2 Purpose of the Thesis

It can be argued therefore that the public are likely to have some concern about the potential healthiness of their food selections. They may have uncertainties resulting from knowledge limitations, comprehension difficulties and potentially misleading marketing information. Therefore the thesis explores the use of health and nutrition claims in comparison with other attributes influencing food selection. Then the influence of beliefs and attitudes deriving from such claims are analysed. Finally their potential to mislead is examined.

1. The logical starting point is the precise measurement of how much attention is paid to the information on packaged foods. The question is, how important are health and nutrition claims in comparison to price, brand and nutrition-table information?
2. Having established the relative levels of use of the different kinds of information, examination can be made of the major evaluative dimensions customers use in their decision making. An estimate of the input of health and nutrition claims to these dimensions, and their relative importance to food choices should then be made.
3. Finally, the question of deception needs to be addressed, to determine whether marketing methods that imply health benefits are effectively having the same result as directly asserting them.

1.3 Methodological Approach

Consumer use of marketing claims and their influence upon behaviour was generally the target of earlier research. It used both questionnaire and experimental methods. Results from both methods of research are reported in this review of the literature. This thesis however almost solely uses computer based experimental methods. Using computer based designs enabled better control than most paper based questionnaires and made graphical display designs that were used practicable. Participants' introspective reports were used where necessary to clarify the reasons for their responses. Although such reports can be unreliable, they were used with carefully collected experimental data. Also, the reliability of many of the results was confirmed by replication as well as by statistical significance testing. The findings extended several of the theoretical structures and methodologies used and provide new and substantial data. They are of potential usefulness to legislators, food choice researchers and those whose concerns include the theoretical and methodological applications.

1.4 Relative Use of Food Product Information

Examination of the first problem follows.

1.4.1 Desirability of information

Increasing knowledge of the links between dietary habits, cardiovascular disease, cancer, stroke, diabetes and obesity led to widespread demand for labelling legislation in the 1980's (Institute of Medicine, 1990). Lord, Eastlake and Stanton (1987) report a corresponding increase in nutrition and health claim use in articles in magazines and newspapers over the same period. An important precedent was in 1984, when the Kellogg company launched one of the first major marketing campaigns linking dietary intake with health. They specifically promoted the breakfast cereal All Bran as an aid to reducing risk of bowel disease through higher fibre intake. All Bran was a highly successful product and has since been followed by many other similar marketing campaigns. However, although the market shares for food products claiming health

benefits may have increased, there have been not been any correspondingly large shifts in dietary behaviour. For example, the level of fat consumption has been maintained at a fairly constant level (Institute of Medicine, 1990).

A survey organised by the National Consumers' Council (1985) showed that the British public see this manufacturer provided information as predominantly sales motivated and information from supermarkets as helpful and impartial. Government information was perceived as aimed at changing eating habits by influencing dietary attitudes. The study also asked respondents (820) to rank their awareness of nutrition terms and their importance to food label use (see Table 1).

Table 1 Combined ranking of awareness and importance to use of food label terms (adapted from National Consumers Council, 1985)

Protein	71%
Vitamins	68%
Fat	56%
Sugars	56%
Calories	54%
Salt	53%
Iron	50%

Most people (72%) regarded nutrition information to be useful to themselves and 85% thought the information would be useful to others.

1.4.2 The effect of apparent information omission

These findings provide evidence of the importance to the public of health related label information. They reflect a commonly found preference for relatively full nutrition and constituent information on food labels (Jacoby, Speller and Kohn, 1974, Anon, Nutrition & Food Science, 1985 and National Food Processors Association, 1990). Johnson and Levin (1985) for example found that even when product information did not correlate positively with other relatively good attribute details approval was still higher than when the information was withheld. This was also shown by Meyer (1981)

who found that participants responded as if they assigned below neutral values to any missing attribute information. These findings indicate that a manufacturer's sales may be adversely affected by competitors' use of health or nutrition claim information that they do not themselves display.

1.4.3 The effect of nutrition claims on hedonic ratings

However, information provision can also adversely affect hedonic ratings. When a food is perceived negatively on a sensory attribute, like taste with some low fat varieties, the information provided can reinforce the consumers' negative expectations. Light, Heymann and Holt (1992) showed this effect with cheese slice tasting. Participants gave the lowest rating to low fat cheese that was labelled as such and the highest rating to high fat cheese with high fat marked on its label. Therefore, from a marketing perspective, a careful balance between the use of sensory and health claim information may be desirable on some foods.

1.4.4 Brand characterisation

In any case, it may be that sales of low fat products are stimulated as much by a desire to identify with a healthy lifestyle as any real motivation to adopt a controlled diet. McCracken (1987) argues that much marketing information is less a list of benefits and more a portrayal of lifestyle or character with which to identify. He makes the point that simply assuming that the consumer seeks to procure the most positive benefits misses the importance of the values that exist and are created as population effects. This wider perspective offers some explanation of a faster growing market share for healthiness improved products without any significant dietary changes overall.

1.4.5 Comprehension of information

If customers are attracted in growing numbers to foods that are marketed as having positive nutrition and health values, an important question is how well the information is understood. Their choices are unlikely to be satisfactory if they do not generally understand the information provided. Findings by Bentley (1991) suggest that there is considerable miscomprehension. She tested a generally representative population

sample with food information leaflets and found that 30% of them were incomprehensible to her sample. Her conclusion was that the leaflets should be aimed at a reading age of nine to ten years rather than 14 years and above.

A survey of almost 2,000 British adults is one of several showing common misconceptions about claimed product attributes (Association for Consumer Research, 1989). Respondents generally could not differentiate the technical difference between low fat and reduced fat, or between the terms flavour and flavoured. The respondents were also confused by the term natural colour that cannot be taken to imply that the colouring is from the primary constituent of the product. At present there is no legal definition of low fat, low sugar or high fibre although there are EC proposals to establish maximum quantities per 100 grams or millilitres (Anon, Which Way to Health, 1993).

A further potential for miscomprehension exists where only a sub-set of the information is used because of memory or time constraints. This can lead to mistaken impressions of products for many reasons. It particular occurs where a misleading claim is used that appears to be salient to the purchase decision. Hutchinson and Alba (1991) demonstrated this effect in experimental trials. They regarded it to stem, in the majority of cases, from a lack of product knowledge. They found the incidental information acquisition their participants used was not sufficiently analytical to form the more useful structured type of knowledge.

1.4.6 The use of 'high', 'medium' and 'low' qualifiers

The National Consumers Council (1985) tested different label formats and found that information reduction techniques were favoured when making choices. 'High', 'medium' and 'low' qualifiers on numeric nutritional information were popular. These load reducing information qualifiers also assisted more accurate information processing. Foulke (1992) found the same preference for the use of qualifiers in a large study for the Food and Drug Administration in the USA. A later British study also replicated this finding. It found that use of high, medium and low qualifiers, in

conjunction with the numeric nutritional details, facilitated faster more accurate brand comparisons (Black & Rayner, 1992).

However, there are pitfalls with this technique as some products may have relatively lower fat levels than the product norm and still be high in fat in overall terms, e.g. low fat margarine. There is also the difficulty that the use of these designators is likely to promote the erroneous idea of good and bad foods. Current dietary advice is that an overall balance should be striven for (Anon, Packaging Week, 1992).

1.4.7 Strategies in information use

A primary reason for using an information sub-set is to reduce memory loading. When trying to compare the nutritional details of a product across brands it becomes necessary to use an information sub-set. Even when making comparisons using verbal qualifiers, it is easier to pick one or two salient attributes and compare these than to try to compare all the attributes.

1.4.8 Tendencies to use information reduction techniques

Payne, Bettman and Johnson (1988) broke decision making down into what they called elementary information processes. They used a computer program to control a task time limit, whether there was a dominant alternative decision and the dispersion of attribute values. They found that participants adapted their strategies to using sub-sets of information and that adaptation was focused toward reducing effort rather than maintaining very high accuracy. Their performance improved with a repetition and the information processing tended to be attribute based. Participants more often examined the same attribute across the alternatives than all the attributes within each brand.

Johnson, Payne and Bettman (1988) found that even offering substantial rewards for high accuracy did not reduce this effect. Jarvenpaa (1989) also found adaptive processing in participant's cognitive representation of data displayed in various chart formats. Protocol analysis revealed that participants altered their cognitive representation of the chart information to suit the demands of his task.

1.4.9 Familiarity and amount of time spent processing information

The level of product exposure the customer has experienced is a further relevant factor. Park and Lessig (1981) investigated the relationship between product experience and the amount of time spent choosing between alternatives. They found that medium familiarity purchasers are likely to spend longer on processing product information. They concluded that this was because these purchasers are less reliant on brand and price details than those low or high on familiarity. The greater weighting found on brand and price by the latter being due to their low or conversely high familiarity. The medium familiarity purchaser spends longer making choices because they pay greater attention to identifying an acceptable sub-set of attributes with which to compare the alternatives.

1.4.10 Graphically presented information

Much product packaging information is not presented as textual attribute descriptions (e.g. 'light', 'low-fat'), or tabulated numeric data, but as photographs and graphic images. These are found on all but the smallest packages. Graphically presented details differ markedly from textual information in several ways. Increases in graphic information can reduce rather than increase complexity, because extra graphic information can immediately make an image clearer. This proposition only holds for the type of details that can be expressed graphically. Graphically based representations of nutritional details have yet to be put into widespread use. However, it is easy to express sensory attributes such as freshness, colouring, texture and examples of how the food might be used and consumed. Comparison of likely sensory appeal can also be made much more directly when there is no need to translate a textual description to a sensory recollection. Images can also be used to convey abstract qualities like nutritional benefits by using pictures of healthy attractive people engaged in physical exercise (see Figure 2). These sorts of images can effectively flesh out benefits that claims like low fat, low sugar, high fibre and so on are purported to provide (MacInnis and Price, 1987).

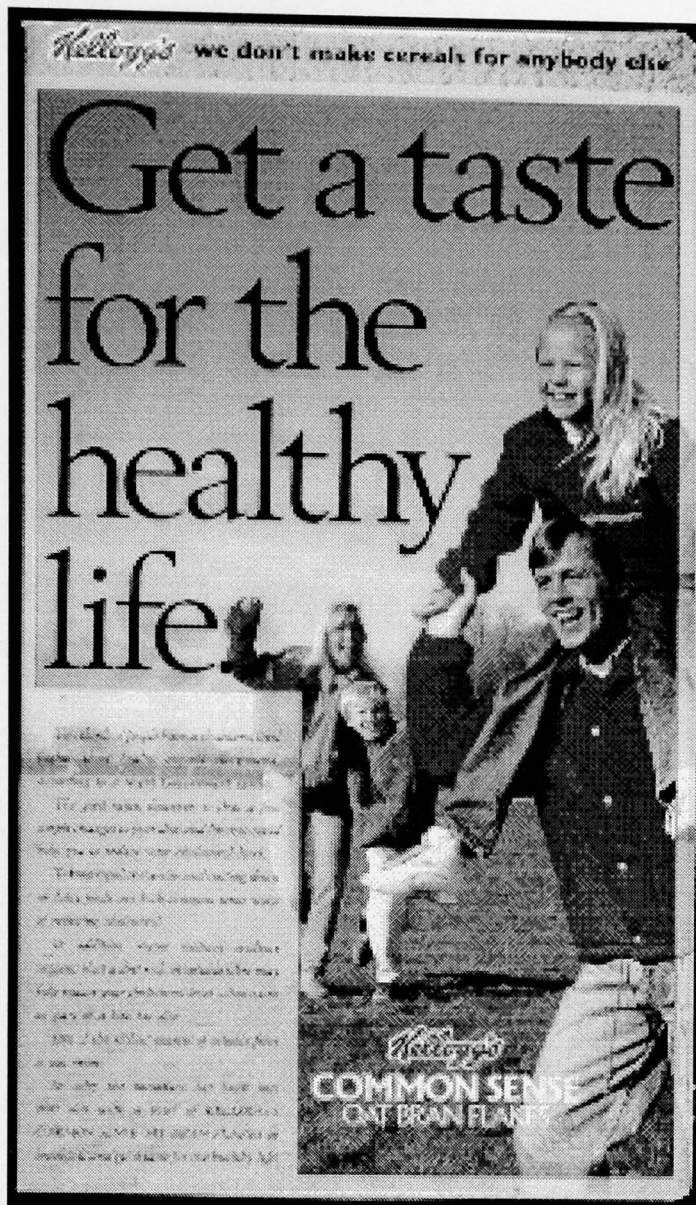


Figure 2 Fleshing out the benefits of good nutrition using graphical information

1.4.11 Recall of information

Images can also be used to increase product recall and recognition. Eye movement studies show most people initially fixate on pictorial information. The use of larger illustrations and colour increases this tendency (Finn, 1988). Recall is also improved when there is disparity between textual information and the brand name related image (Houston, Childers and Heckler, 1987). An explanation for this is the greater elaboration required to link in unexpected material.

Edell and Staelin (1983) also examined links between the dominant graphic and textually presented product details. They hypothesised that where graphics are semantically unconnected, less recall and processing of the brands' attributes will occur. This effect could be used by marketers who wish to reduce attention to product

details that may be evaluated negatively. Their results supported the hypothesis. Recall and evaluations of product details were lowest where the graphic used was also some form of characterisation (i.e. the graphic depicted likely users of the product).

1.4.12 Inferences produced by text and graphics

Mitchell and Olson (1981) used a series of presentations of product texts with and without various graphics that were unconnected with the products' attributes and found that participants nonetheless drew inferences from them that affected their beliefs and hence attitude ratings. By taking account of participants' attitude toward the marketing information, they found that greater account could be made of the attitude toward each product.

Although it was revealed that the pictures produced significant inference formation in participants' cognition, Smith (1991) showed inferences formed from pictures are weaker than those from textual information. She had difficulty using images for inference formation to test propositions, as it was hard to find sufficiently unambiguous propositions that could be displayed graphically (Smith, 1992).

1.4.13 Limitations in previous information-use studies

There are no reports of analysis of the relative use of label information that overcome limitations inherent in the display board technique. Many studies simply being questionnaire based. Ruddell (1979) used the display board technique with information contained in envelopes, which participants opened to view nutritional information. She found that higher income participants accessed more information and relatively more highly educated white participants reported more thoughts. There is an obvious difficulty with using this technique, in that information that has been accessed from an envelope is unlikely to be returned to its location and then be accessed again. The method is also fairly intrusive and unrelated to the usual way the customer derives information from product labels. Other studies that have physically obscured information can be criticised along similar lines (Jacoby, Chestnut and Silberman, 1974 and Jacoby, Szybillo and Busato-Schach, 1977).

Eye movement measurement techniques appear to be promising. However, owing to the relatively small lettering size of much of the information, there would be significant practical difficulties in making accurate measures in a realistic situation. It would be better to try the type of technique used by Crosby and Peterson (1991) in a study examining individual differences in list searching styles. They used a large computer monitor to display lists and reflection of an infra-red beam from the participants' cornea, to track their visual acquisition paths on a secondary monitor. This frees the participant from the bulky head apparatus required for portable equipment, but requires that they keep a static posture during testing.

The difficulty still remains that visual acquisitions are only an implicit link to the cognitive process as they do not directly record cognition (Holbrook, 1978).

Nonetheless attribute exposure duration has been found to be a significant influence on attribute belief-strength ratings (MacKenzie, 1986).

1.4.14 The present information acquisition experiments

The problem of how to measure consumer use of different categories of information accurately was tackled in the present experiments by using a novel computer based development of the display board method (see Figure 3). This methodology allowed participants to view product attributes by moving a mouse pointer to uncover hidden information (Bettman, Johnson and Payne, 1990). The methodology overcomes some of the criticisms of the information display board, in requiring less effort to access individual pieces of information (Bettman, Johnson and Payne 1991). Information on brand, price and claim was presented, along with quantitative nutrition information on energy, fat, carbohydrate and protein. This type of presentation removes many of the differences in the form of information on real packs (e.g. position, size of lettering) and allows measurement of the time spent viewing information and the sequence of viewing. A general indication of the relative importance of brand, price, claim and nutritional information should be provided by these measures. The product information was taken from products currently being marketed. It was possible to test the influence

of missing information on brand choices because not all details were present on every pack and these details were left blank in the experiments.



Figure 3 Example computer information display screen used in the information acquisition experiments

Potential nutrition knowledge contrast effects were examined by replicating experiments with members of the public and with workers and students in the Food Science department at Reading University. Along with the visual acquisition data one sample of members of the public also gave reasons for their choices.

It was hypothesised that participants would pay greater attention to and hence spend longer processing marketing information consisting of price, brand and claim than nutrition table information.

1.5 Attitudes

Examination of the second problem follows.

1.5.1 The effects of information presentation on attitudes

In the preceding section mention was made of some of the ways that presentation can influence attitude formation. Biehal, Stephens and Curlo (1992) for instance showed that attitude toward an advert could be influenced positively by graphics that had been rated as 'good'. They also found a context effect, whereby the attitudes toward a particular brand could be significantly altered by the graphic used with another brand.

Similarly, Mitchell (1981) found greater explanation of attitude to purchase by including attitude toward the adverts measures, when manipulating the presence of affect-laden photographs. The experiment was a two-factor repeated-measures Latin square design with four levels for each factor. The picture type-factor was the presence or absence of a photograph and whether it had been evaluated as positive, neutral or negative. The photographs were unconnected to the four products used and gave no extra information about them. The presentation was by slides and the copy text remained identical for each product throughout the tests. Less favourable opinions were found to occur with the negative photographs and more favourable ones with the positive photographs. These results demonstrate that differences in product attributes may be insufficient for a full explanation of measured attitudes.

1.5.2 Cognitive and affect components of attitudes

Attitude measures are often made separately for cognitive and affect components.

Burton and Lichtenstein (1988) give good experimental support for this intuitively plausible separation. Their study was designed to examine the difference between the cognitive and affect components in attitudes toward advertisements. Separate measurements of cognition and affect revealed significant differences that were obscured when the measures were combined. In hierarchical regression analysis both aspects showed approximately equal significant weightings.

1.5.3 Assessing product qualities through packaging

These results point to the need to understand consumer beliefs and choices with the meanings generated by inferences from what might be termed peripheral cues, like graphics in hedonic and impulse buying (Friedmann and Zimmer, 1988). The generally elusive attribute qualities of perfumes for example, have been shown to have clear identifications with likely users, that could be completely altered by the type of packaging shown with the products. Jellinek, Du Bosque, Gschwind and Scharf (1992) quote Lewis Carroll's 'A word (scent) means whatever I say it means' in reference to these findings.

Although quality cues can be ascertained before consumption, quality attributes such as flavour cannot (Jan-Benedict and Steenkamp, 1990). Reliance is therefore often put on cues such as brand name, price, physical characteristics and packaging details.

Obviously, nutritional qualities are very difficult to perceive directly and generally must be inferred, like the flavour of an untried food. The difference is that nutritional quality is much harder to confirm. Illustrations of this include the nutritional value of bread, that was found in one study to be based more on its colour than the nutritional information given. In another, potato crisps packaged in polyvinyl bags were perceived to be tastier than identical crisps in wax coated bags (Jan-Benedict and Steenkamp, 1990). Consumers can test their judgement about the flavour of a product with a lot more accuracy than they can the nutritional qualities.

1.5.4 Brand image and attitude forming beliefs

A further element of inferential belief formation that may be produced by product packaging and presentation is the link between consumers' self image and the brands they buy. Tidwell, Horgan and Kenny (1992) demonstrated this by using structured lists of adjectives. Participants rated their characteristics and those of someone they anticipated would use products they would never buy. The characteristics proposed for the 'others' differed significantly from their own. Tidwell et al. (1992) concluded therefore, that self image is related to brand image. This is another example of how inferential beliefs derived from peripheral cues may alter perceptions, beliefs and hence attitudes.

1.5.5 The importance of attitudes

The importance of attitudes towards brands and foods is due to the generally significant link between positive attitude and increased likelihood of buying behaviour. Mass advertising relies on attitude formation and change. Increasing consumer choice has been matched by more intense efforts to influence behaviour through the manipulation of attitudes. Generally, attitudes about products are believed to be formed by direct information provision on the product itself, or in its advertising and through the inferential beliefs just discussed. Buying behaviour can be viewed as a largely reasoned

process following from attitudes resulting from these beliefs (Ajzen and Fishbein, 1980).

1.5.6 The Reasoned Action Model

Ajzen and Fishbein (1980) believe that attitudes are formed from the product of beliefs and corresponding outcome evaluations (see Figure 4). With foods, an example might be that a food is believed to have a particular nutrition value and consuming food having that nutrition value is evaluated as having a positive or negative outcome. The beliefs should be behavioural beliefs that are related to performing specific actions at particular times. Ajzen and Fishbein stipulate this level of specificity to incorporate as many relevant environmental constraints as possible. If questions are put that do not incorporate this level of focus the answers received will probably have a low correlation with actual behaviour. They would probably reflect what the respondent wishes to see happen and not what they would expect to occur. The authors regard previous attitude models as largely unsuccessful because they were unable to predict behaviour.

Predicting behaviour has been the primary motivation for conducting attitude research.

1.5.7 Limitations of previous attitude research

One argument they quote that had been used to explain the discrepancy between predicted and observed results was that people learn not only attitudes, but responses also. Therefore, the responses of different individuals need not be equivalent, even when their attitudes are very similar. Fishbein and Ajzen rejected this argument because they believe attitude theory is of little value if it cannot be used to predict behaviour.

If you were to ask someone their attitude toward eating fried breakfasts it might be quite positive. However, their actual behaviour might be negatively correlated with their attitude, particularly if their health status had been compromised by their dietary intake. By asking about their beliefs regarding their *performing* the behaviour of eating fried breakfasts on particular occasions a more meaningful analysis could be made of how their beliefs correlate with behaviour. Many people might now regard a fried breakfast

as something to avoid on a regular basis, but all right for occasional consumption at particular times.

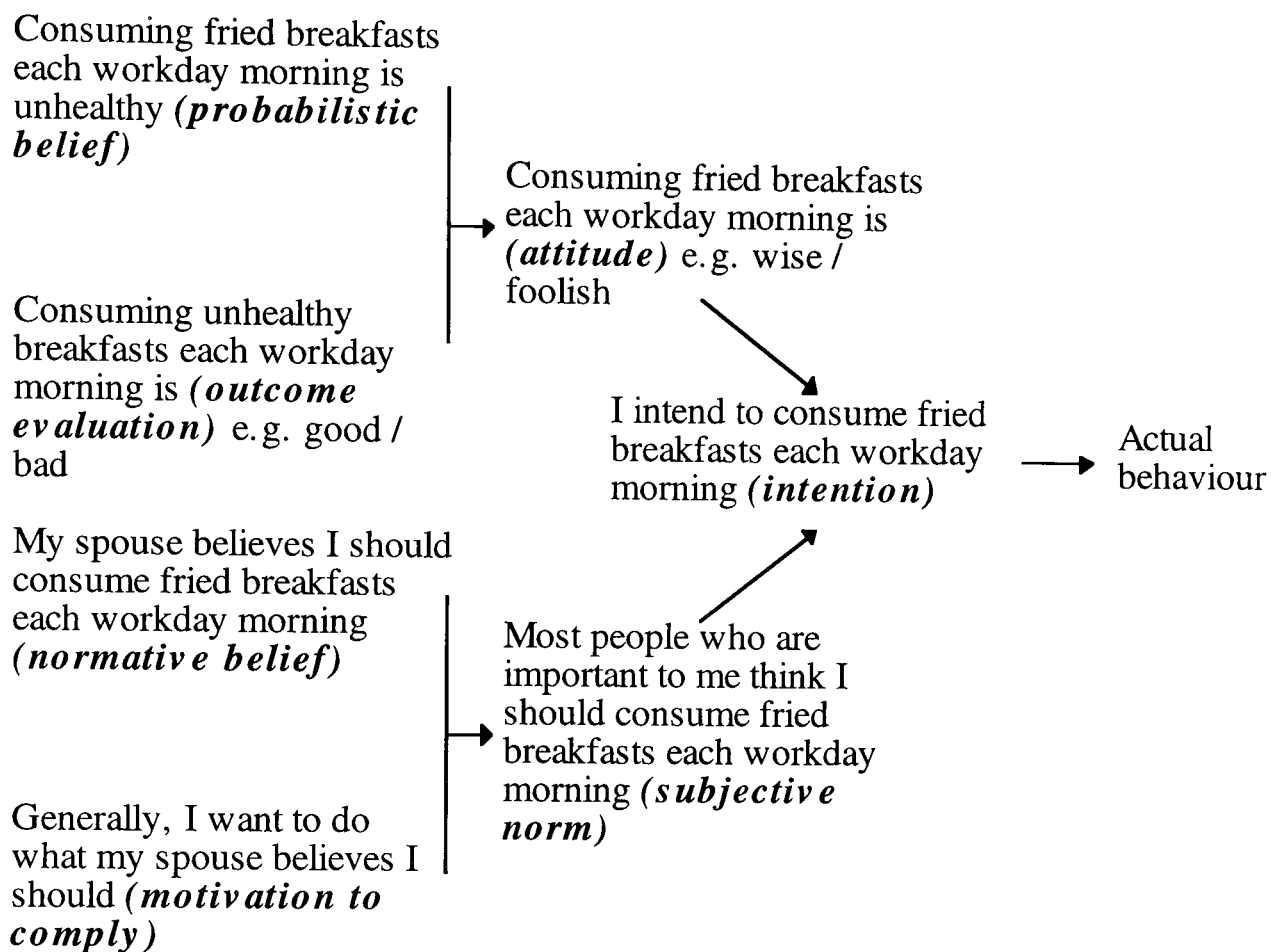


Figure 4 Basic structure of the Reasoned Action model showing the order and direction of the relationships

1.5.8 Eliciting beliefs salient to the attitude

Ajzen and Fishbein recommend a population sample give the first four or five issues they regard as relevant to the behaviour in question as the best way to obtain the salient beliefs. With frequency analysis it is then possible to see which issues occur often enough to be included in the questionnaire. By using this technique there is some assurance that the items will be predictive of the attitude.

1.5.9 Belief times outcome evaluation

Ajzen and Fishbein termed the model the 'Reasoned Action Model' because they consider that most behaviour is rational and follows from a reasoning process. Beliefs about behaviours are assumed to be subjected to an evaluation process. An outcome evaluation question is asked when questioning about performing an action. For

example, a question about the healthiness of eating fried breakfasts would be accompanied by a question on the importance of eating healthy breakfasts. This can show that though someone regards eating fried breakfasts as unhealthy, they do it because they are not concerned about the healthiness of their breakfasts.

1.5.10 Belief times outcome evaluation logic

The reasoned action model multiplies each belief by its corresponding outcome evaluation. Bipolar scales allow each response to show a positive or negative behavioural belief and evaluation of performing the behaviour. Ajzen and Fishbein use bipolar scales because attitudes are essentially evaluative constructs. Even where a jointly negative belief rating and evaluation are made the positive weighting on the attitude is still logical as the sum belief is that an unpleasantly evaluated result is considered unlikely to occur.

However, most belief evaluation pairings are not twin negatives. A positive belief rating and outcome evaluation yield a positive weighting on the attitude to the behaviour and conversely, a negative (or positive) belief rating and positive (negative) evaluation yields a negative attitude weighting. In a meta-analysis of food study results, Sparks, Hedderley and Shepherd (1991) found better belief to attitude correlation with bipolar than unipolar scaling.

1.5.11 Weighting the individual beliefs against the attitude

The products of each belief and evaluation pair are summed and correlated with the attitude. This indicates how well the set of beliefs relates to the attitude. The size of the correlation of each of the belief evaluation products with the attitude can be measured using multiple regression. By this means it is possible to determine the beliefs that would be the most influential for changing the attitude and thence the behaviour.

1.5.12 Subjective norms

A second stage links the attitude to the intention. The correlation here should also be significant if the question has been well focused. A further variable included at this stage is the subjective norm. This is used to determine how much influence social

pressures have on the intention. The technique used for determining the salient beliefs is applied to finding significant others' whose beliefs would be considered.

Respondents give a rating on a bipolar scale of how much they think each significant other would think they should perform the behaviour. These ratings are then multiplied by a motivation to comply score and summed, as with the products of the beliefs and evaluations (except that motivation to comply is rated on a unipolar scale). They are then correlated with the general subjective norm rating. Multiple regression can again be used to determine the most influential beliefs.

1.5.13 Intention and behaviour

The subjective norm and the attitude are regressed against the intention to perform the behaviour. Their relative weighting indicates the influence of perceived social pressure. It is intuitively plausible that generally a distinct attitude (or subjective norm) is referred to when deciding to act and not a large set of beliefs and evaluations (or motivations to comply). The final measure is actual behaviour. This should correspond well with intention. Therefore there are three stages in the model. The first shows the relative weighting of attitude belief components, the second the weighting of the attitude and subjective norm and the third correspondence between intention and behaviour.

1.5.14 Knowledge structures

Nutrition knowledge is important because the model shows that beliefs about behaviours influence attitudes, then intention and finally actual behaviour. Rather than using multiple-choice questionnaires, the better recent analyses of nutrition understanding have examined knowledge structures and their interconnections (Axelson and Brindberg, 1992). Unfortunately, even relative experts understanding of nutrition can be somewhat limited.

Leeds (1989) for instance, found that the knowledge structure of a group of nutrition students was characterised by relatively higher levels of conceptual knowledge than understanding of nutrition processes. She ascertained this using a concept map consisting of nodes representing concepts and links representing ideas that link

concepts. She asked undergraduate nutrition students, who had completed a nutrition course, to give verbal protocols on what was happening to a peanut being burned in a spoon. The protocols were transcribed into statements and then into representational models. These models were then compared with the previously constructed concept map. Students showed a deficiency of knowledge of the more abstract transformational links. This may have been due to insufficient grounding of the course information to their personal experience. If so, this inadequacy in the structure of their knowledge might be expected to be present to a far greater degree in the general population.

1.5.15 Experts nutrition beliefs

James, Auld and Slater (1993) gave structured interviews to 30 registered dieticians and used a comparable conceptual map approach to analyse the results of their nutrition questions. They obtained results similar to those of Leeds (1989). Very few cross-links between concepts were obtained and the number of concepts reported by 33% of the sample was also relatively low.

There are general guidelines on what is best for healthy eating (Committee on Medical Aspects of Food Policy, 1984), but experts do differ in their opinions. Media reports on healthy eating can often appear contradictory and this probably confuses and irritates the public. By contrast though, Eves, Kipps, Noble and Noble (1994) report key diet and health issues were largely agreed by 14 respected health and nutrition professionals. They were questioned about targets for consumption, views on carbohydrates, sugars, salt and alcohol consumption, caffeine and additives, antioxidant nutrients, what caterers' responses should be, vegetarian eating and other issues.

1.5.16 Knowledge and behaviour links

That the public may be confused by, or lack of confidence in, experts' nutrition advice may help explain the poor link between nutrition knowledge and positive dietary intake. Shepherd and Stockley (1987) used the reasoned action model to examine nutrition knowledge and fat consumption. They found that the attitude component was a better

predictor of fat consumption than the subjective norm and no relation between consumption and nutrition knowledge.

1.5.17 Positive attitude and knowledge links

However, other studies have found links between nutrition knowledge, information use and liking. Ruddell (1979) is quoted above (page 12) on information. Fullmer, Geiger and Parent (1991) more recently found that, although knowledge about fibre claims on products was low, attitude toward the information was generally positive. They discovered a positive correlation between education level and fibre knowledge and corresponding understanding of such claims. Knowledge also correlated positively with attitude toward diet-disease related messages, although checking for fibre content ranked low on the list of items to which attention was paid.

1.5.18 Self efficacy

These results suggest that the general level of nutrition knowledge may be low. That nutrition knowledge and the use of information are difficult to link with behaviour change indicates that other factors predominate. One factor that may be important is the level of control people perceive they have over their diet.

Using discriminant analysis, Contento and Murphy (1990) found factors important to dietary change included the perceived benefits, normative beliefs, perceived susceptibility to disease, overall health concern, perceived level of personal control and cues to action. An important additional factor to come out of the study was that those most able to make dietary changes were also characterised by a higher level of self efficacy. This related to their ability to prepare altered diet meals.

Perceived control is an important element of self-efficacy theory that Bandura (1989) developed to help explain belief, attitude and behaviour links. An important aspect of the theory is the stress placed upon the self reflexive nature of human thought and action. Because judgements and actions are partly self determined, people can effect changes in themselves and their situations. Our actions are affected by our environment. We can change our actions because we realise this and are able to change

our environment. However, the perception of low self-efficacy tends to create a negative behavioural loop by which previous failures reduce the ability to perceive that positive changes can be made. The result is that attempts will be given up more easily, or may be avoided altogether because of the risk of failure to the self image.

1.5.19 Perceived control

Ajzen and Madden (1986) also saw the need to incorporate within the reasoned action model an element dealing with control. They argue that most intended behaviours may be considered goals and control is relevant to some extent with all goals and can be measured on a continuum. Although it is not usually possible to measure actual control, measurement of perceived control is likely to be equivalent to it (Ajzen and Madden, 1986).

Perceived control may affect behaviour directly or indirectly through intention. If actual control is significant to the implementation of the behaviour the predictive power of the model may be significantly increased by taking perceived control into account.

Students' intentions and control perceptions on their getting top grades in a course of study were used to test this extension to the model. Measures were taken early and then later in the term, at which time students could be expected to have more realistic expectations of their grades. Subsequent hierarchical regression analysis of the results did indeed show that perceived control significantly extended the multiple-correlation from 0.55 to 0.68. A second experiment confirmed that perceived control improved the prediction of pupil's intentions, but not their behaviour. Students often tended to lower their expectations and thence intention to try hard when they became aware that success was much more difficult than they had anticipated.

1.5.20 Attitude variability and perceived control

Sparks, Hedderley and Shepherd (1992) examined the relation of perceived control to attitude variability in consumers of wholemeal bread and biscuits. Results showed that greater attitude variability was matched by a corresponding decrease in perceived control. The authors had hypothesised this decrease to be due to conflicting

motivations. Conflicts between motivations would be likely to spring from wanting to eat food that tastes good and needing to eat healthier food, often be perceived to have less desirable sensory characteristics. These results indicate that inclusion of a perceived control measure should generally be useful in food choice studies.

1.5.21 Performance of the reasoned action model

The reasoned action model is the most widely used model in attitude analysis and has been shown to be consistently useful, even when some of the original dictates about restrictions on use have been ignored. Sheppard, Hartwick and Warshaw (1988) conducted a meta-analysis with 87 studies from nine journals of consumer research and social and applied psychology. They found an overall intention to behaviour correlation of 0.53, and attitude plus subjective norm correlation with intention of 0.66 (both statistically significant). A review by Weinstein (1993) showed that neither the health belief model, subjective expected utility, or protection motivation theories offer better predictive or explanatory power. Weinstein did however question how the belief and evaluation variables should be combined. Other research has not always used multiplication of beliefs and evaluations and further exploration of this area was suggested by the comparisons given.

1.5.22 Examining using beliefs times evaluations

There has been previous research examining whether multiplying beliefs by evaluations gives a better result than simply adding them. Doll and Orth (1993) compared the fit of data from the product sum model with a summation model using hierarchical regression analysis. They first entered the additive combination of beliefs and evaluations followed by the multiplicative combination. This showed a clear advantage from entering the products and hence provides support for the psychological meaningfulness of the multiplication method. Their study measured the behavioural intentions of both sexes to using four types of contraception. The product sum model significantly improved the regression fit in six out of the eight cases.

1.5.23 Using belief evaluation products without summation

Doll and Orth (1993) discuss variations from the reasoned action model. These include multiplying the belief evaluation products by the subjective norm ratings, hence making subjective norm a weighting factor. Another variation is using the belief evaluation products without summation. This is reported by Doll and Orth to be useful where the attitudes to be measured are too differentiated to be integrated into a single attitude. Beliefs about some foods might show significant shifts of perceived relevance. A high level of sweetness or fat for a particular food might be negatively regarded, but this may not be reflected in outcome evaluation measures where the frequency of consumption is low.

1.5.24 Present experimentation examining attitudes

In the present experimentation, computer displayed photo-realistic images of packaged food products currently marketed were used (see Figure 5). Health and nutrition claims were removed to produce a without-claims condition using photo-editing software. A pilot study was conducted to establish which attributes are used in evaluating packaged food products. This was done to ascertain the attributes on which these products should be rated. It was accomplished by displaying images of packaged food on a computer in three formats; unaltered, with all textual information removed and with all graphical information removed. Attributes derived were then frequency analysed and used within the reasoned action structure, producing rating scales upon which each packaged food was evaluated. They covered aspects of affect, sensory appeal, appearance, nutrition, presentation and use.

Two experiments were conducted. Each used a between-subjects design. They involved comparison between British and French members of the public, with manipulation of the presence of textual claims the independent factor. It is important in increasing integration within Europe to understand similarities and differences in customer's needs and cognition. Very little cross-cultural experimentation of this type appears to have been conducted with food products in the public domain.



Figure 5 Photograph showing the claim deletion experiment. Products were displayed on the large screen on the left and the rating scales on the smaller monitor to the right.

1.5.25 Empirical testing of the veracity of theoretical assumptions

Returning to the belief and evaluation scoring, Hewstone and Young (1988) compared bipolar with unipolar scaling. While acknowledging that the use of bipolar scaling allows a psychologically meaningful expression of the scores, they saw a problem in the need to assume a true zero point on what are essentially interval scales. Using attitudes toward EC membership they found that the multiple correlation between belief evaluation products and the attitude could be improved with unipolar scaling (from 0.30 to 0.46). A second study used measures that showed a greater number and spread of negative scores that should have assisted the multiplicative model. This also showed unipolar scoring to be more effective. There was a significant correlation between the results of both methods in each of the experiments.

Hewstone and Young's (1988) results therefore conflict with Sparks, Hedderley and Shepherd's (1991) meta-analysis showing bipolar scaling to be more effective.

However, the meta-analysis included a larger number of studies and these were specifically related to food choice. These results show how the reasoned action model

may be usefully modified on pragmatic grounds and that the outcomes of different data analysis techniques may eventually lead to theoretical modifications.

1.5.26 Double negative belief evaluation pairings

Valiquette, Valois, Desharnais and Godin (1988), for example, examined the relationship between negatively scored pairings of beliefs and evaluations and the internal consistency of attitude scales. They found a significant negative correlation (-0.6) between the number of these pairings and the item's total correlation. They hypothesised that these pairings may not represent a psychologically valid phenomenon and suggested statistical techniques for determining when to remove them. Similar evidence along these lines would point to a need to re-evaluate the positive weighting of jointly negative pairings.

1.6 Network analyses

Reasoned action attitude modelling using neural networks is examined in this section.

1.6.1 Idiosyncratic structuring of the components of the model

Because of the difficulties of generalising from attitudes to behaviours in food research, Conner (1993) regards that factors existing outside the model could be incorporated on an ad hoc basis. Conner does not state how such an idiosyncratic selection of factors should be implemented. However, there are ways to achieve this within a neural network model.

Conner (1993) gives the results of path analyses from four studies. While these showed general support for the theory of reasoned action, links between components did not consistently correspond with the theory. In one study, subjective norm acted through behavioural beliefs rather than through intention. Conner also indicated there could be direct links to behaviour from all components of the model. Path analysis is a statistical technique attempting to find the best sequence of precedents and antecedents in a structure having an output value. Similar to multiple regression analysis, the elements in such analyses are given weighted links.

The backpropagation of error in a connectionist network is another technique that could be used within the framework of the theory. This could construct its own relationships between the component elements. Backpropagation uses a form of regression analysis. The weights upon inputs are learned by progressive sweeps of data through the network structure. Examination of such a model based network could provide a useful alternative to conventional statistical approaches. A primary distinction between backpropagation and conventional analyses is that it *learns* connections between the input and output stages. Examination of a network could also be used to test the multiplicative relationship between the beliefs and evaluations.

1.6.2 Comparing networks with regression analysis

Reasoned action theory, regression analysis and most backpropagation networks perform a type of dimension reduction. They weight multiple inputs against a focal output measure. Regression analysis attempts to fit a parameter that matches inputs to the output (SPSS, 1988). Backpropagation of error places two or more series of adaptive weights on the inputs. It attempts to find a representation that produces accurate predictions. Series of weights update following successive presentations of data values through the network (Rumelhart, Hinton & Williams, 1986). Although multiple regression and backpropagation both weight inputs, the forms of the solutions are qualitatively different. Regression analysis uses parameter fitting resulting in an equation, while backpropagation produces an adaptively learned series of weighted links.

1.6.3 The similarity between connectionist networks and brain functioning

The representations of solutions within connectionist networks have attracted the attention of psychologists owing to their similarity with brain functioning. The brain is more complex than any artificial network, but the representation of information within connections is considered to be similar (Rumelhart, Hinton & Williams, 1986). The neural structures of axons and dendrites, pass and store information by means of synaptic links, similar in function to the links within artificial networks. Artificial

networks are the only computational structures that have proved capable of useful learning outside of highly artificial and constrained domains. For instance, artificial networks are the most capable computational mechanisms yet found for performing pattern recognition. Pattern recognition is the basis of many perceptual and intellectual capabilities. This has been viewed as further evidence that a network approach is simulating brain like functioning (Hanson & Burr, 1990).

The analogy between brain and backpropagation learning is only relevant at a fairly abstract level, because the passing of error values back along connections is not assumed to be present within the brain. The analogy is considered useful at the structural level of multiple connections between simple units and adaptive updating of weights between them enabling learning. Many useful correspondences between our own intellectual structuring of information have been found when examining the pattern of weights in networks that have been trained to produce accurate responses (Quinlan, 1991). Generally, the problem solutions found with artificial networks have been at a level closer to perceptual abilities than higher cognitive functioning requiring conscious reasoning.

1.6.4 Examples of successful network analyses

Other notable areas of success with artificial networks include vision research. The representation learned has been shown to correspond to the formation of the simple cells found in the mammalian visual cortex (Wright, 1992). Human visual functioning has also been successfully modelled by incorporating the centre surround structure of some visual cells in the projections within networks (Quinlan, 1991). Perhaps at a somewhat higher cognitive level, backpropagation has been used to simulate the learning processes involved in speech formation. Analyses of units within NETALK showed that the representation formed distinguished vowels from consonants and had other features of human speech (Sejnowski & Rosenberg, 1987). These successes suggest examination of representations formed using the theory of reasoned action would be a suitable research objective.

1.6.5 How a backpropagation network functions

The operation of a backpropagation network is essentially simple at a surface level and network development tools have made the use of networks relatively easy. However, understanding the fundamentals of backpropagation allows better comprehension of the representations they form. There are many types of backpropagation network and the feed forward type is described here (Dayhoff, 1990). Data presented at the inputs is passed on to succeeding layers of units and then to the output. The units are representations for processes computed by a program that carries out all the functions within a network. The program may also perform other operations such as the display of learning curves.

In the current application, for each belief and evaluation used in the reasoned action model, there would be a corresponding input unit represented in the network (see Figure 7 on page 34). The task performed by the input units is simply to redirect each input value they receive to every one of the units within the next layer. Each input unit is fully interconnected to every unit in the following layer and has no other connections, i.e. input units do not connect to each other. The data values supplied to the input units would be those from each of the participants who completed a questionnaire.

Supposing prediction is to be made of attitudes, every one of the beliefs and evaluations given by a participant would be presented to the input units as a single row of data. Their direct attitude measures are used to calculate the error level produced by the output unit.

The layer following the input layer is often referred to as a hidden layer. It is here where the bulk of learning and representation of the problem solution takes place. Each of the hidden layer units receives input from every one of the input units. Each hidden layer unit places a differential weight against each of those inputs as learning progresses. A secondary function of hidden units is to direct their computed values to the output unit. This receives inputs from every hidden layer unit and learns differential weights for each of those. The secondary function for the output unit is to compare the

sum of its weighted inputs with the direct measure of attitude. The difference between the values is the error value.

The backpropagation of error follows by referring to the input value from each of the hidden units. The output unit computes new values for the weightings it places upon them on a relative basis. The greater the magnitude of the value from the hidden layer unit, the more the weighting will be increased upon it. All the inputs are computed to be equally responsible for the error value, hence the relative weighting.

This process continues at the hidden layer. Hidden layer units use their error values to update weights on their inputs, again relative to magnitude. This process of feeding the data set through the network is continued cyclically until the output error level is satisfactorily low.

This description has ignored some important details. There is a transfer function used to pass values between layers. A bias value is passed through all but the input units to initially maintain them on the median of the transfer function. There is also a momentum value that is used to accelerate the learning rate, during rapid error rate reduction. This is reduced as the network progresses through the duration of the intended training regime (Dayhoff, 1990). These details are important to efficient network learning. However, they are not vital to understanding how the outputs are computed and the representations within hidden layer units formed (although see Equation 1 through to Equation 3 for more detail).

Equation 1 Error for output unit j for pattern p equals target output for unit j for pattern p - actual output times output for unit j for pattern p times 1 - output for unit j for pattern p

$$\delta_{pj}(t_{pj} - o_{pj}).o_{pj}.(1 - o_{pj})$$

Equation 2 Weight change at time n + 1 between i th and j th hidden units equals learning rate constant times error of j th output unit times activation of i th hidden unit plus momentum term times previous weight change at time n

$$\Delta w_{ij}(n + 1) = \eta.(\delta_{pj}o_{pi}) + \alpha.\Delta w_{ji}(n)$$

Equation 3 Hidden units in layer l feed layer m & error term for hidden unit l for pattern p = output of hidden unit l for pattern p times 1 - output of hidden unit l for pattern p times sum of product of weights for all units in next layer & their error terms

$$\delta_{pl} = O_{pl} \cdot (1 - O_{pl}) \cdot \sum_m \delta_{pm} \cdot W_{lm}$$

1.6.6 Analysis of hidden unit computations

In early work, difficulties analysing representations within networks gained them a reputation as a 'black box' methodology. Studies have subsequently shown that conventional statistical analyses can be made on the outputs within hidden layers. This allows examination of the solutions. In the vision research that discovered simple feature detectors, the hidden layer was displayed visually and the representations formed were readily identifiable (Wright, 1992). Representations within NETALK were revealed with cluster analysis of the weight values (Sejnowski & Rosenberg, 1987).

Analysis can also be made by dithering input values (altering values positively and negatively) by a set percentage and noting the degree of difference on hidden unit output values. This can be done so that all but the inputs under examination are turned off and the resulting hidden unit value changes then relates specifically to those inputs. The use of dithering and input switching is facilitated by a user friendly network development environment. These procedures can otherwise prove inordinately time consuming (NeuralWorks II Plus, 1992).

1.6.7 Using the reasoned action structure with backpropagation

Besides simply comparing the performance of an artificial network with conventional regression techniques, analysis can be made by partitioning the network structure to more closely follow or deviate from a model under consideration. With the reasoned action model, the hidden layer might be partitioned so that beliefs and evaluations feed through the first hidden layer, to a second hidden layer unit representing computed attitude. Output from this could then be directed to a third layer unit representing intention. By partitioning the first hidden layer, subjective norm and perceived control

might be linked directly to intention, bypassing attitude as in the theory of reasoned action (see Figure 6 and Figure 7). However, it should be noted that the approach taken with attitude diverges from the reasoned action model. Ideally, the belief and evaluation inputs would connect directly with the unit referred to as the hidden attitude unit. This was not done in this case because the software made it necessary to first connect them through the initial hidden layer.

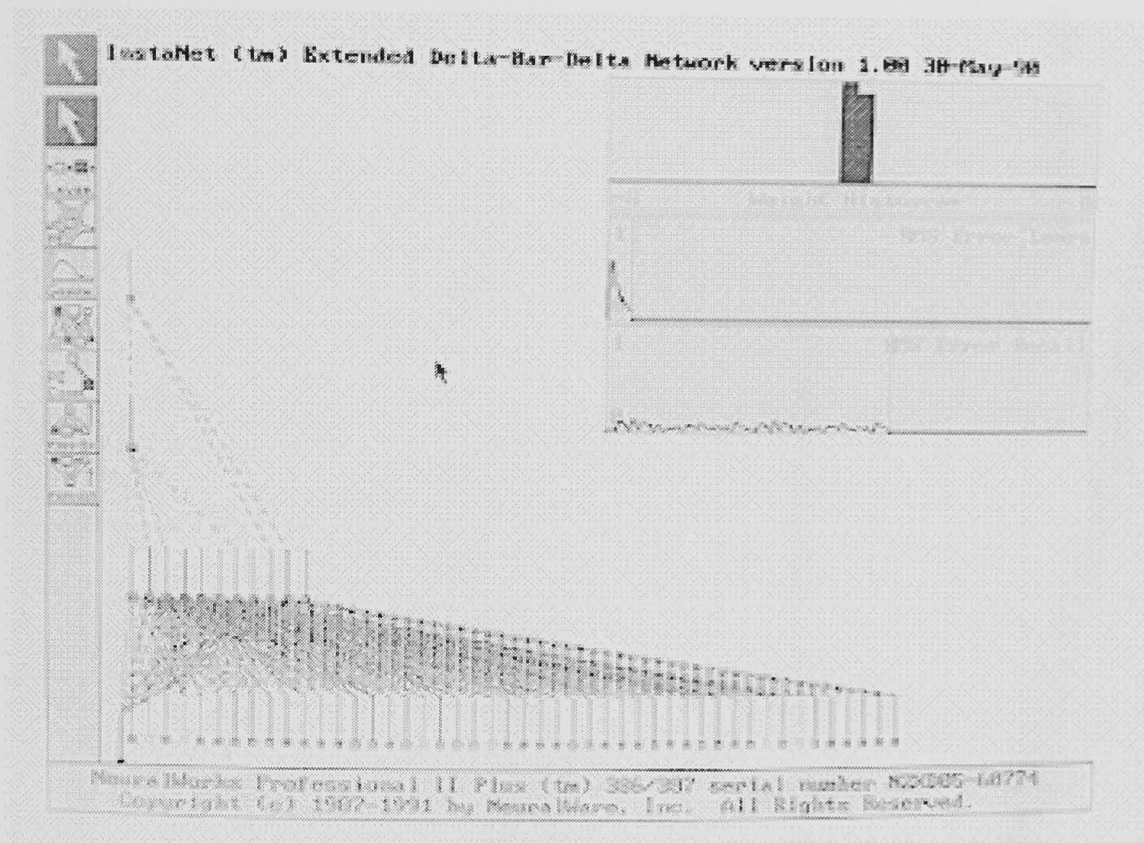
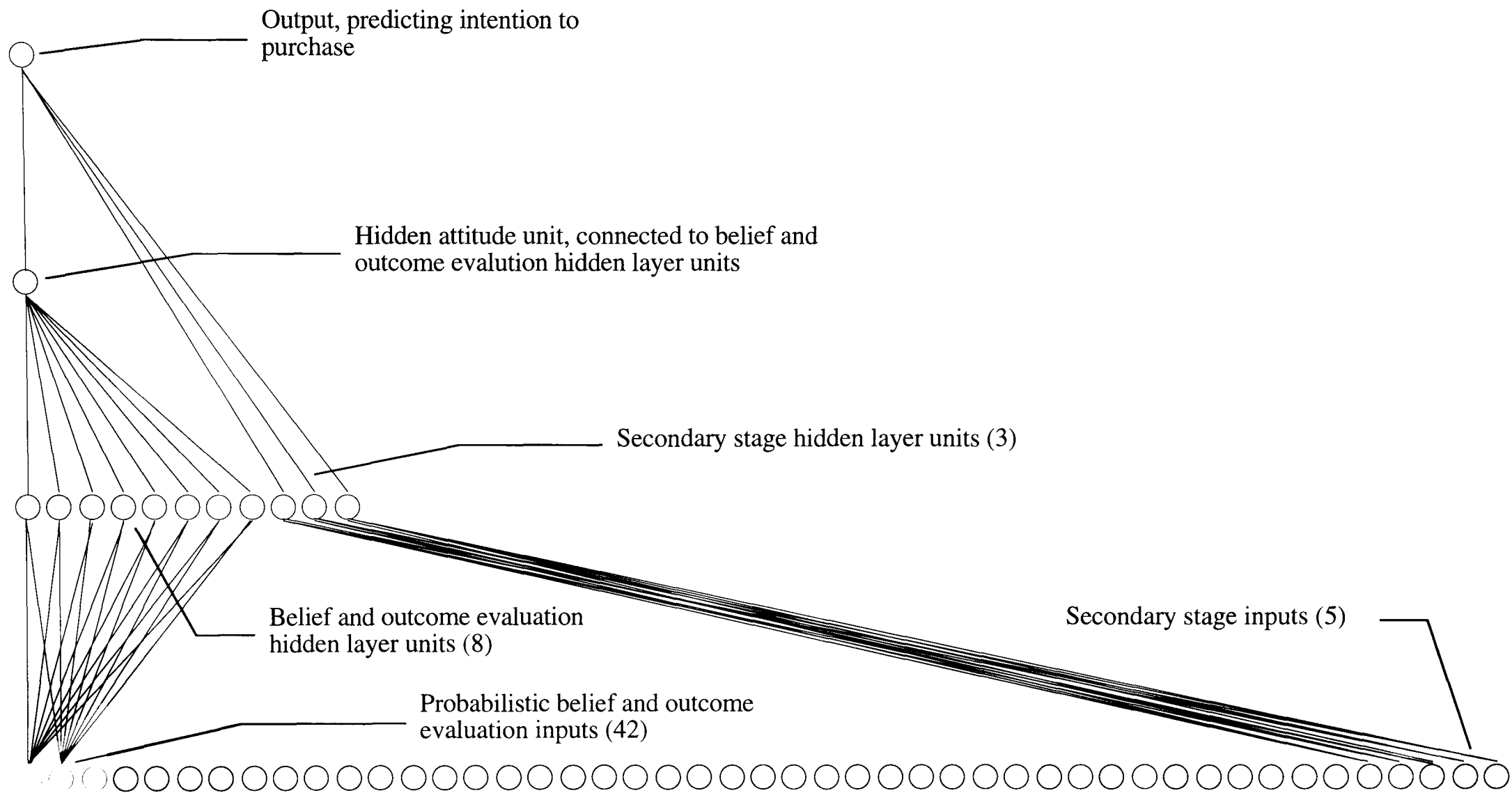


Figure 6 Photograph of the computer display of the network structured on the Reasoned Action model

1.6.8 The present backpropagation experimentation

The present experimentation used dithering of input values on a network based on the reasoned action model structure. Belief and evaluation data from the computer displayed photo-edited claim manipulation work was used (see page 25). Examination of the hidden layer outputs was made to determine if they were multiplying the beliefs and evaluations. The model was also represented in the structure of a backpropagation network, as described in the preceding section (Using the reasoned action structure with backpropagation) and analysis made of the performance.

Figure 7 Structure of backpropagation network, showing processing unit connections (note that for clarity, only the connections for the first belief evaluation pair are shown)



This included factor analysis of the computations of the hidden units and analysis of the networks' ability to generalise predictions. Training data from the with-claims condition was used to predict intention scores from the without-claims condition. The ability to generalise was also compared with conventional regression analysis, using a simpler representation of the model. This consisted of the belief evaluation structure alone and thereby excluded the subjective norm and intention components.

1.7 Representation of Information

Examination of the third problem follows.

1.7.1 Deceptive marketing claims

Advertising and marketing claims can be contrived to deceive. These deceptions may pass unnoticed because they simply omit relevant information or imply benefits.

Definitions of deceptive advertising tend to incorporate concealment of the deceptive element and include reliance on ambiguity and inferences generated by the reader.

Inference processes arising from the information its structure and the reader's pre-existing knowledge are central to the issue. The representation of information in memory and the mechanisms of memory acting on its recall and use is relevant to comparisons and choices. False beliefs generated by deceptive claims will probably result in less optimal selections.

1.7.2 A hierarchy of measures of deceptiveness

Armstrong, Gurol and Russ (1980) list four levels that might be used in measuring deception: Consumers report claims they perceive. They report claims they can remember. They report salient beliefs. They report the perceived salience of the claims to purchase decisions. Each of these measures is designed to gauge different aspects. Level one can determine if the deception relies upon information explicitly stated or inferences. Inferences about a product may be generated consciously, or unconsciously. Level two can also determine the influence of any recall inference

processes and biases. Level three can indicate whether the importance of attributes is unjustifiably raised. Level four tests the likely influence upon purchase behaviour.

1.7.3 Correction and cost of deceptive information

They used corrective advertising presented by company or more neutral watchdog body presenters and found that both approaches were equally effective (Armstrong, Guroi and Russ, 1979). The study included an advert that was subject to litigation for its deceptiveness. Listerine mouthwash erroneously claimed fewer and milder colds with regular use. The belief adjustment of the corrective advertising was found to persist over time. Craswell (1991) concluded that the level of deceptiveness and potential harm of the consequences, can be ascertained through comparing beliefs produced from the original and a revised version. The aggregate injury being the key measure of the negative effect of the deception.

1.7.4 False physiological acceptance of claims

Olson and Dover (1978) revealed how a deceptive claim could lead to false acceptance of an implied attribute. They hypothesised that deceptive claims could lead to erroneous acceptance of the claimed physiological property. In a between-groups design they exposed the experimental group to the claim that the coffee they were given was not bitter. Because the experiment was conducted over several weeks and the experimenter made it clear he was not personally involved with the product, they hoped to avoid any positive experimenter bias. The coffee was made to taste bitter, by using it double strength in the experimental condition. Nonetheless, they still rated it less bitter than the control group on the 'not at all bitter' question (4.82 versus 2.06).

1.7.5 The tendency to use claim information

As previously discussed (Strategies on page 9), reliance will often be made on a sub-set of the available information and consumers can therefore be particularly vulnerable to a single misleading claim. The influence of a claim will be stronger where it appears to be salient to the purchasing decision. Hutchinson and Alba (1991) showed this when examining the degree of attribute information learning, with goals memory loading and

attribute salience as independent variables. They found that greater analytic reckoning arose when all of a product's attributes were examined. This also led to better structured knowledge. Obviously, when all of a product's attributes are examined there is less likelihood that reliance will be made on one or two pieces of information.

Jacoby and Hoyer (1990) regard poorer choices being made because of miscomprehension of information as unlikely with printed claims. Although miscomprehension for complete television adverts has been quoted at around 30%, this figure did not hold for the literature they reviewed on printed claims.

1.7.6 Making inferences

Miscomprehension can easily occur where a specific claim is not made explicitly, but happens as a result of a reader's inference processes. Bransford and Franks (1971) showed that the holistic representation of individual sentences could add up to more than the sum of their parts. They found that similar recognition confidence levels were given for 'new' sentences, that incorporated the collective semantic gist of material previously presented, as for the 'old' sentences that had been shown. Their results indicated that the explicitly stated information and its syntactic form are quickly lost. The holistic representation that remains has been generated by the perceiver as part of the comprehension process. These representations tend to go beyond the original detail, in what Bransford and Franks refer to as a process of inter-sententially defined ideas. They found these results with both abstract and concrete test materials (Bransford and Franks, 1972).

1.7.7 Recognition responses

Strunk (1967) found it is difficult to detect syntactic active/passive mode changes in sentence recognition. This appears analogous to the unreliable differentiation between assertive and implied forms of phrases found in later work. Another finding relevant in this context, is that recognition response times have been shown to be faster where there is a positive semantic match between given and new sentences (Haviland and

Herbert, 1974). Therefore, comparisons of response times to erroneous and valid inferences might be used to indicate how closely their truth values are associated.

1.7.8 Recognition confidence

Kardes (1988) used confidence scores to determine inference formation in sentence recognition. The testing centred on giving participants premise A implies B and B implies C and testing whether participants would be as confident that they had been shown A implies C. He devised this technique to avoid leading questioning creating the inferences it was designed to measure. The results showed that confidence levels were high when the conclusion had been shown previously, but were also high where the premises were logically related. Where inferences appear logically valid they will have a similar influence on decision making as true attribute information.

1.7.9 Mental models

Unravelling whether something was previously stated or inferred has been examined with mental model representations (Garnham, 1987). When comprehending a text, a mental model is constructed from the syntactic and semantic information and any missing elements are filled by the reader's default values. At any given stage of completion, a mental model ceases to incorporate the syntax and semantics that were used to build it. It is then formed from the perceivers' knowledge structures.

Johnson-Laird (1983) regarded neither mental imagery nor propositional symbolism as the form of these representations. He viewed these as different levels of explanation, rather than as alternatives. The mental models are structural analogues to the world and are strongly tied to an imagable basis of operation. Hence it can be seen that the reader can make assumptions that are not logically valid when inferring the content of missing information.

1.7.10 Schemata

A similar approach to mental model theory, in understanding comprehension processes, is an explanation that proposes the mind seeks and is formed by regularisation in its inputs. Brewer and Nakamura (1984) give a useful synopsis of schema research

findings and attribute the initial work to Bartlett. Bartlett viewed schema as unconscious mental activities consisting of previous experiences in organised form. He considered the regularisation of errors to be an effort to derive meaning. It results from trying to fit new information with previously stored information. Bartlett also postulated an imagery based recall of memory traces to accommodate recall of individual events. Like most modern theorists he regarded recall to be a largely reconstructive process. Schema research has been most useful in showing how regularisation leads to recall errors. People tend infer aspects of situations they cannot remember, or that differ markedly from their expectations. Unexpected details that are not given special attention are often forgotten.

Schema based processing has proved useful in computer based natural language programs. Initially, researchers assumed it would only be necessary for a natural language program to classify input using an automated dictionary look up process. However, a dearth of success was followed by the realisation that comprehension of even simple sentences requires a significant amount of domain knowledge. Schank (1982) most successfully accomplished this by creating scripts for situations a computer program could call upon to resolve ambiguities in the sentences input to it. One program developed with this technique read news stories, gave summaries and answered questions about details that were not contained in the input, but could be inferred from the program's domain schemata.

Schank (1982) describes fine-grained schema dynamics and structures that can account for many human cognitive processes. His work has more recently been extended by connectionist research that explains cognition by patterns of activity over many small processing units. These processing units use simple rules of activation, but can collectively incorporate sophisticated learning capabilities. They are useful way of explaining how meanings of lexical items can change in differing contexts (Chandler, 1991).

1.7.11 Individual differences in inference making

Where learning or experience modifies interpretation of information, it is likely that personal cognitive characteristics and relative knowledge levels will influence any inference processes. Dollinger and McMorrow (1991) tested individuals for their ability on a task that required them to pick out people fantasising a criminal act, by using responses gained from word associations. They found that sagacity (which they relate to an ability to see into a situation, recognising its important elements by careful observation and reasoning processes) is not directly related to general intelligence. Their findings supported the view that ability at humanities, rather than science, was a better predictor of sagacity. Some individuals will be less likely to make erroneous inferences, as a result of this specialised capacity, than others of perhaps higher intellectual ability.

1.7.12 Relative knowledge levels and inference making

Gardial and Biehal (1991) examined the influence of knowledge levels on inference generation using evaluative versus factual advertising information. They found that low product knowledge consumers made fewer inferences, regardless of the form of the advertising claim. Those with greater knowledge made more inferences with factual than with evaluative information. In correspondence with mental model theory, higher knowledge participants made more inferences concerning missing information than did those with less knowledge. More-informed consumers are better able to notice missing information and use prior experience to make inferences about its nature. There were fewer inferences made in response to the evaluative material. This may reflect Edell and Staelin's (1983) finding that drawing attention away from specific qualities of a product results in less processing and fewer counter arguments.

1.7.13 Rules used to produce common implication types

The effect of presentation on inference making has been examined in general discourse by Grice (1975) who defined a number of conversational rules used to create implications. Grice made the distinction between conventional implicature where the truth value cannot be denied and what he termed conversational implicature. A co-

operative principle relates to the action of making the relevant types of responses in the communication process. Grice defined the co-operative principle as consisting of quantity, quality, relation and manner elements. Quantity refers to making information as informative as required. Quality refers to not saying what you believe to be false or for which you lack adequate evidence. Relation refers to being relevant to the purpose of a communication. Manner refers to avoiding ambiguity and obscurity. Grice classified all four categories as purposive rational actions and implications can be produced by breaking any of the maxims. Omitting information in a reference can imply the writer intentionally missed out saying X is good at Y, but the writer did not want to say so explicitly. An implication using the quality maxim could be made where the audience and the speaker both consciously realise each other knows that what is being stated is false. Breaking the quality maxim might be used to create irony where one says to the other X is a good friend. The relation maxim might be used where an abrupt change of conversation is used to indicate an intentional avoidance of an issue, with the aim of producing a strong implication for why this was done. Grice states that 'The truth of a conversational implicature is not required by the truth of what is said, the implicature is not carried by what is said, but only by the saying of what is said, or by putting it that way'. Some of these rules can be equally well used in the presentation of product information.

Grice's point that conventional implicatures' truth value cannot be denied, refers to a logico-linguistic hypothesis that only logically related implications will be given full truth value. Harris (1977) tested this assumption using a number of verb types. As he had hypothesised, Harris found that implications were more often perceived as true than as indeterminate in truth value.

1.7.14 Common types of implications used by marketers

Preston (1977) catalogues a number of different claim types he categorised from the Federal Trade Commission's hearings on deceptive advertising claims. An expansion implication is described as a false widening of the scope of the attribute benefits being

claimed for a product. Preston quotes the example of a product that referred to 'relief from the itching of eczema...' but which nowhere called the product a remedy or cure. The expansion implication appears to be the most common form of deceptive implication. The expansion implication is probably widely used because it takes very little effort to construct or accept. The uniqueness implication implies that the attribute qualities referred to are unique to the product or its constituents. The reasonable basis implication implies the product has been proven to have the attribute qualities claimed for it. The inconspicuous qualification hides restrictions on a products performance, creating unduly high expectations. The expansion, uniqueness, reasonable basis and inconspicuous qualifications were the main types listed by Preston, although he also refers to several others. Figure 8 for example shows a postmodern example of puffery (i.e. an obviously outrageous claim).

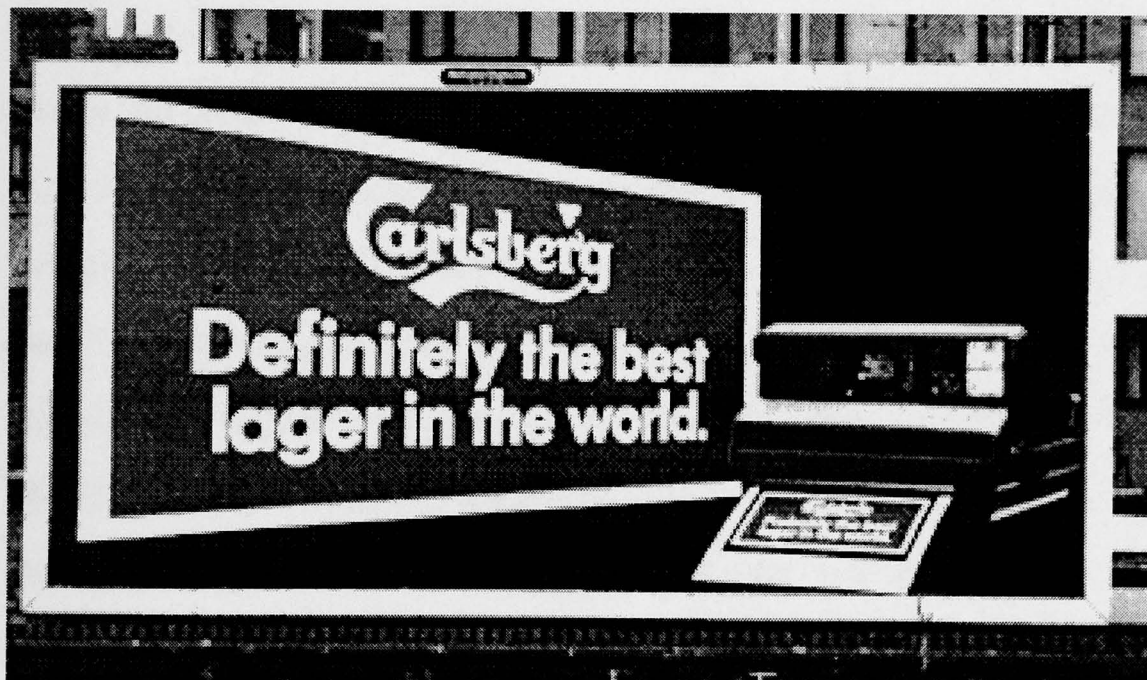


Figure 8 Currently the archetypal user of the probabilistic type of claim. In contrast to the main billboard image the message on the Polaroid print says 'Probably the best lager in the world'

1.7.15 Testing the effectiveness of various implication types

Burke, DeSarbo, Oliver and Robertson (1988) quote two of the implication types referred to in Preston's (1977) paper in their work. A randomised sequence of brand adverts for Ibuprofen pain relievers were used in a partial Latin square design. To avoid memory effects beliefs and evaluations were measured concurrently with presentation.

The product information was shown on computer and this enabled automatic presentation of materials and data collection. Information presented consisted of a headline, computer scanned illustration and product attribute claim. Attribute selection was determined by repertory grid use. Product attributes were either not presented, presented truthfully, or presented as expansion implications and were also modified by the inclusion of qualifiers. The design gave each participant 16 presentations. The claims used, related to pain relief, side effects, low price and speed of relief. Expanded claims like 'the fastest possible relief', were only literally true because other brands were not faster, only as fast. Of the 16 presentations, four included all the information and the rest missed out at least one attribute. Participants rated their beliefs on seven point scales.

True information was found to lead to significantly greater belief in brand performance than no information and expanded claims gave significantly stronger beliefs than true claims, for all the attributes. The inconspicuous qualifier led to stronger beliefs than true claims, except for price. Links were noted between the attribute beliefs, affect ratings, preference and likelihood of purchase. Like Olson and Dover's (1978) results (see False physiological acceptance of claims on page 36), these findings give experimental support for the likely influence of deceptive claims. If a purchase has been prompted by a particular claim and Ibuprofen had relieved the pain satisfactorily, the customer would be quite likely to infer that the claimed quality had been influential in their relief. Continued use of a brand, might follow due to a false belief that it is superior to other brands possessing identical pharmaceutical properties.

1.7.16 Truth values accorded to implied marketing claims

Harris (1983) reports a series of experiments that were designed to ascertain whether the truth value accorded to implied claims differed significantly from those of explicitly asserted claims. He states that memory is a largely constructive process and that it can be distorted by inferences made during comprehension. Product claim implications invite these inferences and lead to error in recall.

In brief, participants were shown asserted or implied claims and then gave truthfulness ratings for paraphrased versions of the asserted claims. If the participants shown implied claims were accurate in their truthfulness ratings, they should give them an indeterminate truth value. Those shown assertions should rate the paraphrases as true. A survey of the results of a number of these experiments, given by Harris, is that in both conditions the asserted claims were rated as true or probably true in 80-85% of cases. Harris prefaces the overall findings with the qualifier that there was often a claim type main effect. Lower truth ratings tended to be given by those shown implied stimuli. Overall, the results indicate that there was no real difference in the truth value accorded to implied or asserted types. Harris regarded the findings as due to a tendency to impose structured interpretations on information and experience. He makes the point that to draw inferences and assume them to be true is natural and normally useful. To avoid drawing inferences and making assumptions in these cases requires a meta-linguistic problem solving approach.

The methodology used two lists of the same commercials. One list of commercials was produced in implied form and the other in asserted form. An example of an asserted version (given by Harris, Dubitsky, Perch, Ellerman and Larson, 1980) is; 'Do you have tired aching feet at the end of a long day? You should be wearing Hush Puppies, with their revolutionary new cushion sole. Be kind to your sore feet. Hush Puppies will relieve your aching feet'. The corresponding implied example was; 'Do you have tired aching feet at the end of a long day? You should be wearing Hush Puppies, with their revolutionary new cushion sole. Be kind to your sore feet. Hush Puppies are just right for you'. The difference between the two examples is that the last sentence either asserts that the shoes will 'relieve your aching feet' or merely says they '...are just right for you.' By saying the shoes are 'just right', in the context of the preceding sentences, about 'aching feet' and 'cushioned soles', indicates that the phrase is being used as an expansion implication. The benefits of the product are strongly implied by the juxtaposition of the preceding phrases, leaving the reader to expand on them and infer the intended meaning. The two matching test sentences were a paraphrase of the

asserted claim and a false filler. The methodology relies on comparing the participants' relative 'truthfulness' ratings of the paraphrases of asserted versions. Paraphrases of implied versions are not used. The paraphrase of the asserted version in the example just given was 'Hush Puppies will make your tired aching feet feel better'. The false fillers were used to reduce the level of true responses and in the example was 'Hush Puppies have a solid wooden sole for better support for weak arches'.

Harris, Dubitsky and Bruno (1983) report that binary forced choice recognition had previously been tried. With direct recognition, participants were correct in 69% of cases with the assertion versions and correct in 77% of cases with implied versions.

However, Harris et al. (1983) state that this task bore little relation to that facing the consumer and participants tended to pick implied rather than asserted versions when guessing. The tendency to pick implied versions was described as an artefact and possibly due to participants trying to indicate they had not been 'tricked' by the wording. Confidence ratings were also reported to add little meaningful data.

1.7.17 Alternative explanations for rating implications as probably true

An alternative explanation for participants tending to pick implied versions on direct recognition is that their selections may have been biased by their schemata. If they had no prior expectations regarding the form of the claims, they should do one of the following: (i) Choose versions in the form they had been shown with high accuracy; (ii) Choose versions in the form they had been shown with incomplete accuracy, owing to recognition failure; (iii) Choose versions in implied form because they wanted to indicate they had not been 'tricked'; (iv) Choose versions in the assertion form because they had guessed the rationale and wanted to please the experimenter; (v) Choose implied or asserted versions consistently, because of vague recollection and expectation of the form the claims will take.

The finding that participants tended to pick implied claims indicates that either they were trying to prove they were not 'tricked', or their recall was vague and they believed that the claims would have been presented in implied form. Weighing against the hypothesis

that recollection was imperfect is the finding that, in roughly 70% of cases, participants could recognise the form they had been shown. The studies Harris reports used only assertion form paraphrases in the test set. There is no indication that implication paraphrases were ever included.

1.7.18 Possible modifications to the truthfulness testing methodology

It would seem useful to give further examination to whether the methodology might produce biased responses. Examination of the possibility of a schema effect upon recognition and recall might clarify the findings. Testing recognition with paraphrases of both asserted and implied versions, with measures of reasons given for selections, would test schematic biases. Another aspect that might benefit from further work is the scaling of the responses. Five point scales, consisting of segments labelled; false, probably false, indeterminate, probably true and true were used. Using a continuous scale would allow greater definition in the responses. Testing might also usefully avoid using the term truthful with advertising materials. In most of the studies reported, participants were requested to ignore their usual cynicism about advertising claims. They might instead be asked to pick the paraphrases that best match those shown previously. They could then rate them for accuracy and indicate their confidence of selecting correctly.

1.7.19 Variations on the truthfulness methodology

The methodology has been used with variations, exploring factors that may have significantly altered the findings. Mady and Newman (1987) used auditory and visual presentation modes as independent factors and tested for any effect of repetition. They used a balanced design, where participants received half the stimuli in assertion form and half in implication form. Those shown in assertion form on one list, were shown in implication form on the other. Results with auditory presentation showed that assertions were rated significantly more truthful by those given assertion stimuli. Repetition was tested by playing the stimulus tape again directly after testing. The effect of repetition was not significant, but again, there were significantly more 'true' responses from those shown assertion stimuli. Presenting the stimuli visually showed

that the assertions were again given significantly higher truthfulness ratings and that the effect increased significantly upon repetition.

Rebok, Montaglione and Bendlin (1988) looked for potential effects of age and training. Participants in the older age group were three times the age of those in the younger group (72 versus 21 years mean age). The responses included reading times, response times and confidence ratings of making correct responses. Reading times were significantly longer with the older age group, but there was no significant difference between claim types. Both younger and older groups were significantly more confident in responding to implied claims. There was a significant effect of training. Those given training in how to recognise the difference gave significantly lower truth ratings to implied stimuli.

Searleman and Carter (1988) tested the effectiveness of different types of implications. The only difference found was that the comparative adjective without qualifier was less effective than the other types. One example of a comparative adjective without qualifier was 'Lacklustre Floor Polish gives a floor a brighter shine'. The other types of implication used were: juxtaposed imperative statements e.g. 'Get a good nights sleep. Buy Dreamon Sleeping Pills'; hedge words including 'Ty-One-On pain reliever *may* help get rid of those morning-after headaches'; piecemeal reporting of survey results, including 'John Doe Jeans are available in more colours than Gloria Vanderbilt's, are more sleekly styled than Sergio Valenti's and are less expensive than Cheryl Tiegs'.

1.7.20 Sentence recognition theory

Ideally, a single theory could account for the perception that implied claims were no different from those asserted and inference processes lead to asserted information recollected as having been implied. Kintsch, Welsch, Schmalhofer and Zimny (1990) present such a theory and it accounts for findings related to syntactic, propositional and experiential levels of sentence recollection. Kintsch et al.'s theoretical model incorporates many aspects of previous work on list learning and text comprehension.

1.7.21 Syntactic, textbase and situational model levels

Three levels of representation are required for discourse recognition, namely syntax, textbase and prior knowledge. The syntactic level separates the surface form of the sentence (the grammatical structure). A textbase level, although determined by the syntactic elements, can exist in the abstract form of the semantic content expressed by those elements. A proposition can be expressed with multiple syntactic forms. The textbase level therefore represents all the meaning-preserving paraphrases of a sentence. A situational model refers to the experiential knowledge of the reader. Due to knowledge differences one person may comprehend a sentence differently from another. There may be a fuller understanding because of superior knowledge and this difference is represented at the level of the situational model. Situational models are analogous to mental models and schemata because they postulate comprehension processes moulded by personal experience.

Different forms of phrasing in presentation and recognition can be analysed at each level of the model. When the sentence to be recognised is a verbatim representation, there is a perfect match available at syntactic, propositional and situational model levels. When a paraphrased test statement is used, textbase and situational model levels will be represented, with correspondence absent at the syntactic level. A test item that represents what could be inferred from the stimulus sentence would only be represented in the situational model.

1.7.22 Recognition and cognitive representation levels

The theory indicates that over increasing time delay, recognition should increase for paraphrase and inference items and remain at a static level with verbatim items (see Figure 9). Rising recognition responses for paraphrase and inference items should occur due to the relatively decreased retention of the syntactic representation. At the situational model level the memory trace remains relatively constant (see Figure 10).

Therefore, shortly after reading some label marketing information any memory trace of the wording will quickly decay.

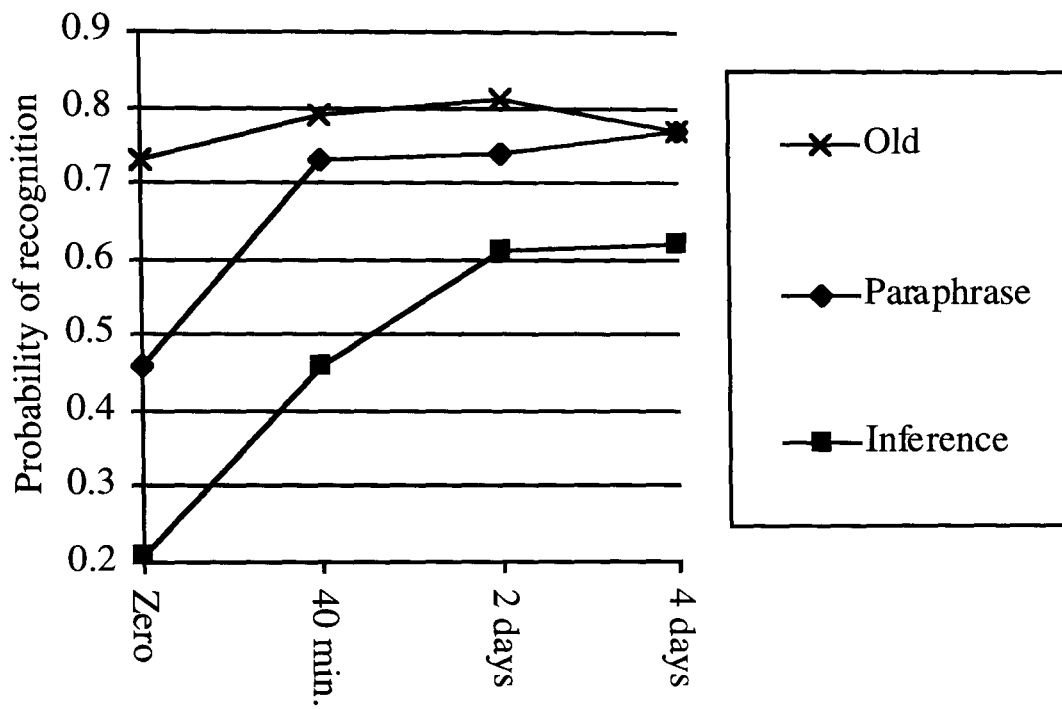


Figure 9 The probability of recognition of sentences as a function of test delay (adapted from Kintsch et al., 1990)

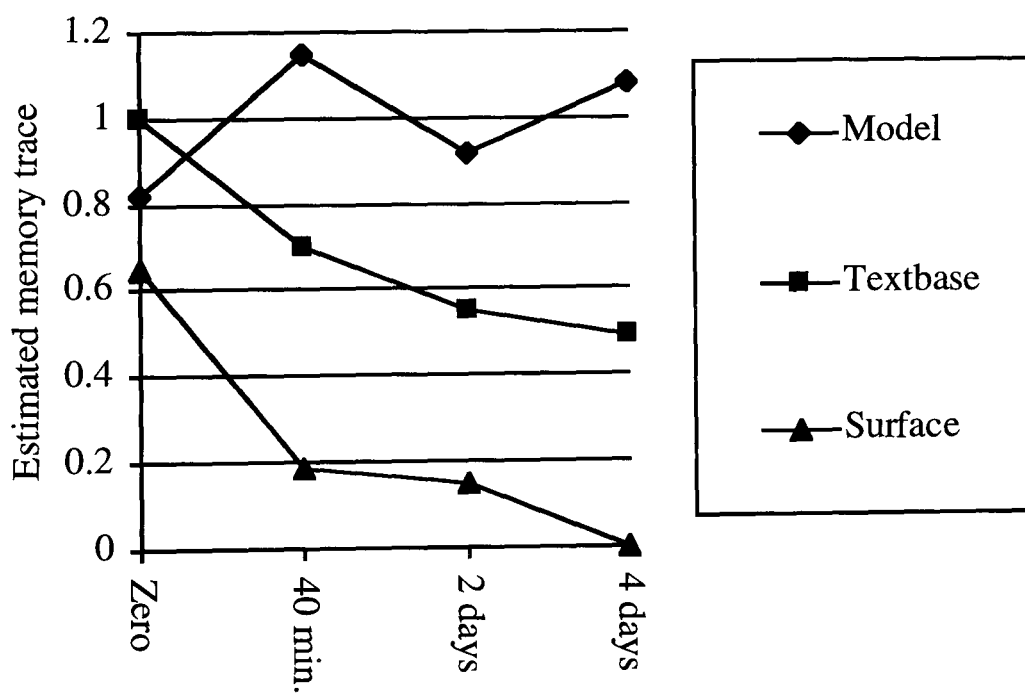


Figure 10 Estimated memory trace as a function of test delay (adapted from Kintsch et al., 1990)

The meanings held by what was said will be retained longer, but the final memory trace will be amalgamated with similar memories. After several days, any recollection of the information will be more from what would be inferred would have been said, than from recall derived from the memory trace.

Kintsch et al. propose that test sentences will be matched against all available memory traces and differ from earlier theorists in this respect. Previously, input was presumed to be matched only against the specific memory trace. Their model uses dumb rules that try to match the input against all available representations. The contradictory matches produced are resolved among the three levels by interactive activation and inhibition processes. The correct interpretation of a word depends on the matching context being available in memory to disambiguate the meaning. Increasing activation for one meaning inhibits activation of alternatives at all levels in the model.

1.7.23 Testing the three levels of representation theory

Effects at the situational model level are not easily predictable because of individual differences and therefore Zimny (1987) used scripted norms for the test items in paraphrase and inference forms. In recognition testing, contextually appropriate or unrelated sentences were included to act as baselines. With testing that ranged from immediate to four days delay, responses showed rising recognition for paraphrase and inference sentences and only a slight increase for verbatim sentences. Differences in the strengths of the responses at each level were compared and revealed decaying syntactic and textbase traces and relative stability at the situational model level.

Zimny's results were used to assess the values and connection pattern of a spreading activation model of the recognition process. Running the model showed that the surface and textbase level elements were relatively sparsely activated in comparison to activation at the situational model level. The activation levels and speed of rise to asymptote were used to test the hypothesis that those with higher knowledge levels would require longer to establish recognition than those without expert knowledge.

Two groups of programmers were tested on Lisp texts (Kintsch, Welsch, Schmalhofer and Zimny, 1990). One group of programmers was proficient in Lisp and the other in Pascal. The recognition times were recorded at six delays of 1.5 seconds increase each. Expert's and non-expert's recognition of verbatim sentences was identical. In recognition of inference test sentences, the proficient Lisp programmers showed steadily increasing confidence over the six steps. The Pascal programmers had an initially high confidence, followed by a decline.

A rising response rate from experts is support for the hypothesis they would be using the situational model level. Those with less knowledge may give an initially high response, but not subsequently be able to sustain this, because inference test sentences are only represented in the situational model. These results were tested with the spreading activation network. To represent their lack of expertise, links to the situational model level were set to zero for the Lisp novices. The output from the model was found to match the pattern in the experimental data.

Fletcher and Chrysler (1990) tested the validity of the theory in a series of experiments designed to ensure that changes in performance would not be attributable to differences in the materials used. Their exhaustive testing also fully supported the three levels.

1.7.24 The present experimentation on representation of information

The present experimentation replicated the implication truthfulness testing methodology, using implied claims taken from food products. A between-subject's design tested relative confidence of correct selection and paraphrase accuracy measures. This avoided the inherent incongruity of obtaining truthfulness measures about marketing information. The information presentation and data collection were made on computer.

Two other experiments used a modification of the truthfulness testing methodology. In these, verbatim phrases from both the asserted and non-asserted forms were displayed in the test set. Probabilistic claims were used in the non-asserted condition and these simply hedged claimed benefits by using phrases such as '...can or may help'.

Participants selected the phrases that matched the ones they had previously been shown and indicated the strategy they used to make their decisions. Members of the public additionally provided a brief written reason for each of their choices.

Two further experiments used implied rather than probabilistic statements in the implication condition and paraphrases of these implied claims in the test set (again, with both claim forms shown in the test set). The first compared intermediate term recall with testing directly following presentation of the stimuli as previously. The second tested long term recall of the stimuli (a seven day delay) and used a cover task so that subsequent testing was unexpected. These participants gave written definitions of the terms implication, assertion and paraphrase.

These results were compared with those of French members of public using the same design. The replication with French members of the public was used to clarify if strongly held British expectations, regarding the form of the claims, was due to schemata processes. It also provided a useful change of perspective.

Follow up testing of French and British samples were made using printed colour images of labels where all the text had been removed with photo-editing software. They were asked to pencil in this missing information. Content analysis was then made of the categories of information produced. This provided further comparison of their expectations about food label information.

Finally, a replication of the truthfulness testing method was made. This showed participants only the paraphrase of the assertion version and a filler in the test set. Participants had to rate the paraphrase they selected for accuracy and give a rating on their confidence of having selected the correct item. This was a cross-over design with half of the participants seeing the stimuli in the opposite claim condition to the other half. The design was partly within-subjects, as participants saw half their claims in implication and half in assertion form.

2. Relative Attention Levels Allocated to Nutrition and Marketing Information

This chapter is essentially as published (minus the introductory material) in the Journal of Economic Psychology (Corney, Shepherd, Hedderley & Nanayakkara, 1994).

2.1.1 Introduction

As described in section 1.4.14 on page 13, the experiments reported here measured the attention given to food label information. They allowed precise computer measurement of the time and sequence of information acquisition. The information was presented as part of simulated consumer decision tasks. They represent a major advance over previous studies. These used information in envelopes (Ruddell 1979), or mechanically obscured information (Jacoby, Chestnut and Silberman 1977; Jacoby, Szybillo and Busatso-Schach 1977).

The literature review clearly indicated that consumers value information provision highly. Omission of information can easily lead to a decision to buy an alternative brand. However, it also revealed low comprehension of numerically based information. People generally prefer to use an information sub-set than carefully compare details. They also tend to rely on brand names as inherent indicators of particular qualities. Therefore, it was anticipated that participants would pay more attention to the brands and claims than to the numeric nutritional information. The one aspect of numeric information that should receive relatively high attention being price. The literature also indicated that comparisons will be made by looking at information across, rather than within-brands. Put differently, they should tend to compare the claims on each brand rather than look at all the details on one brand before moving on to the next. Doing this significantly reduces memory loading during decision making.

2.1.2 Method

2.1.3 Participants

Three separate experiments were conducted. The first with thirty-one Food Science students. The second with 30 members of the public. The third, another sample of 20

members of the public. Each experiment contained approximately equal numbers of both sexes. People were paid £5.00 for participating. The experiments were described to them as a computer based analysis of ‘...how people process food label information’.

2.1.4 Procedure and Materials

The materials and procedure were almost identical for each of the three experiments. Stimuli were presented on an IBM compatible PC using a program (see Appendices Attention to information program code example in the Appendices on page 147) created by the author in the Mouselab programming language (Johnson, Payne, Schkade and Bettman, 1986). This allows computer screen presentation of information in a matrix of boxes. These boxes are closed initially and the information obscured. The participant moves the cursor around the computer screen using the mouse. When the cursor enters a box it opens until the cursor is moved out again. In this way, one piece of information can be accessed at a time. The time each box was open and the sequence of opening boxes was recorded by the computer.

All participants received the same set of stimuli. These consisted of information on 15 types of food products: orange juices, malt beverages, cheeses, jams, tinned vegetables, cooked packed ham, milks, rolls, packed cakes, pastas, tinned fish, tinned soup, tinned fruit, margarine and loaves of bread. For each product, the screen displayed a matrix comprising four columns, each with an example of that food type. There were seven rows of information on brand, claim, price, fat, carbohydrate, protein and energy (see Figure 11 and Figure 12). The type of product (e.g. orange juice) was constantly displayed at the top of each column, along with the label A, B, C or D. At the bottom of each screen there was a row of boxes with which to indicate a choice. These were labelled with the question ‘Which brand would you buy?’

As an example, one of the orange juices had ‘Asda’ for brand, ‘no additives’ for claim, ‘72p’ for price, ‘trace’ for fat, ‘9.6 g’ for carbohydrate, ‘0.6 g’ for protein, and ‘38 kcal’ for energy.

	Fruit cock'A	Fruit cock'B	Fruit cock'C	Fruit cock'D
Brand		Del Monte +		
Claim				
Price				
Fat				
Carbohydrate				
Protein				
Energy				

Choose one: Which brand would you buy?

Figure 11 An example screen of information as the participant would view it during the experiment. The mouse pointer has opened the brand box for fruit cocktail B

	Fruit cock'A	Fruit cock'B	Fruit cock'C	Fruit cock'D
Brand	Del Monte	Del Monte	Asda	Asda
Claim	Fruit juice	Syrup	Quality	No sugar added
Price	58 p	52 p	44 p	42 p
Fat	0.1 g	0.1 g	Trace	Trace
Carbohydrate	12.5 g	18.0 g	17.0 g	12.0 g
Protein	0.4 g	0.4 g	0.3 g	0.3 g
Energy	49 kcal	70 kcal	65 kcal	46 kcal

Choose one: Which brand would you buy?

Figure 12 A screen where all the boxes were locked open (for illustration purposes only as participants could only open a single box at a time)

Claim information was generally nutrition related, health related, or referred to some aspect of quality. A nutrition claim could be 'half the fat', a health claim might be 'healthier' and a quality claim 'quality selection'. All product information was transcribed from product labels found in a large local supermarket. A matrix cell was left blank if that particular pack did not contain the information.

Participants were first presented with a practice screen. The presentation order of the products was randomised for each participant. Half of the participants received the information in the order above (that is with brand at the top) and the other half with it reversed. That is, with energy at the top followed by protein, carbohydrate, fat, price, claim and brand.

2.1.5 Design

The design included one between-subject factor of format, with 2 levels (brand at top versus brand at bottom), and two within-subject factors of information type (7 levels) and column (4 levels). There were fifteen products. These were blocked in the analyses since examining product differences was not an objective of the research. The four brands on each screen differed across the products.

The main dependent variable was the time each box was open. Some boxes had multiple entries because participants were free to access each box as often as they wished. In these cases, the total time (for that participant for that product and alternative) was calculated and used in the data analysis. The second variable measured was the number of times each box was visited. For any box that was not visited the time and the number of visits was treated as zero.

2.1.6 Instructions

Participants were given a typed sheet that contained the following information:

'The experiment requires that you select a product from a choice of 4, shown on each screen displayed by the computer program. When you move the mouse pointer, boxes covering up the product details will temporarily open enabling you to read the information they contain.'

When you have made your choice you click on the relevant selection box at the bottom of the display. Having made a selection a fresh screen of products appears. This process is repeated a total of 15 times.

Before the actual trial you will have the opportunity to use a practice screen to see what is required.'

The twenty participants in experiment three were also given a printed sheet requesting that they record the reasons for their choices. They were allowed to record more than one reason for each choice. The computer program was modified to interleave a reminder after each screen of products. This told participants that they should record the reason for their choice on the sheet provided.

The average time spent on the task was about 40 minutes. Participants seemed relatively neutral about performing it. They did not appear to find it confusing or too difficult.

2.1.7 Data Analysis

The data from each experiment were analysed with analysis of variance (ANOVA). The dependent variables were the time each type of box was open and the numbers of times boxes were visited (both log transformed). There was one between-subject factor of format, with 2 levels (brand at top versus brand at bottom), and two within-subject factors of information type (7 levels) and column (4 levels). Differences between products was a blocking factor since these were not of interest (15 levels). Ninety-five per cent confidence intervals were calculated and used as the basis for testing least significant differences between means.

2.1.8 Results

There were highly significant main effects for information type and interactions between information type and format in each of the experiments (see Table 2). This was true for viewing times and number of visits. There was also a small effect of column in some analyses (see Table 2), with longer times and a higher number of box visits for the column on the left.

Table 2 F-ratios from ANOVA on the time spent inspecting different types of label information and the number of occasions each type of information was accessed (box visits).

Variable	Factors		
	Information (df = 6)	Information x Format (df = 6)	Column (df = 3)
<i>Experiment 1 (residual df = 12537)</i>			
Time	74.3 ***	54.4 ***	3.5 *
Box visits	87.0 ***	54.6 ***	4.0 **
<i>Experiment 2 (residual df = 12132)</i>			
Time	69.7 ***	52.6 ***	2.9 *
Box visits	66.7 ***	45.3 ***	1.9
<i>Experiment 3 (residual df = 8082)</i>			
Time	61.9 ***	20.3 ***	1.8
Box visits	64.6 ***	47.7 ***	1.7

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The mean times for each type of information are shown in Figure 13 through to Figure 18 and the mean numbers of box visits are shown in Figure 19 through to Figure 24. The means are shown separately for the condition with brand at the top of the display and with brand at the bottom of the display. There were highly significant interactions between information and format for all the measures.

With brand at the top of the display, brand and price, and to a lesser extent protein received the most attention. Claim on the other hand received relatively little. The pattern of results was very similar across the three experiments (Figure 13 through to Figure 18). The results are different when the order of information types is reversed. In this format, brand received far less attention and claim was reduced to the lowest level of attention. However, energy, protein and carbohydrate received more attention. Thus there is strong evidence for greater attention to those attributes presented at the top of the screen. Separate analyses investigating product differences showed relatively small effects compared to those reported. Since the products were not chosen systematically no details of these analyses are presented. There was no effect of blank cells. This does

not represent a complete test of the effect of missing information since there were few blank cells and they were not varied systematically. The stated selection reasons given by the twenty participants in experiment three were content analysed. Claim was the most frequently mentioned reason for selection of a brand. This had 190 mentions, followed by price with 90, fat with 80, brand with 50, energy with 23, protein with 11 and carbohydrate with seven.

Whether participants tended to look along the attribute rows or down the brand columns was analysed using the data from experiment three. This analysis only covered individual movements from cell to cell. More extended sequences were not investigated. By this measure, 36% of processing was found to be attribute based and 7% brand based. The remaining movements were across the diagonals.

2.1.9 Discussion

There was good replication of the results across the experiments (the ranking of times in particular, but also visits were practically identical). There were no differences between the Food Science students and the members of the public. This is despite their likely knowledge differences. This might be due to a tendency not to generalise use of expertise, or that they had the same priorities and these were unaffected by nutrition knowledge.

The highly significant interaction between information type and the format of presentation makes the results somewhat difficult to interpret. However, it can be argued that the interaction between attribute and screen position is only to be expected. Brand, claim and price are usually the most prominent items of information on a product, while nutrition information is normally relatively concealed at the side or back of the pack. Reversing the order of attribute listing produced a condition that is discordant with people's everyday experience and may therefore produce results with less relevance for real behaviour.

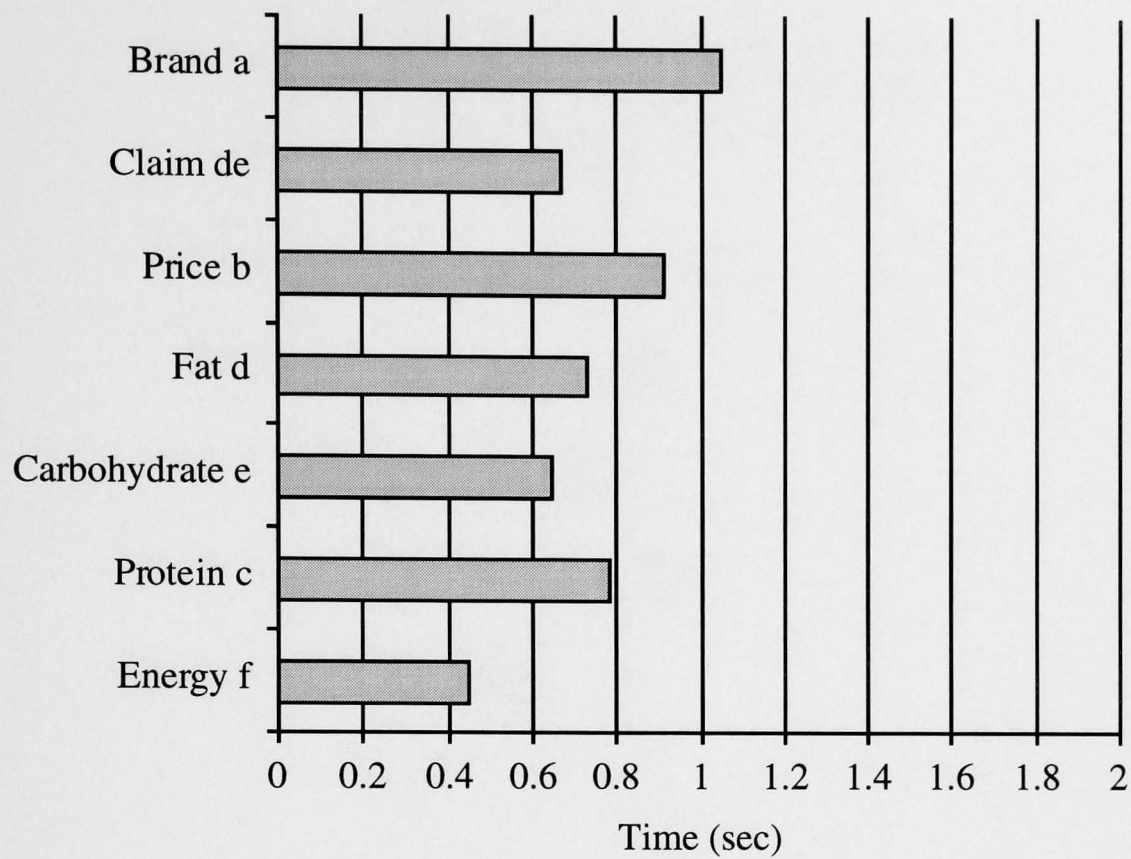


Figure 13 Means of time (sec) spent inspecting information with brand at the top of the display in experiment one. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (see below).

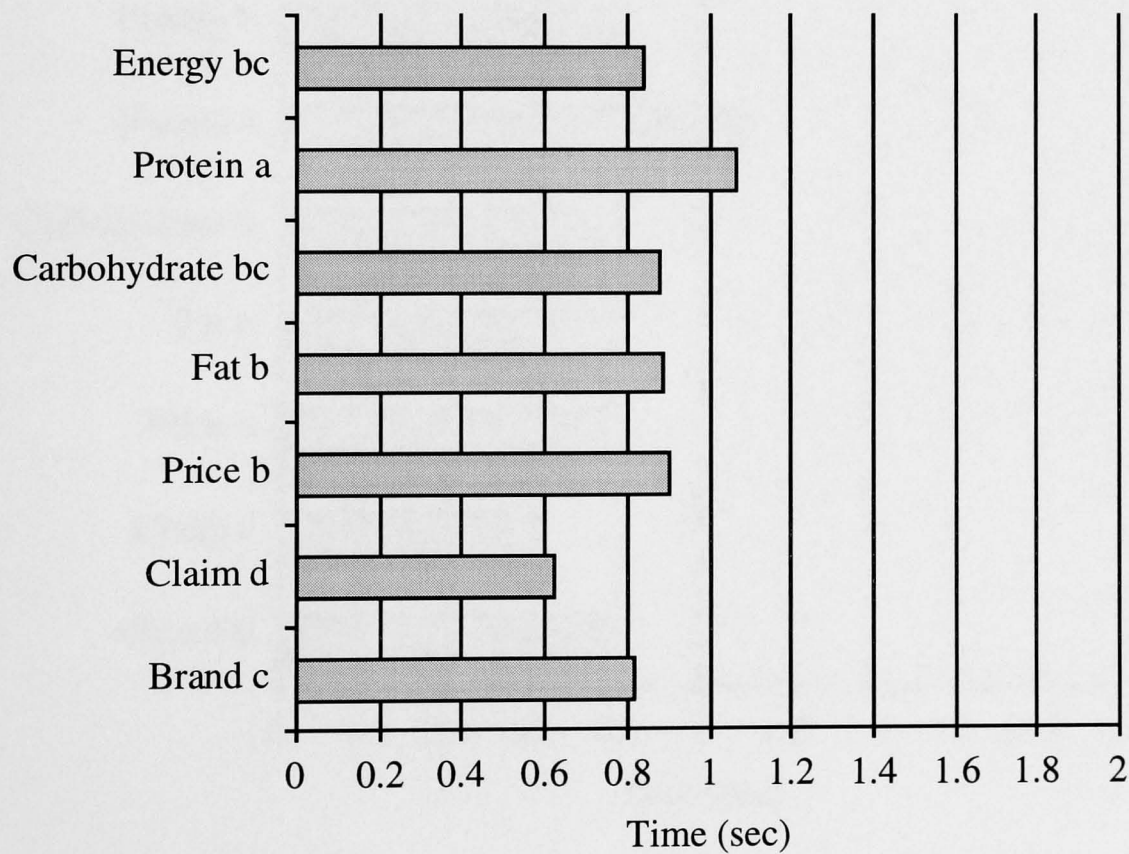


Figure 14 Means of time (sec) spent inspecting information with energy at the top of the display in experiment one. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (see above).

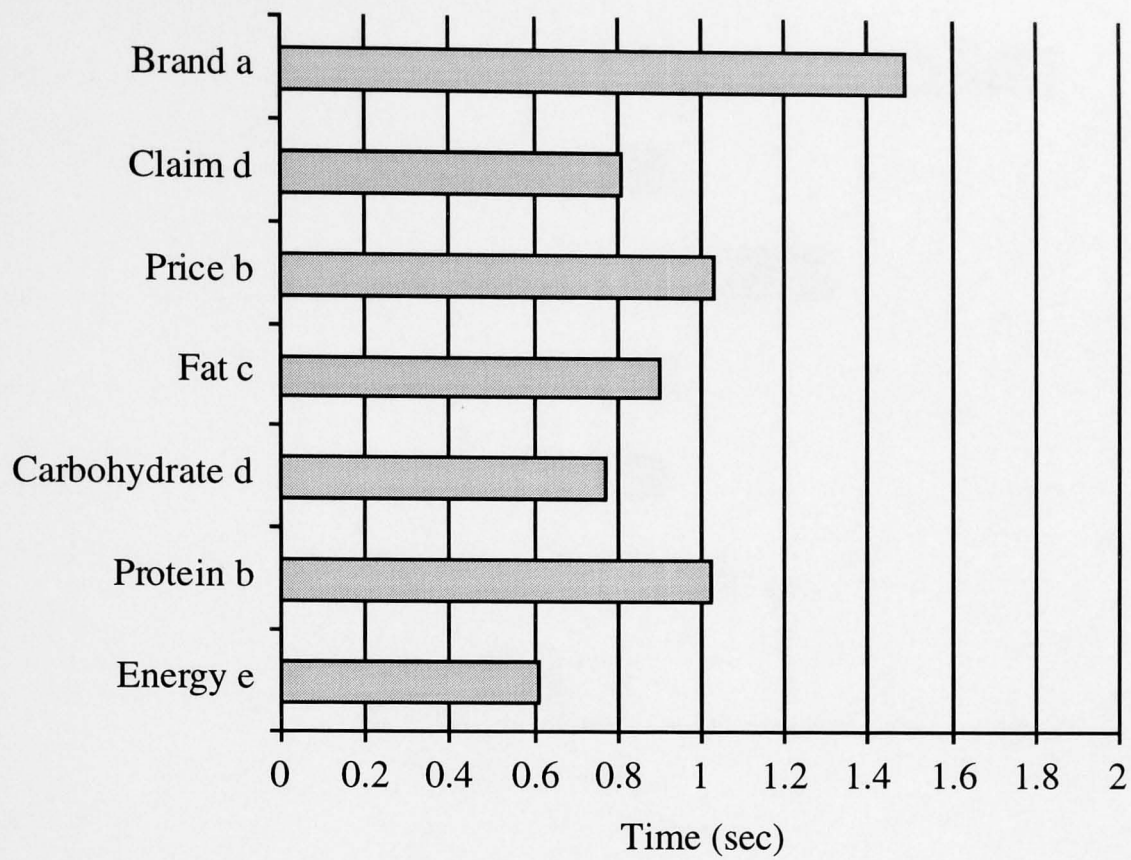


Figure 15 Means of time (sec) spent inspecting information with brand at the top of the display in experiment two. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (see below).

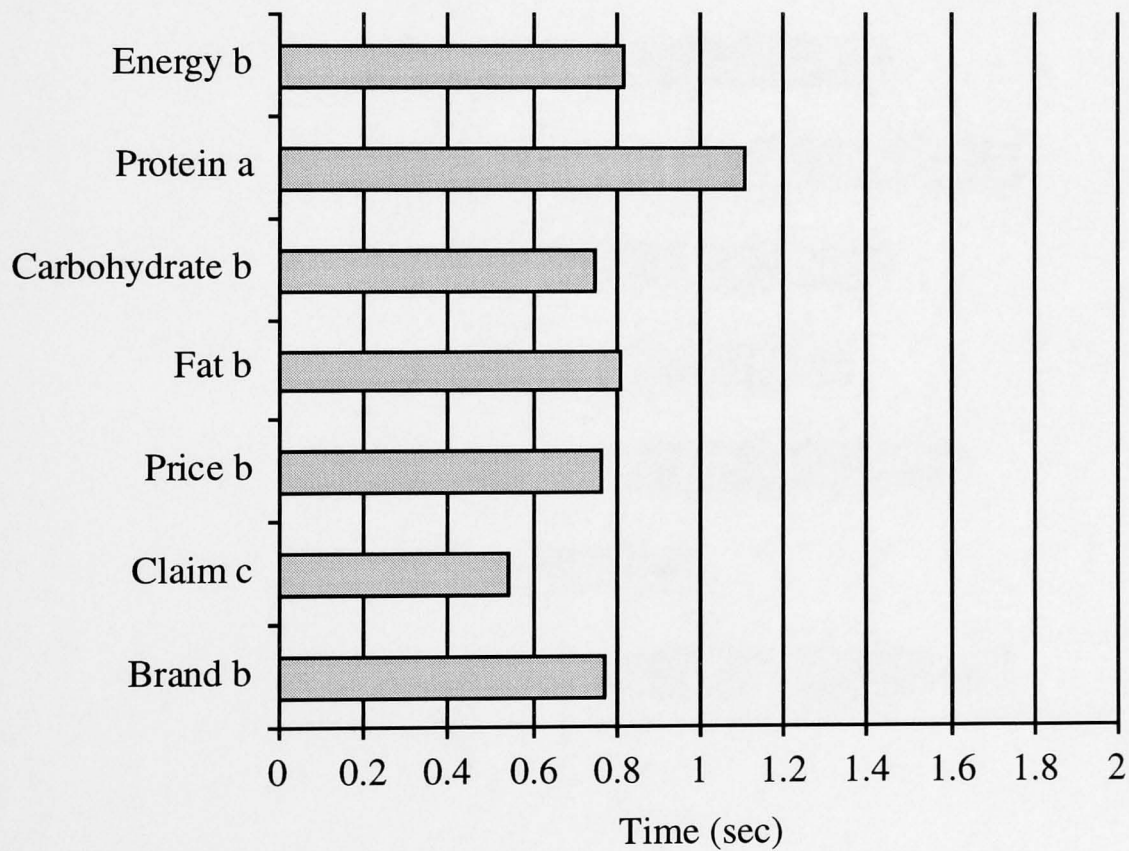


Figure 16 Means of time (sec) spent inspecting information with energy at the top of the display in experiment two. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (see above).

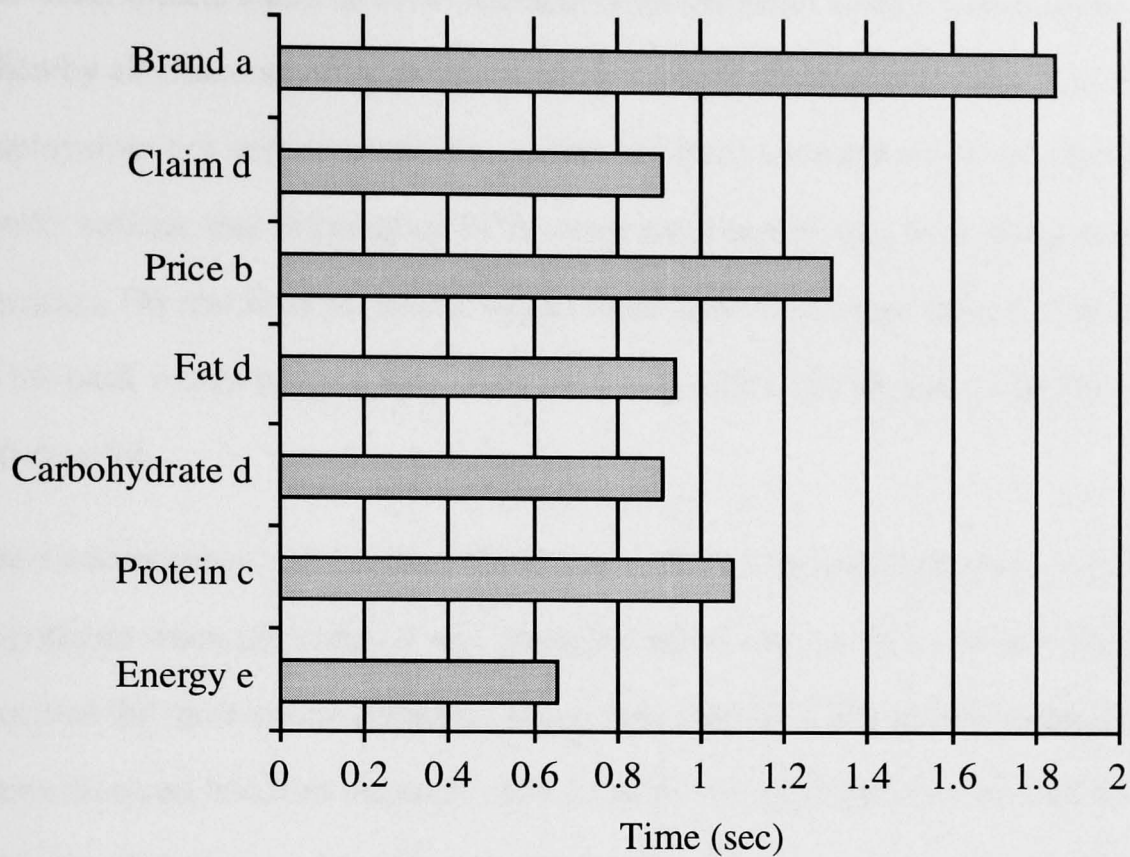


Figure 17 Means of time (sec) spent inspecting information with brand at the top of the display in experiment three. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (see below).

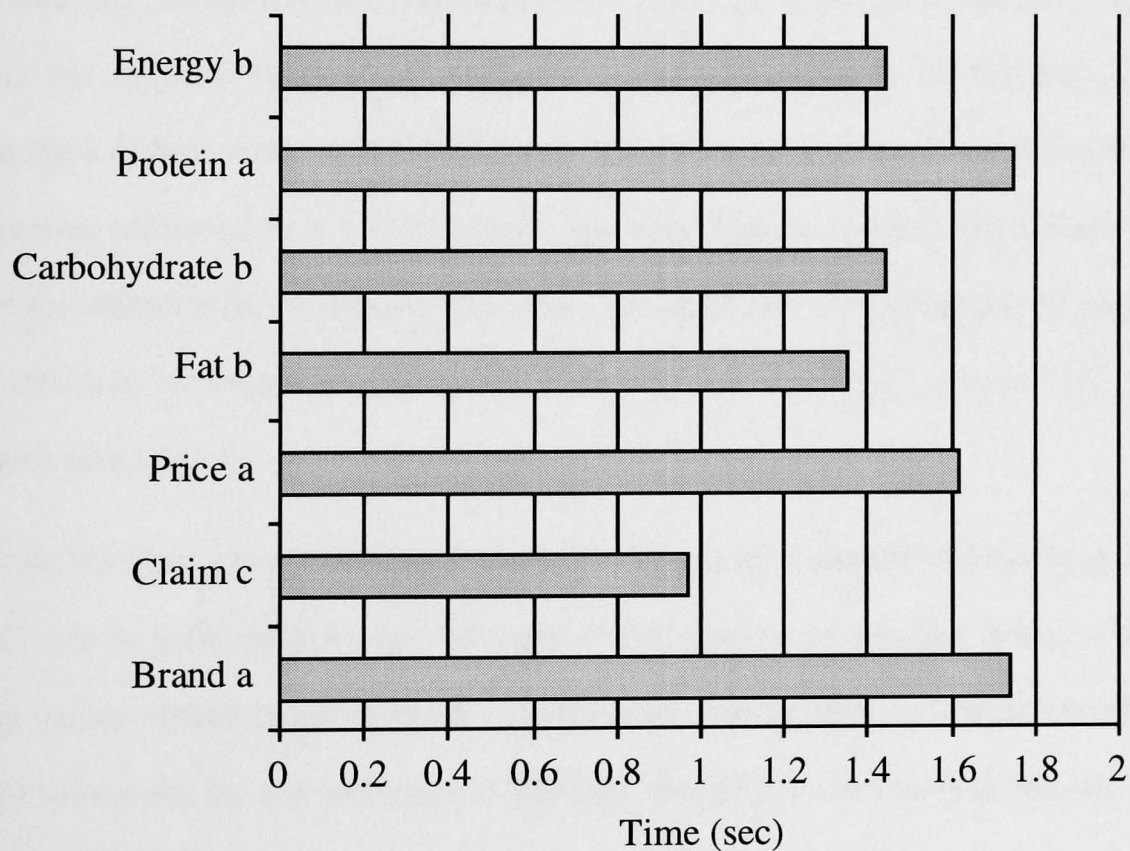


Figure 18 Means of time (sec) spent inspecting information with energy at the top of the display in experiment three. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (see above).

The order effects could be more adequately investigated using a Latin square design whereby all elements of information occupy one of the available positions. Although the display does not seek to mimic the format of information provision on a label, the results indicate that information in the most prominent positions is likely to receive most attention. On real food packs this would mean that commercial information on the front of the pack would be used more than the less prominently displayed nutrition information.

The viewing times and number of box visits offered limited confirmation of the hypothesis when the material was presented in the normal order. Brand and price received the most visual attention (along with nutrition information on protein), but claim received less than expected. The number of box visits confirmed these findings with brand at the top of the display. The results for brand and price are analogous with those from previous studies (for example Jacoby, Chestnut and Silberman 1977; Jacoby, Szybillo and Busatso-Schach 1977; Heroux, Laroche and McGown 1988). In general the commercial information (brand, price and claim) received more attention than the nutrition information. In Figure 13 through to Figure 24, the times and numbers of box visits were significantly higher for the commercial information than nutrition information in 57 of the post-hoc tests. They were only significantly higher for the nutrition information on 41 tests. This confirms the hypothesis of greater attention to commercial information. However, this is mainly for brand and price, not claim information.

While the time spent accessing information is one measure of attribute importance, it will also be influenced by the difficulty of information processing. It might be expected that claims would be much easier to understand than quantitative nutrition information. One reason for the use of claims is that they should provide easily accessible selling points. But, where a claim is ambiguous or difficult to believe, an increase in inspection time for its related quantitative information might be expected. For example, inspecting nutrition information on fat because of an unlikely low fat claim. Numeric information

has been reported as relatively disliked in comparison to verbal attribute descriptions (Jarvenpaa 1989) and this may reflect greater difficulty in processing numerical information.

Although ease of processing might account for the low times for claims, the same argument could also be made for brand. This is also a simple and most likely highly memorable word or phrase. However, it has been argued that the use of brand is more as an identifier or 'chunk' of information (Jacoby, Szybillo and Busatso-Schach 1977). It may be used to represent many of the attributes of the product. If this is correct participants would tend to return to the brand information as they gathered up other forms of information. The finding of longer times and greater numbers of visits for brand with the normal ordering of the material supports this interpretation. The effect was reduced by the reversal of information order. Nonetheless, the brand information still maintained an average level of attention.

An alternative measure of the importance of the types of information are stated reasons for choices and the results for these are very different from the visual attention times. Both types of measure may have limitations. The measures of attention time are affected by difficulty of comprehension and the limitations of short term memory. However, the introspective measures may not reflect the true reasons for choice, since participants might not be aware of the most important reasons for their choices.

It seems unlikely that an attribute would score highly on reported saliency and visual attention and not be a genuinely important decision factor. A high salience score and low visual attention could indicate ease of comprehension, or that the introspective measures lack validity. Conversely a high visual attention and low salience could reveal difficulty of comprehension, or a lack of validity of the introspective reports. This might interact with product knowledge or experience. Thus with high product knowledge a salient attribute might receive low inspection time. Low product or brand knowledge may result in high visual inspection, even of attributes with low saliency.

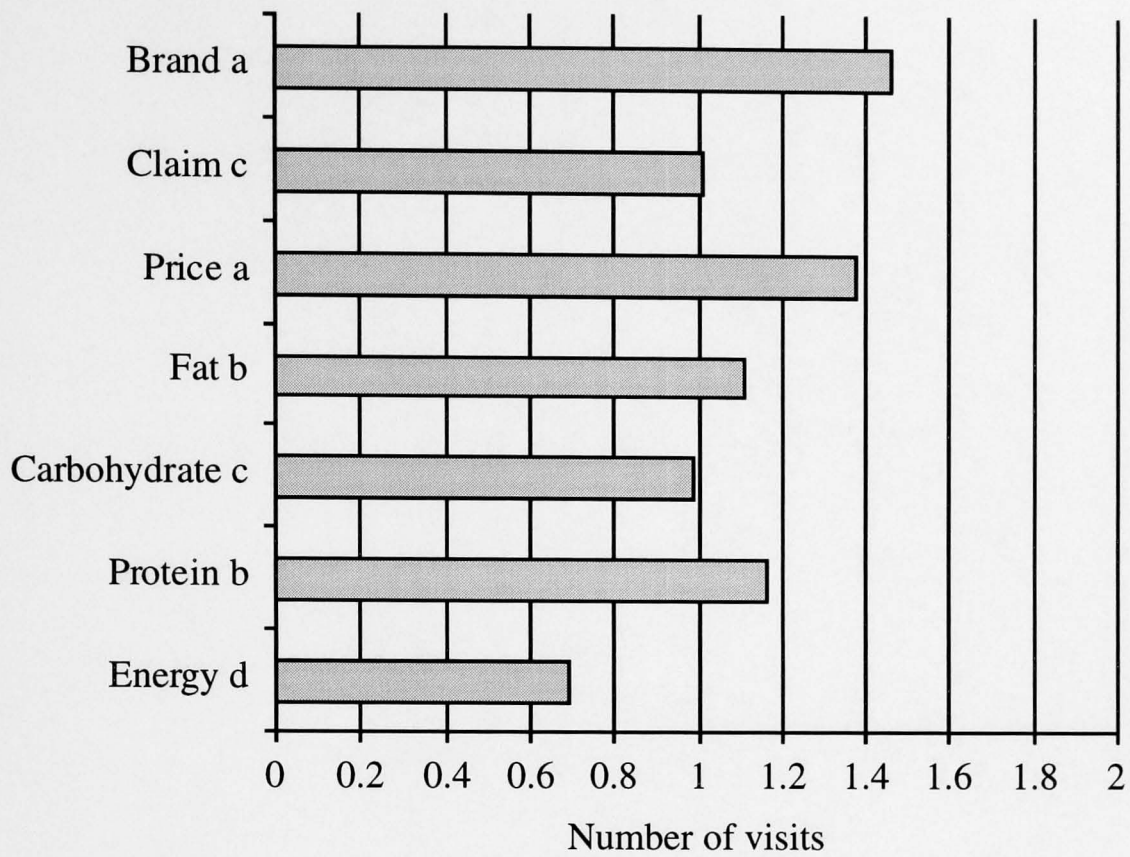


Figure 19 Mean number of box visits spent inspecting information with brand at the top of the display in experiment one. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (below).

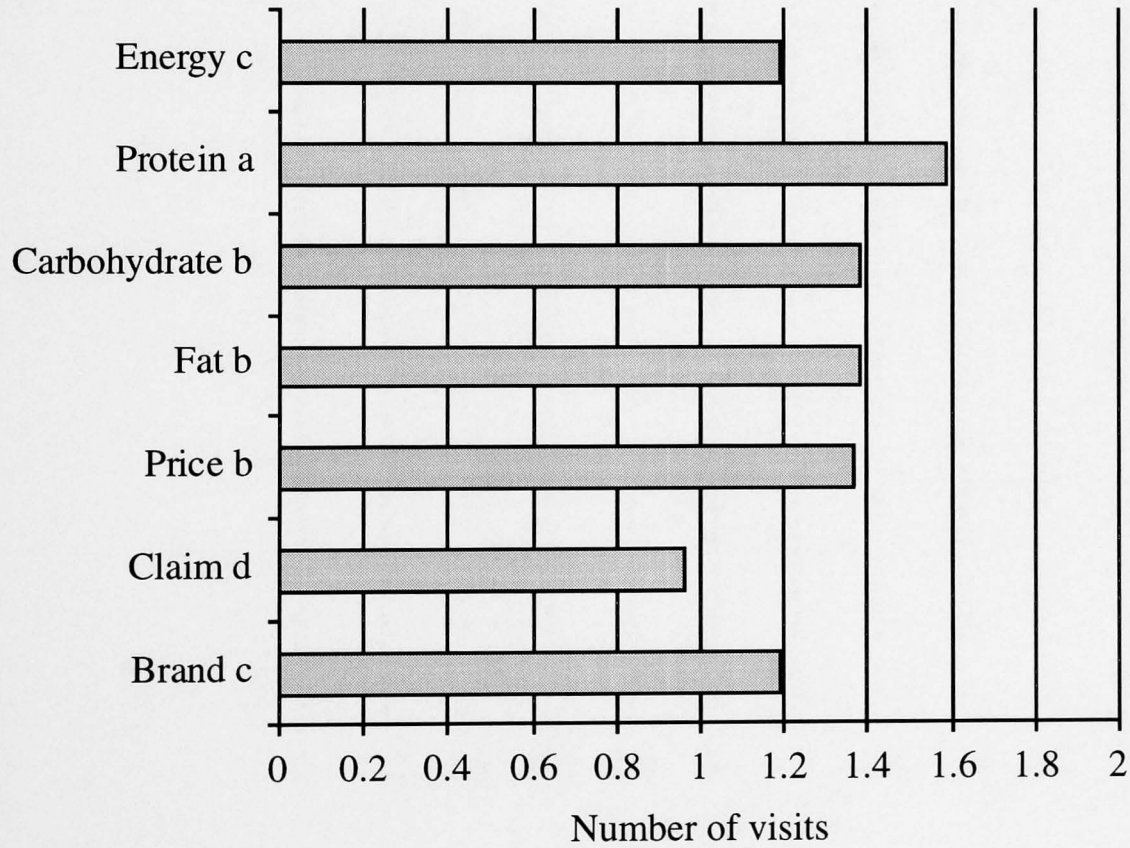


Figure 20 Mean number of box visits spent inspecting information with energy at the top of the display in experiment one. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (above).

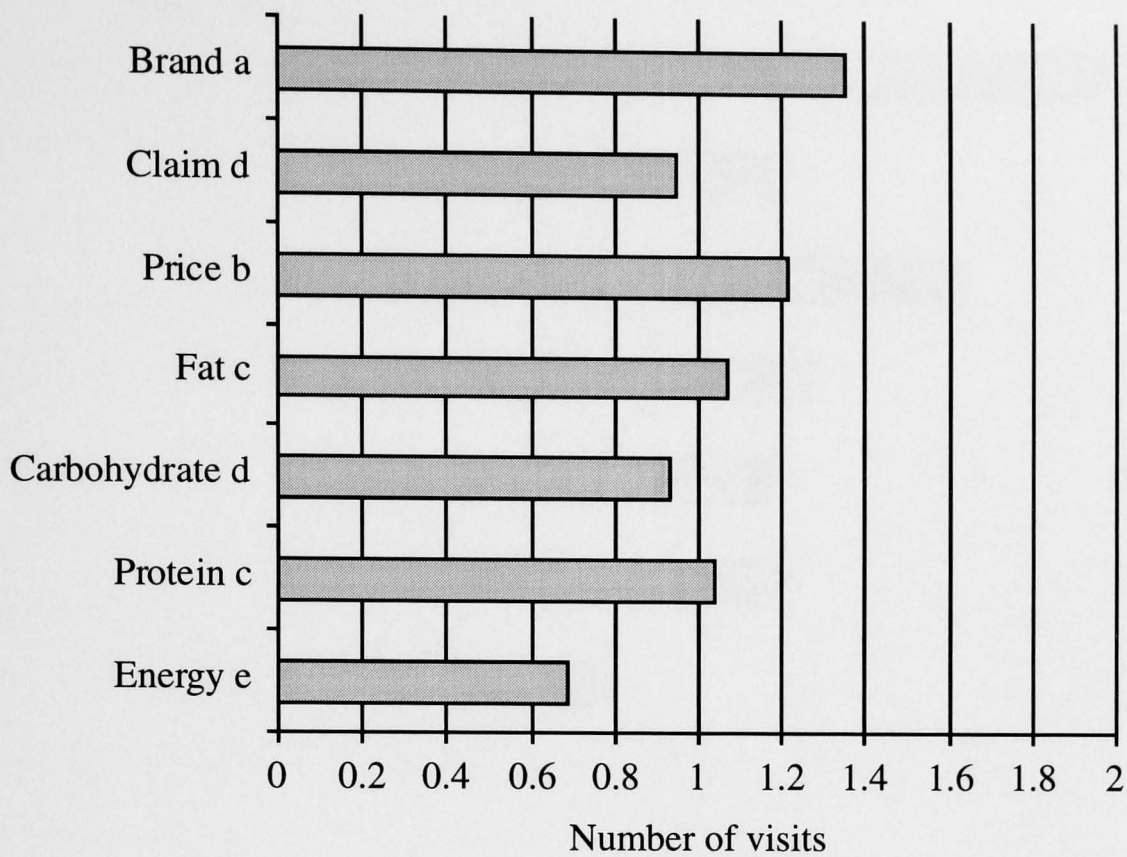


Figure 21 Mean number of box visits spent inspecting information with brand at the top of the display in experiment two. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (below).

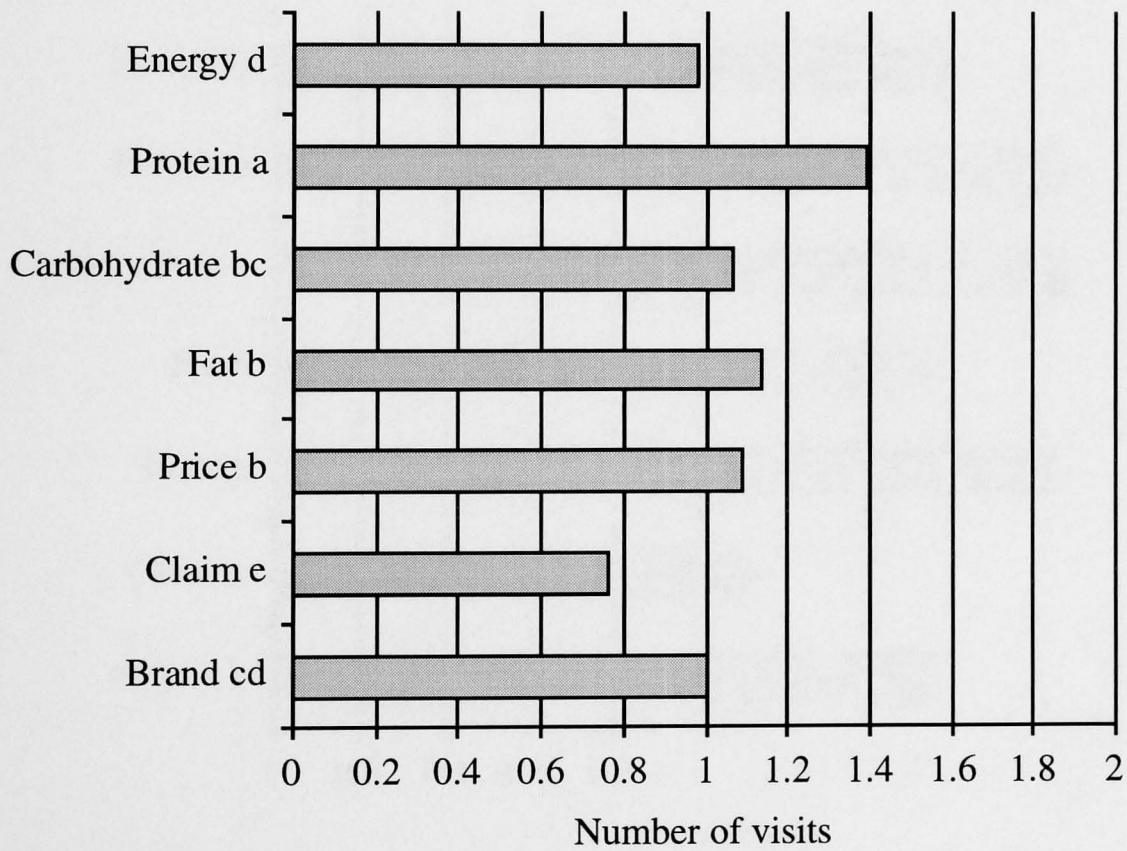


Figure 22 Mean number of box visits spent inspecting information with energy at the top of the display in experiment two. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (above).

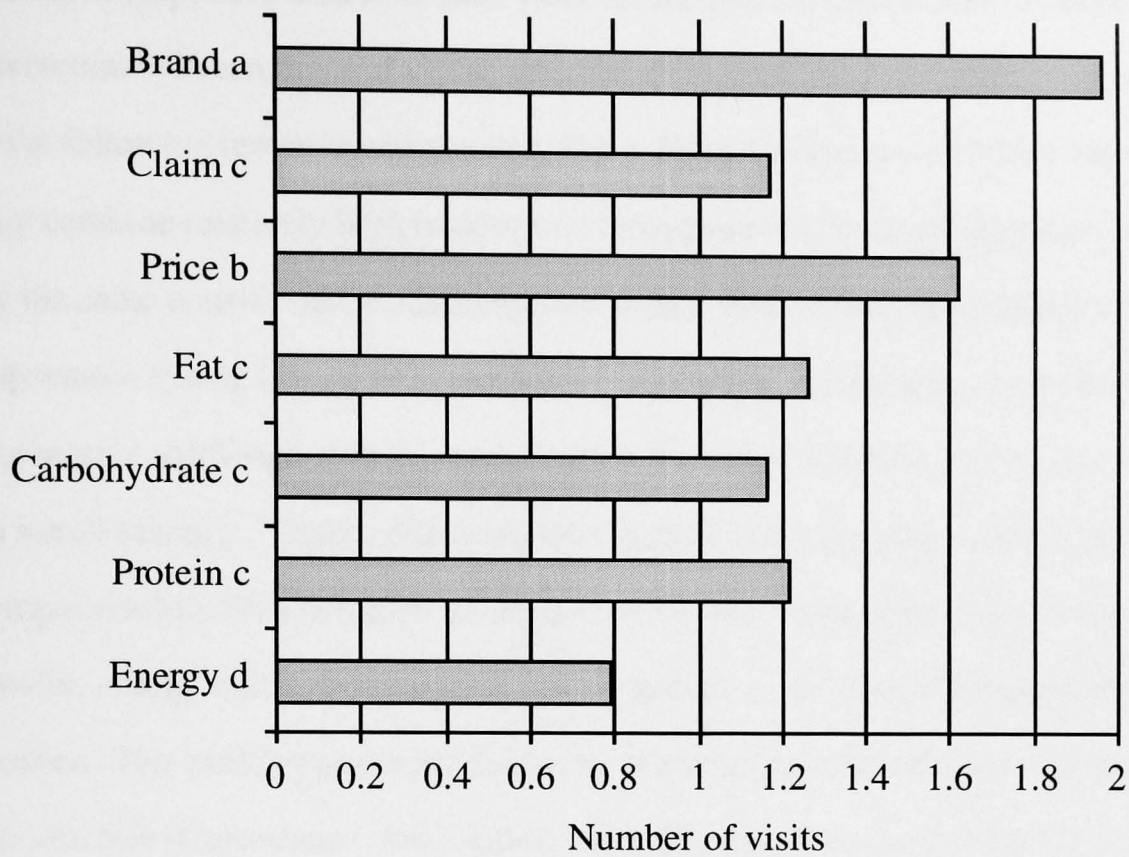


Figure 23 Mean number of box visits spent inspecting information with brand at the top of the display in experiment three. A common superscript denotes no significant difference in post-hoc tests with brand at the top of the display or with the order reversed (below).

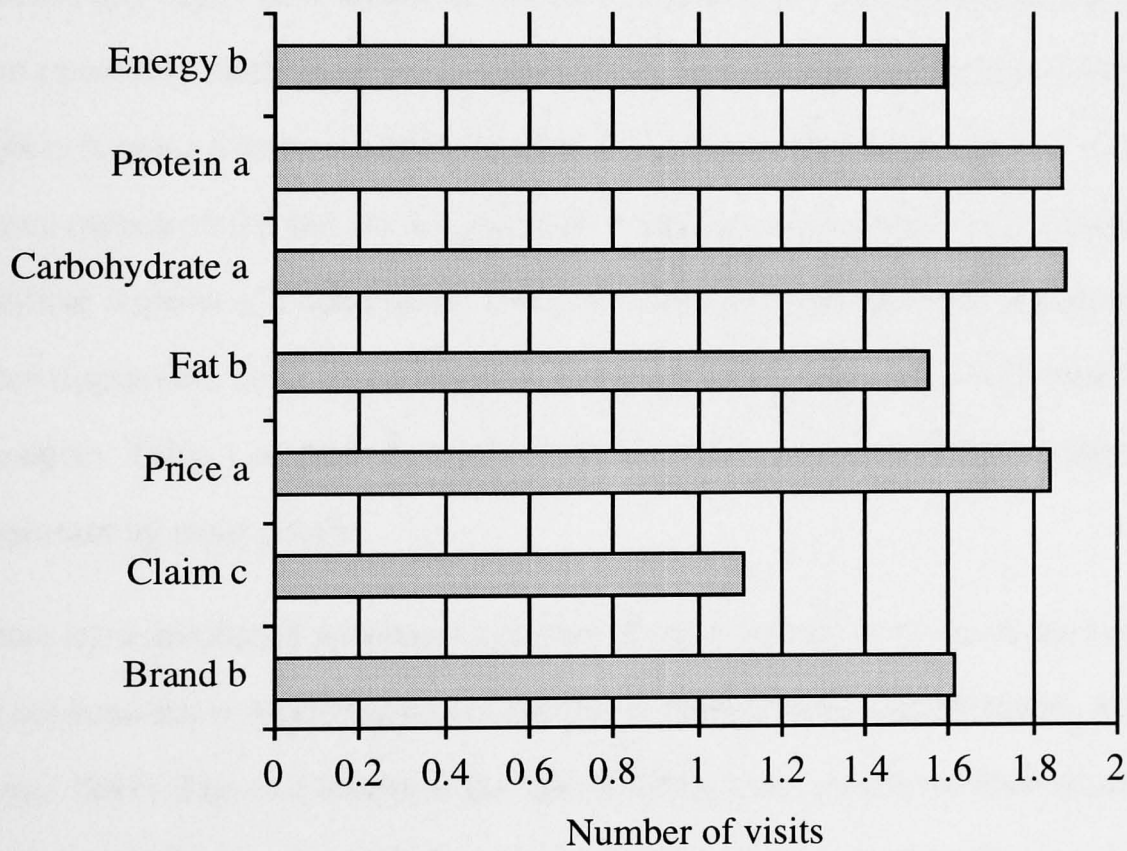


Figure 24 Mean number of box visits spent inspecting information with energy at the top of the display in experiment three. A common superscript denotes no significant difference in post-hoc tests with energy at the top of the display or with the order reversed (above).

Taking introspective data as at least valid for the general direction of importance and the interaction between this and visual attention an indication of comprehension ease leads to the following tentative conclusions. Price, fat and brand are definitely salient, since they combine relatively high rankings on introspective and visual attention measures. By the same considerations, carbohydrate would rank as having genuinely low importance (being low on both measures) and energy and protein a mid-range importance. Although protein scored highly for visual attention, it was second lowest on stated saliency. Finally, claim can be regarded as having high salience and ease of comprehension. So a complete ranking of importance would be price, brand, fat, protein, energy and carbohydrate. Claim would be at, or near, the highest ranked position. This ranking corresponds closely with the literature reviewed in the introduction (Consumers' Association 1985; Heroux, Laroche and McGown 1988; Zaichkowsky and Sadlowsky 1991).

The results for nutrition information on protein are difficult to interpret. It received consistently high visual attention, but the stated saliency was next to the lowest. It is also intuitively likely to be less important than some of the other nutrition information. This is because nutrition guidelines tend to emphasise fat and energy and to a lesser extent carbohydrate, but are not generally concerned with protein (e.g. Committee on Medical Aspects of Food Policy, 1984). It is unlikely that the types of products used were responsible since these were not foods especially associated with protein. However, Table 1 on page 6 clearly shows that protein is generally considered important by most people.

There are a number of potential criticisms of these experiments. Some are common to all applications or modifications of the display board technique (Bettman, Johnson and Payne 1991). The first relates to the system being more structured than normal consumer decision making. Balanced against this the system did allow equal prominence to different forms of information usually given very different amounts of package space and emphasis. An advantage was the inclusion of supplementary

measures of the stated reasons for choices. However, future research should include ratings of the importance of the attributes in making choices, rather than simply asking which were most important. Measures of product knowledge or experience should also provide useful data. The procedure may have had the effect of implying that participants should use all the information available. However, although they may have used more information than usual, they would still pay greater attention to salient than to non-salient information.

The results from the analysis of processing pattern were of subsidiary interest, but did show the expected predominance of processing by attribute (Payne, Johnson and Bettman 1988). However, the present format may have favoured this type of processing when compared with more natural situations.

2.1.10 Conclusions

This ranking of attention allocation is in agreement with previous questionnaire and interview based studies. The results reveal the danger of relying purely on analysis of visual inspection times as a satisfactory indicator of information salience. Claim information received significantly less visual inspection time than most of the other information. Yet based upon self-reported reasons for choice claims are one of the most important attributes.

3. Attitudinal Influences Resulting from the Display of Health and Nutrition Claims

From section 3.2 on page 76, this chapter is essentially as published (minus the introductory material) in *Creative Applications: Sensory Techniques Used in Conducting Packaging Research with Consumers*, (Corney, Issanchou, Shepherd, Griffin, Nanayakkara & Daillant, 1996).

3.1 Computer based attitude elicitation

3.1.1 Establishing commonly used evaluative attributes

In the introduction (see pages 12 and 14 to 15) several studies were quoted showing that graphical packaging elements can influence attribute assessments. They also contribute to the formation of the general attitude toward the product. Cognitive and affective dimensions of attitudes were reviewed and these were shown to have separate influences upon attitude. The cognitive component being more likely to be derived from the textual information and the affective component from the graphical material. In view of these findings, the pilot study adopted an approach that examined these types of information separately as well as in combination. It used images of food packaging with textual and graphical information present, or with only the textual or graphical details.

The main experiments used attribute measures that were found to be salient to participants in the pilot study. The pilot study collected free response data on attributes participants felt were applicable to products shown to them. Frequency analysis of the data was then used to select the most salient attributes. By collecting free responses, rather than using a pre-determined list, it was hoped that measures in the main experiments would be well focussed.

3.1.2 Method

3.1.3 Participants

Seventeen members of the Institute of Food Research, some from the Consumer Sciences department, but most from other departments and 31 members of the public

took part. Members of the public were paid £5.00 for participating, institute staff co-operated on a voluntary basis.

3.1.4 Materials

Seven products were shown that were selected primarily because of their prominent use of health and nutrition claims: Kellogg's 'Common Sense', 'Crunchy Oat Bran', Jordan's 'Oat Bran Hearts' (breakfast cereals), Jordan's 'Oat Bran Bars', Sainsbury's 'Snax' (snack bars), Milupa 'Instant Dinner' (baby food) and Bird's 'Low Fat Custard' (there are four examples in the Appendices starting from page 153).

The front faces of the products were photographed using 35 mm transparency film. The resulting slides were then electronically scanned into Adobe Photoshop (Adobe Systems Inc. 1989-91) image manipulation software. This software was used to edit the images. When text was removed it was replaced by cloning from surrounding areas. When only text was shown, it was necessary to make whole of the rest of the front package face a mid-grey, to ensure the text was legible in all cases. See the three examples, Figure 25 through to Figure 27 on page 72.

The pictures were displayed one at a time on a SVGA screen running at 800 by 600 pixels resolution and 256 colours. They were reduced from actual size, ranging from 9 by 6 to 12 by 9 centimetres. The reduction in scale was the same for each package. The pictures appeared fairly sharply detailed, but not to photorealistic standards (text continues on page 73).

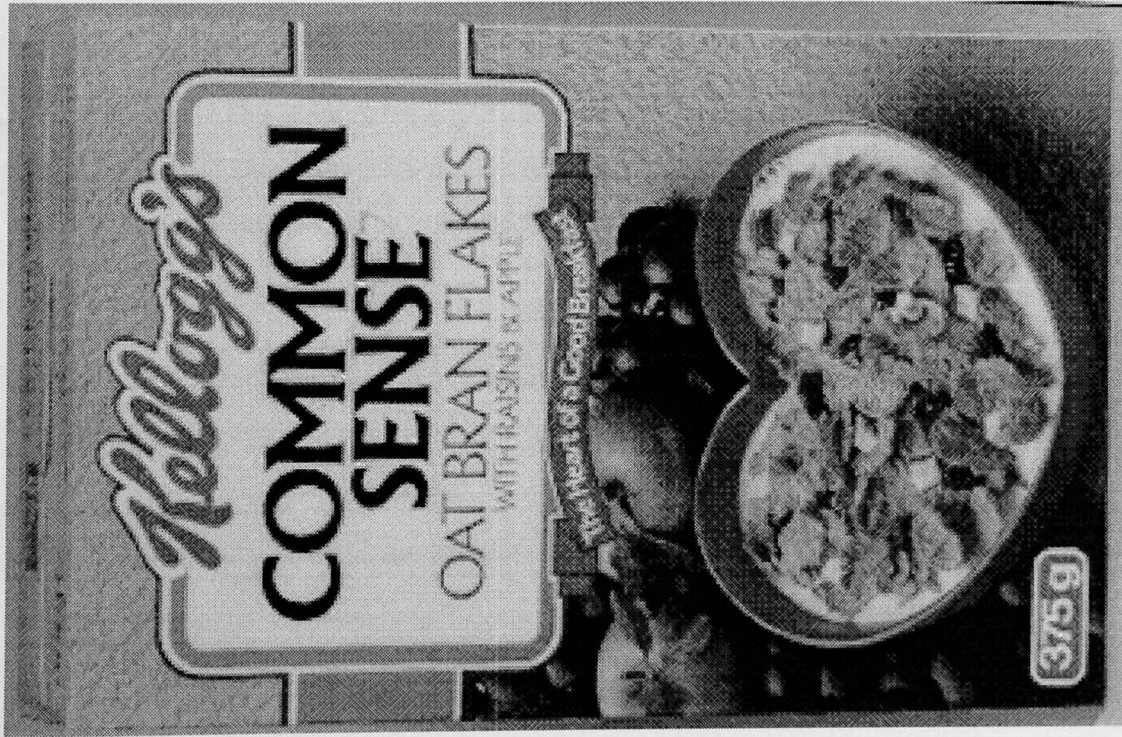


Figure 25 Full display of information

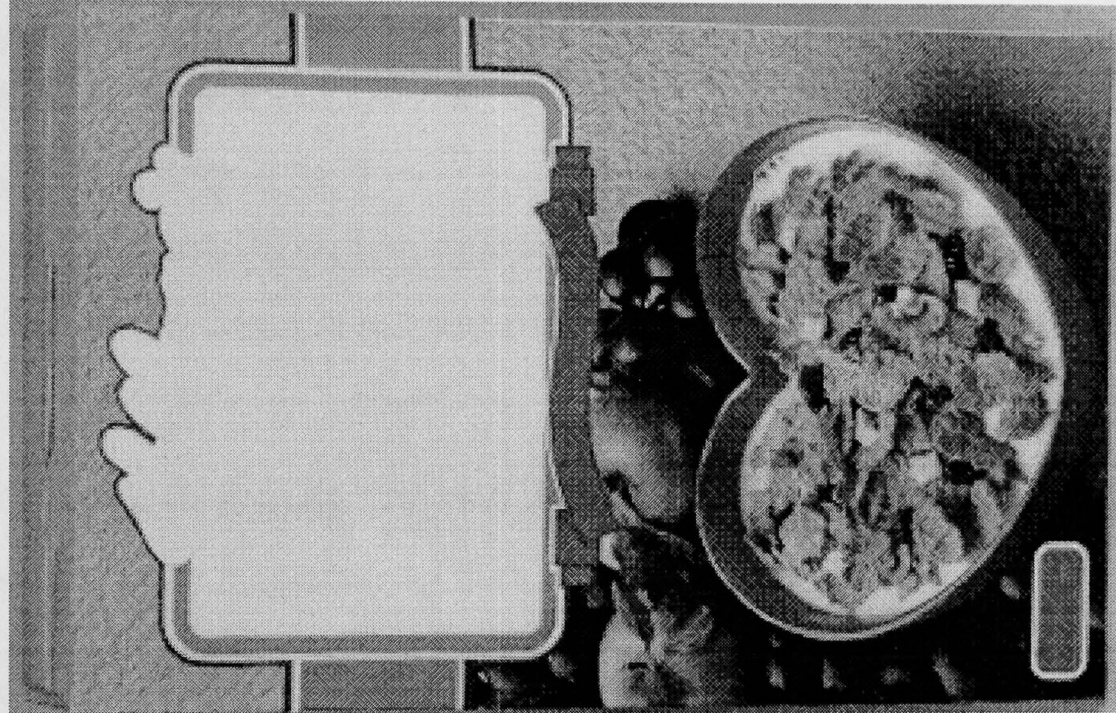


Figure 26 Graphical information

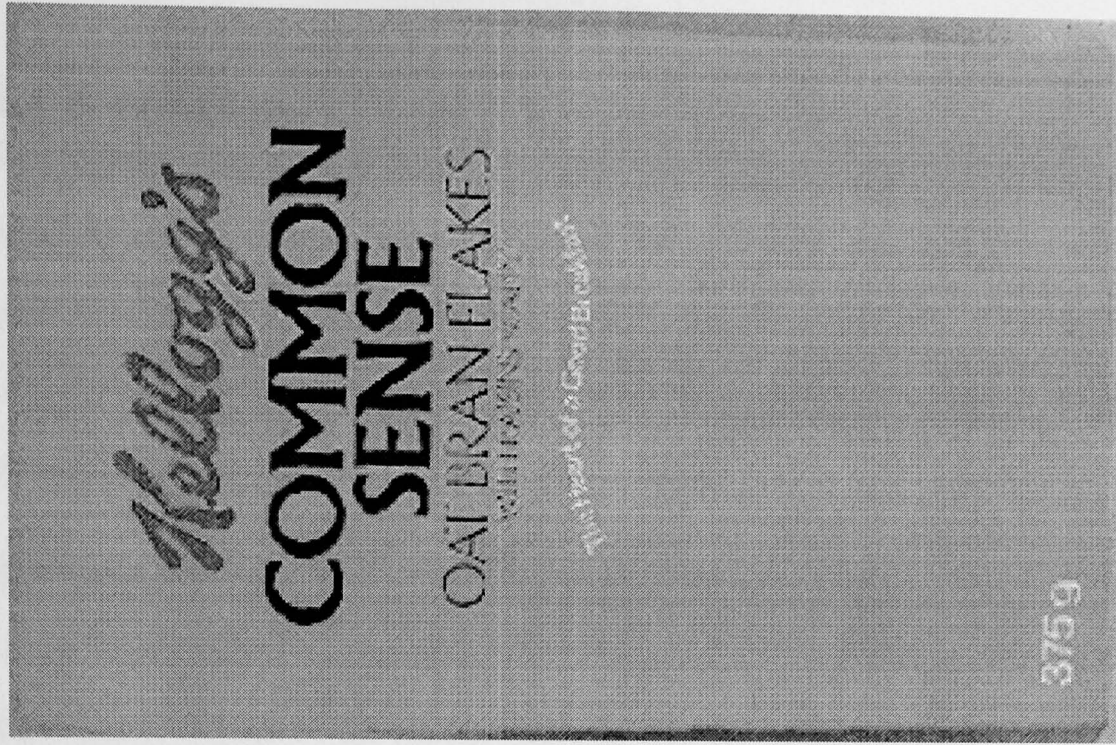


Figure 27 Textual information

3.1.5 Procedure

Participants were allowed sufficient time to produce as many attributes as they could, up to a limit of 12 for each image. They saw pictures in one condition only. If they saw one text only image, all the images they saw were text only. The marked difference between the untouched images and those showing only text would probably have produced unwanted comparison based attributes.

Randomisation was made of image presentation order and of image type presented. Image presentation was controlled by an assistant who also recorded attributes participants thought were applicable to the stimuli.

3.1.6 Results

Many of the attributes recorded were direct transcriptions of words, symbols, or graphics shown on the labels. For example, where a picture of a bird was shown a participant erroneously responded with 'bird' as an attribute. There were 468 attributes that were just words on the products and 361 transcriptions of graphics and symbols. The remaining items totalled 1134.

Measurement of positive, negative and neutral affect showed that neutral attributes occurred most frequently (see Table 3 and Figure 28). Attributes coded as positive included, 'healthy', 'convenient', 'tasty'; neutral attributes included, 'natural', 'bright', 'sweet'; negative attributes included, 'boring', 'dislike' and 'unappetising'.

Table 3 The number of positive, neutral and negative affect attributes that were produced in response to products shown untouched or with text or graphics removed

	Untouched	Graphics only	Text only	Row Totals
Positive	128	100	83	311
Neutral	475	580	304	1359
Negative	141	30	122	293
Totals	744	710	509	1963

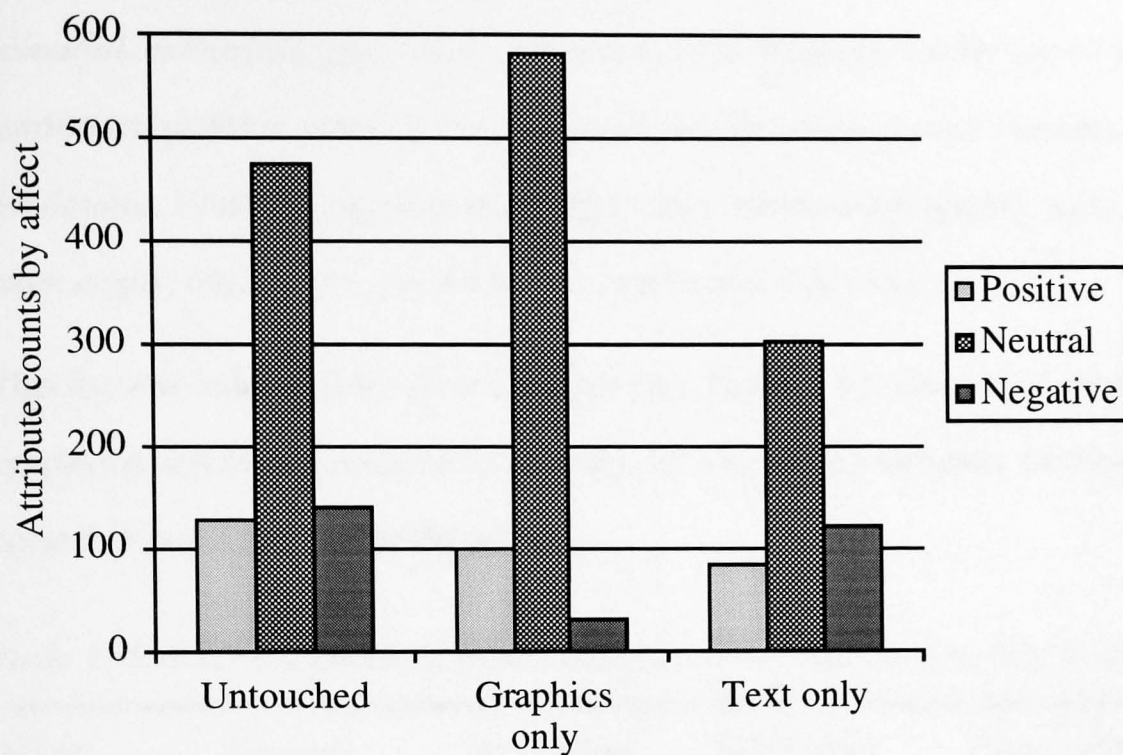


Figure 28 Bar chart of the number of responses to the label formats by affect

Frequency analysis of the 1134 attributes that were not simply transcriptions showed seven or more repetitions appeared to capture those likely to be of relevance. These represented 40% of the total sample and they are listed here.

78	healthy	12	convenient	7	wholesome
33	boring	11	cholesterol	7	fresh
22	nice	11	unappealing	7	plain
20	appetising	10	uninteresting	7	unappetising
16	dull	9	quality	7	colourless
16	tasty	9	bright	7	happy
16	sweet	8	presentation	7	dislike
16	attractive	8	informative	7	crunchy
15	bland	7	nutritious	7	easy
14	colourful	7	unfamiliar	7	uncolourful
12	natural	7	empty		
12	grey	7	like		

They can be classified into groups. Responses primarily of affect were; *attractive, bland, boring, dislike, dull, happy, like, nice, unappealing* and *uninteresting*.

Responses referring to perceived sensory qualities were; *appetising, crunchy, sweet,*

tasty and *unappetising*. Responses referring to general physical appearance were; *bright*, *colourful*, *colourless*, *grey*, *plain* and *uncolourful*. Responses referring to perceived nutritional qualities were; *cholesterol*, *fresh*, *healthy*, *natural*, *nutritious* and *wholesome*. Finally, responses referring to the presentational quality were; *convenient*, *easy*, *empty*, *informative*, *presentation*, *quality* and *unfamiliar*.

This list was reduced from 34 to 27 items (see Table 4) by removal of antonyms and synonyms and further reduced to 21 items, by eliminating semantic overlap (as subjectively determined by the author).

Table 4 Attribute list produced from distillation of the total set provided by participants

Affect	Sensory	Appearance	Nutritional	Presentational
Attractive	Appetising	Bright	Fresh	Convenient
Interesting	Crunchy	Colourful	Healthy	Empty
Like	Sweet	Plain	Natural	Informative
Happy	Tasty		Nutritious	Quality
			Wholesome	Unfamiliar

3.1.7 Discussion

The average number of attributes participants produced was approximately four per image. There is a pattern to the frequency of responses on affect (see Figure 28). In all three presentation formats, attributes coded as neutral in affect were produced with the highest frequency. There were far fewer positive or negative coded attributes.

Figure 28 shows that the balance between positive and negative attributes shifts across the three presentation formats. While the number of positive and negative attributes in the untouched presentation formats is similar, there are almost twice as many positive as negative attributes recorded for the graphics only format. By contrast, in the text only format, approximately 30% more negative than positive attributes were produced. This may well have been due to the less attractive appearance of the products when displayed without graphics. It is also notable that there were far fewer negative

attributes produced in the graphics only format. This is true for comparison with the untouched format as well as text only condition.

Therefore, a more critical response was made when text was displayed, possibly because the text provides information with which to disagree. An image may be liked or disliked. However, in the case of these products none of the images were likely to cause aversive responses. The comparative lack of stimulus information in the text only format probably accounts for approximately 30% fewer attributes being produced. The experiments reported in the next section used the attributes that emerged on this pilot study.

3.2 Experiments Comparing effects of claims with British and French Consumers

Two experiments are reported that compared consumers' perceptions of food package labels where health and nutrition claims were present and where they had been removed. Unlike previous studies examining the influence of information on perceptions, realistic materials were used. This was accomplished by presenting information on a computer as photo-realistic images of packages where claims had been removed by editing to give a without-claims condition. Automatic presentation of materials and data collection meant participants proceeded through the computer questionnaire without the presence of an experimenter. The experiment was conducted with both British and French consumers.

The data analysis was designed to follow Ajzen and Fishbein's (1980) Theory of Reasoned Action attitude model (described in chapter 1). In the theory, beliefs about a behaviour multiplied by evaluations of outcomes due to performing the behaviour predict attitude. In this case the attitude in question was the *attitude to purchase*¹. The advantage of this method is that beliefs are contextualized and likely to have greater predictive accuracy.

¹ For clarity all variable names in this chapter will be given in italic font

The secondary stage of the model consists of predicting *intention* from *attitude to purchase* and the *subjective norm* which is perceived social pressure. Additional variables were included in the present study. *Ease of purchase* represented the suggested extension of the model in the form of the Theory of Planned Behaviour (Ajzen, 1988). *Attitude to the label* was also included. At the request of the French researchers, *ease of purchase* was replaced by a scale measuring how *beneficial* participants perceived each product.

3.2.1 Method

3.2.2 Design

A between-subjects design was used. The independent variable was the presence/absence of textual health and nutrition claims. The dependent variables were the 21/19 (British/French) primary stage attributes (listed in Table 4 on page 75), plus the four secondary stage variables (*attitude to purchase*, *subjective norm*, *ease of purchase* and *expectation of purchase*) and 13 reasons for ratings variables (determined during initial data analyses reported below). Note that the French primary stage attribute set replaced the items ‘crunchy’, ‘plain’, ‘sweet’ and ‘tasty’ (listed in Table 4) with new items covering ‘flavour’ and ‘texture’. The computer based attribute elicitation method reported in section 3.1 was not repeated for the French study.

3.2.3 Materials Editing

Materials used with British participants consisted of eight foods. There were three packaged meat products, three breakfast cereals, crackers and a nut snack bar (see Attitudinal influences of health claims computer images starting on page 157 in the appendices).

These were photographed with colour slide film and then scanned into a photographic image retouching program. Textual health and nutrition claims were removed for the without-claims condition. Removing claims involved filling in resulting gaps with suitable material pasted from surrounding areas (see Figure 29 and Figure 30).



Figure 29 Beef Lasagne with claims



Figure 30 Beef Lasagne with claims removed

The flexibility of the software (Adobe Systems Inc. 1989-91) enabled precise execution of these changes and even under close scrutiny the graphics did not reveal signs of editing.

3.2.4 British Products

Alterations to the products were as follows: Beef Lasagne, a convenience frozen meal, had red flashes containing the claims, 'low in fat and saturates', 'controlled sodium', 'approved by the Family Heart Association as part of a low fat diet' and a yellow flash with 'new larger portion 279 calories' removed for the without-claims condition (see Figure 29 and Figure 30 on page 78). Beef Julienne, another convenience frozen meal, contained the same claims as Beef Lasagne, but with red flashes rather than green for the first three claims. The fourth claim was simply 'new' and omitted the reference to calories. All Bran breakfast cereal had a yellow flash claiming 'a low fat food and always has been', a circular red and blue flash with 'very high fibre cereal' and claim 'fortified with vitamins and iron' removed for the without-claims condition. Common Sense, a bran breakfast cereal of a different type, displayed a yellow flash 'a low fat food and always has been' and a red banner with 'the heart of a good breakfast'. Hi-Lo diet crackers used a white flash '15 calories per cracker' and a claim 'high fibre - low fat - low salt'. Jordans crunchy bar had a green flash 'new - oatbran can help reduce cholesterol' and stylised red underline to 'wholegrain' removed for the without-claims condition. Sultana Bran breakfast cereal contained a yellow flash 'a low fat food and always has been' and 'provides essential vitamins and iron'. Chicken Masala, a convenience frozen food, had a green flash 'low fat recipe', product range title 'Healthy Options', a line stating 'no artificial colours or preservatives' and circular claim 'tasty - healthy - satisfying' containing the outline of an exercising figure.

3.2.5 French Products

French participants saw nine products; Three ready meals, two breakfast cereals, one soup, milk, snack bar and dessert (see Attitudinal influences of health claims computer images starting on page 157 in the appendices).

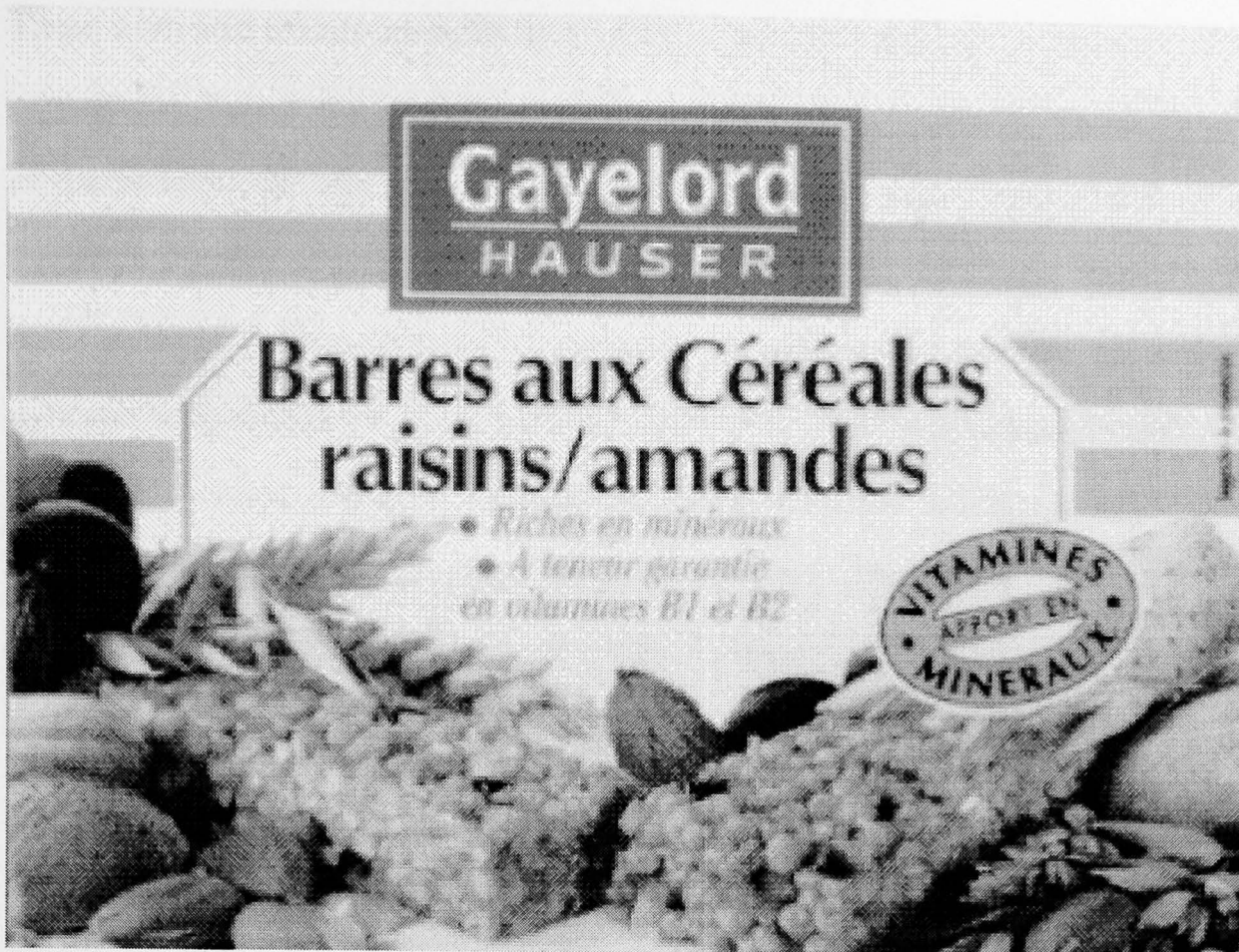


Figure 31 Raison and cereal bars with claims

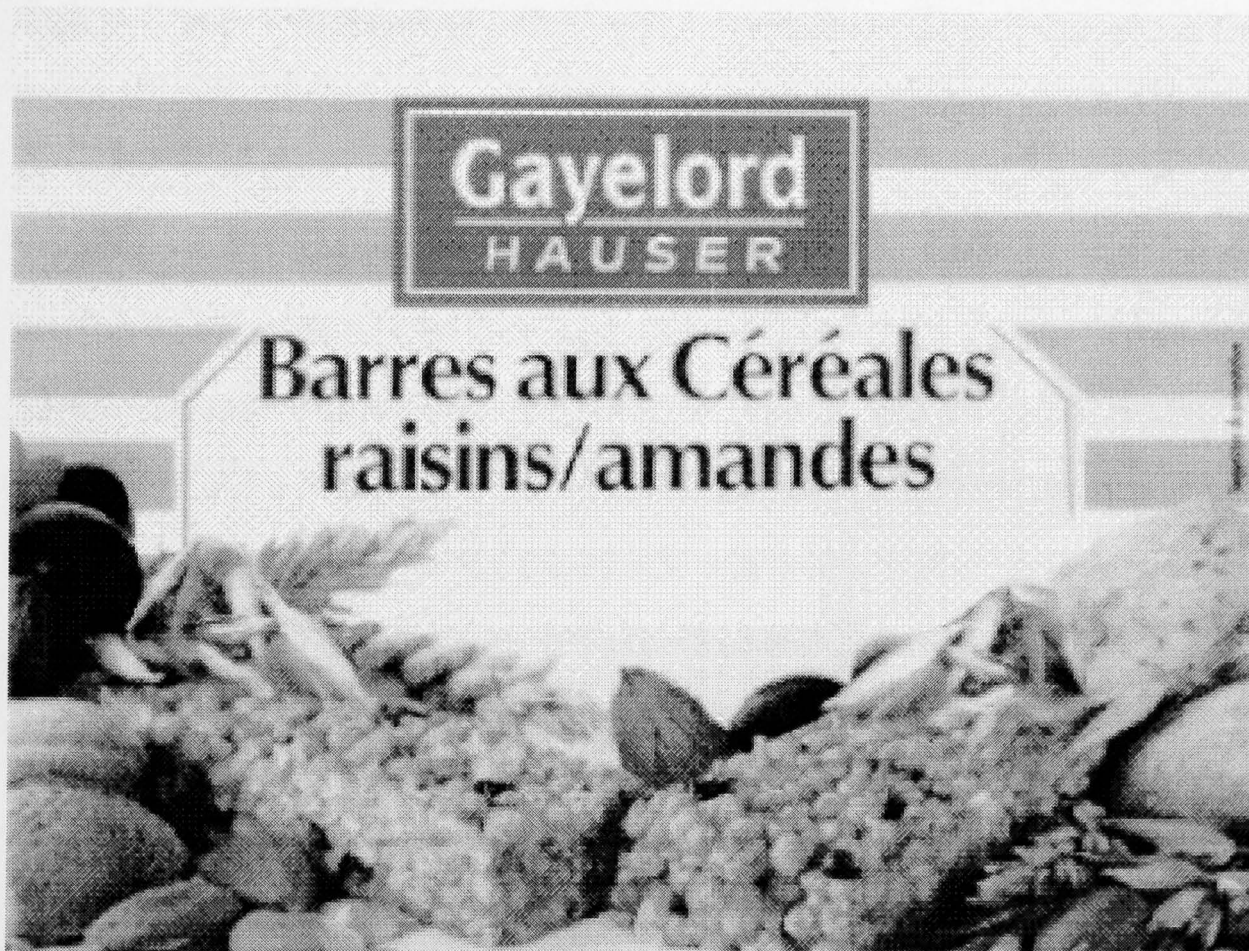


Figure 32 Raison and cereal bars with claims removed

These were also brands currently in circulation and purchased in the area local to the experiment. Barres aux Céréales raisin/amandes (see Figure 31 and Figure 32 on page 80) had a blue oval 'apport en vitamines-minéraux' and 'riches en minéraux' with 'à teneur garantie en vitamines b1 et b2' removed for the without-claims condition (Raisin and almond cereal bars with a blue oval stating intake of vitamins-minerals and rich in minerals with guarantees your needs for vitamins b1 and b2). All Bran breakfast cereal had '28% de fibres de son de blé', 'naturellement très riche en fibres - facilite le transit intestinal' and red oval 'avec 8 vitamines' (28% wholegrain wheat fibre, naturally very rich in fibre - helps digestion and red oval with eight vitamins). Fleury Michon Supreme de Poisson displayed 'légère' and circle 'faible en lipides' (Fish supreme, light range and circle low in fat). Pâtes Diététiques au Soja had 'enrichies en protéines', blue band 'vitamines b1, b2, pp, b6', red band 'sans cholestérol' and '100% végétal' (Dietetic soya noodles, enriched in protein, blue band vitamins b1, b2, pp, b6, red band without cholesterol and 100% vegetable). There was a Muesli which displayed 'avec 8 vitamines et du fer' (with 8 vitamins and iron). Viva Lait claimed 'À teneur garantie en vitamines' and 'à teneur garantie en vitamines: a, c, b1, b2, b5, b6, pp' (Milk, guarantees vitamins and guarantees vitamins: a, c, b1, b2, b5, b6, pp). Knorr Soupe de Crustacés aux Algues claimed 'enrichie en vitamines et protéines - contient du magnésium' (Sea food soup with seaweed, enriched with vitamins and protein - contains magnesium). Soja Sun Framboise Passion had 'naturellement - sans cholestérol' and a curved band '100% végétal' (Raspberry passion yoghurt, naturally - without cholesterol and a curved band 100% vegetable). William Saurin Boeuf à l'Estragon et tagliatelles displayed a red oval line with 'garanti équilibré ISA' (Beef tarragon with tagliatelle, a guarantee of wholesomeness by ISA).

3.2.6 Procedure: Computer Display System

Images were independently randomly ordered for each participant. They were displayed at actual size on a 1152x870 pixel 21 inch screen. This displayed the images in true colour (a palette of 16.7 million colours). Scales used for the attribute ratings were displayed on a 14 inch monitor placed to one side. These horizontal line scales ranged

between -10 and +10. Analogue pointer and numerical rating indications were displayed for the British participants (only the analogue pointer was used in the French version). At the top of each screen of primary stage attribute scales was the heading 'Buying this product would give me a product which is...'. Three or four of these scales were used on each screen. Each subsequent screen was accessed by clicking a graphical button displayed at the bottom right screen corner. This action simultaneously appended the data that had been entered on the screen to the participants' file.

The secondary stage attributes each appeared separately and were given headings that conformed to semantic requirements particular to each scale. For example, 'Most people whose opinion is important to me would think I should buy this product' used with the subjective norm scale. Completion of all ratings initiated display of the next product in the randomised sequence and a return to display of the primary scales. The programs (see page 148 for a program listing) were developed by the author using a Hypercard language (Aldus SuperCard, Silicon Beach Software, 1989-91).

3.2.7 Procedure: Three Phases to Data Acquisition

Following ratings of the attributes, outcome evaluation scores were collected. Each outcome evaluation score was linked to an attribute. For example, the attribute rating for 'Buying this product would give me a product that is healthy' had a corresponding outcome scale labelled 'For me buying food with a label that makes the food look healthy is unimportant/important'. Outcome evaluation ratings were taken after all the product attribute ratings had been made. This was done because it seemed likely that participants might feel obliged to reflect their initial evaluations in their subsequent attribute scoring. Unlike the attribute measures, the outcome evaluations were only rated once, as they are general beliefs that are not specific to products.

For the British participants each product was then shown again with a request for 'The most important reason for my rating of this product on X was...'. 'X' referred to a subset of 13 attributes, *bright, plain, convenient, crunchy, difficult, fresh, happy, healthy, interesting, like, nutritional, quality, tasty*.

This subset was chosen after indications of statistical significance in the between conditions differences of the first twenty participants. Therefore the reasons given data quoted are from 42 participants only (as the subset had not been selected, the first 20 participants did not give reasons for their ratings). Researchers entered these data owing to keyboard entry being required. This qualitative stage was considered likely to help explain ambiguities that might arise in the results. Apart from an introductory run through the rating scales for the first product, this was the only section requiring an experimenters' presence. For the rest of the time participants proceeded in isolation.

3.2.8 Participants

Sixty-two (21 males, 41 females) members of the public from the Reading area were recruited by newspaper advertisement requesting volunteers for food label information experiments. Participants were randomly assigned to conditions. The with-claims condition included 10 males and 22 females. The without-claims condition contained 12 males and 18 females. There was a payment of £8.00 for completing the experiment, which took less than one hour.

Ninety members of the public from the Dijon area participated and 15 of these had previous taste panel experience. Participants were only selected if they declared themselves responsible for at least 50% of the household food shopping. There were 39 females and six males per condition. They were each paid 80 francs.

3.2.9 Results

3.2.10 Analysis of Variance of British Data

Analysis of variance was made by claim condition (presence/absence of textual health and nutrition claims) and product with blocking by subject. Significantly higher ratings were given only for the attributes *informative* and for *ease of purchase* in the condition with-claims (see Table 5). Note that *purchase intention* (the grand means were, 0.98, S.E. 0.45 with-claims and 1.75, S.E. 0.37 without-claims) and *attitude to purchase* (3.01, S.E. 0.39 with-claims and 2.93, S.E. 0.35 without-claims) scores did not differ significantly between conditions (see the appendices page 169 for a full data listing).

Table 5 British study mean scores and standard errors for attribute scores that differed significantly across conditions

Attribute	Mean		S.E.	<i>p</i>
	With Claims	No Claims		
Informative	3.39	1.16	0.91	*
Ease of Purchase	7.15	4.63	0.70	***

* $p < 0.05$, *** $p < 0.001$

3.2.11 Reasons Given for Ratings on 13 Attributes

The higher score for *informative* with-claims might be expected because of the prominence of the claims on the packs, but also for reasons of salience. Content analysis of the data on reasons for giving particular ratings indicated that claims were used when present. ‘Information’ was given as the most important reason for ratings of nutritional value with-claims, but without-claims the primary reason given was ‘contents’. This suggests that claims were used when they were available and depiction of contents where they were not. Similarly, reasons given for healthiness ratings centred on ‘information’ / ‘writing’ with claims and ‘contents’ without-claims.

Ratings for convenience were also explainable by reasons given, showing ‘easy’ and ‘microwavable’ most frequently. Reasons given data also revealed that only the without-claims condition showed ‘familiarity’ as a factor in *ease of purchase* ratings. Therefore the convenience rating may have in part been due to the without-claims products appearing unfamiliar and therefore more difficult to obtain.

As shown in other studies there was consistent mention of ‘brand’ as the primary reason in *quality* ratings and graphic representations of attributes were most frequently cited overall; these consisted primarily of ‘picture’ and ‘food’.

3.2.12 Factor Analyses

Given the large number of primary stage attributes that could be used as predictors of *attitude to purchase*, a factor analysis was used to reduce these to a more manageable set of underlying factors. These were then used in a regression analysis predicting *attitude to purchase*. Regression analysis of the primary stage attributes against *attitude*

to purchase, was made by producing variables consisting of factor weights determined using principal axis factoring (with varimax rotation). Factor analysis of the entire data set was used because the factors were virtually identical across the with and without-claims conditions (see Table 6).

Table 6 British study showing reliable factor loadings^a

	Enjoyable	Nutritious	Colourful
Like	0.87	0.80	0.82
Appetising	0.86	0.80	0.78
Tasty	0.81	0.79	
Interesting	0.74	0.70	
Attractive	0.71	0.67	
Happy	0.51		

^aLoadings greater than 0.5

Regression of the variables produced from these factor weights were made onto *attitude to purchase* for each condition to compare their weighting in the with and without-claims conditions (see Table 7). The multiple correlations were $R = 0.79$ ($df = 236$, $p < 0.001$) with-claims and $R = 0.71$ ($df = 244$, $p < 0.001$) without-claims.

Table 7 British study, showing coefficients from multiple regression against attitude to purchase

Factor	With-Claims			Without-Claims		
	df	Beta	<i>p</i>	df	Beta	<i>p</i>
Enjoyable	235	0.75	***	243	0.58	***
Nutritious	235	0.20	***	243	0.39	***
Colourful	235	0.10	*	243	0.08	*

* $p < 0.05$, *** $p < 0.001$

The best prediction of without-claims *attitude to purchase* from the with-claims scores was obtained using the belief scores without multiplication by the outcome evaluations. The multiple regression equation using these scores alone showed they were a good predictor ($R = 0.68$, $p < 0.01$). Because of this, the factor weights and regression analyses were computed using the belief scores only.

3.2.13 Secondary Stage Regressions

Again a backward elimination method was used. Each non-significant variable was removed from the regression model until all the remaining variables produced significant weights (see Table 8).

A separate factor analysis was conducted that included primary and secondary stage variables. This analysis supported the two stages Reasoned Action model as the secondary stage variables separated from the primary stage factors in the analysis.

Table 8 British study, showing coefficients from multiple regression against purchase intention

Factor	With-Claims			Without-Claims		
	df	Beta	<i>p</i>	df	Beta	<i>p</i>
Attitude to label	235	243	0.10	*
Attitude to purchase	235	0.69	***	243	0.70	***
Ease of purchase	235	243	0.08	*
Subjective norm	235	0.28	***	243	0.09	*

* $p < 0.05$, *** $p < 0.001$

The *subjective norm* (the extent to which each participant believed others whose opinion they regarded as important would perceive they should buy the product) was clearly more predictive in the with-claims group. Individual regressions (for each product) revealed that while the *subjective norm* was never significantly weighted without-claims, it was always significantly weighted with-claims. This was with significance computed at the 10% level, as two *subjective norm* scores with-claims were not significant at the 5% level.

3.2.14 Analysis of Variance of French Data

The score for *flavour* showed a marked trend to be higher without-claims (see Table 9).

None of the other variables (see page 173 for a full data listing), including *purchase intention* and *attitude to purchase* differed significantly between the groups (*purchase intention* was 1.55, S.E. 0.29 with-claims and 1.88, S.E. 0.27 without-claims.

Attitude to purchase grand means were, 3.00, S.E. 0.24 with-claims and 3.35, S.E. 0.24 without-claims).

Table 9 French study, showing mean score and standard error for flavour

Attribute	Mean		S.E.	p^a
	With Claims	No Claims		
Flavour	2.33	3.31	0.25	0.053

^aNot significant

3.2.15 Factor Analyses

The procedure previously described for determination of factors was repeated. Results obtained were similar in showing factors on nutrition and enjoyment. There was also a factor specific to the sensory qualities. This factor was labelled appetising (see Table 10).

Table 10 French study, showing reliable factor loadings^a

Enjoyable		Nutritious		Appetising	
Happy	0.82	Healthy	0.81	Flavour	0.76
Colourful	0.80	Natural	0.77	Texture	0.71
Bright	0.77	Nutritious	0.76	Appetising	0.70
Attractive	0.77	Quality	0.72		
Interesting	0.74	Wholesome	0.62		
Like	0.72				

^aLoadings greater than 0.05

Correlation differences using summed beliefs or summed products of beliefs times outcome evaluations were not large. The factors were however again computed using the attribute belief data only. A similar pattern emerged to that seen with the British data. There was higher weighting given to sensory attributes over the nutritional. The multiple correlations of the factors with the *attitude to purchase* were $R = 0.82$ ($df = 400$, $p < 0.001$) with-claims and $R = 0.78$ ($df = 400$, $p < 0.001$) without-claims (see Table 11).

3.2.16 Secondary Stage Regressions

The inclusion of *beneficial* resulted in an effect almost converse to that with the *subjective norm* in the British data. With significance computed at the 10% level *beneficial* was significant with all nine products without-claims and *subjective norm*

with only two. Again the direct measure of *attitude to the label* was the least highly weighted overall (see Table 12).

Table 11 French study, showing coefficients from multiple regression against attitude to purchase

Factor	With-Claims			Without-Claims		
	df	Beta	<i>p</i>	df	Beta	<i>p</i>
Appetising	400	0.52	***	400	0.56	***
Nutritious	400	0.42	***	400	0.35	***
Enjoyable	400	0.23	***	400	0.32	***
Informative	400	0.14	***	400	0.20	***

*** $p < 0.001$

Table 12 French study, showing coefficients from multiple regression against purchase intention

Factor	With-Claims			Without-Claims		
	df	Beta	<i>p</i>	df	Beta	<i>p</i>
Attitude to label	400	0.14	***	400	0.15	***
Attitude to purchase	400	0.47	***	400	0.37	***
Beneficial	400	0.15	***	400	0.34	***
Subjective norm	400	0.21	***	400	0.17	***

*** $p < 0.001$

3.2.17 Discussion

3.2.18 British results

Clearly the anticipation of enjoyment of the food was considered more important in the *attitude to purchase* by both with and without-claim groups. The general surface appearance of the packaging was significant but least important. The importance of the *subjective norm* with-claims and the reasons for ratings data showing that claims were used when present, give firm evidence of how these claims influence perceptions during decision making. However, while there is an increasing market share for healthier products in Britain, these data show that the claims do not generally affect attitudes to purchase, or purchase intentions.

3.2.19 French Results

These data showed the presence of a specifically sensory factor that is of primary importance, closely followed by nutritional and general enjoyment factors. A fourth factor seems to represent information presence. It may be an element of *attitude to the label*, beyond that acting through *attitude to purchase*.

The significance of the *beneficial* scale in the regression of the secondary stage variables and the *subjective norm* results indicates that the general opinion is that healthier products should be bought. However, the *Beneficial* scale was probably interpreted in terms of personal perceptions of healthiness. These would probably be less influenced by claims than by individual experience and associations.

3.2.20 Comparing Populations

Regression of factor scores in both population samples showed that while enjoyment was of more concern than nutrition, perceived healthiness was still highly significant. The presence of claims appeared to have more impact on British participants on two counts: They rated products with-claims as significantly more *informative* and they showed a much higher weighting on the opinions of others.

Europe wide market research has shown the British market for 'light' products is larger than elsewhere. British homemakers spend less than half of the time in the kitchen that French homemakers spend. They might be assumed to buy more convenience foods and therefore more likely to use foods displaying lower fat and calorie claims (European Marketing Information Ltd., 1990). With more time the French can prepare more of the fresh natural food they consider healthy and be less likely to take any notice of health claims on convenience foods.

In contrast, the outcome evaluation data showed clear similarities between the population samples. However, the *convenient* scale was ranked as far more important by the French group. Reportedly greater use of microwave ovens and convenience foods by British homemakers could explain their lower score. They may have already satisfied most of their convenience needs. In accord with previous findings, label

information provision was considered highly important by both populations (see Figure 33).

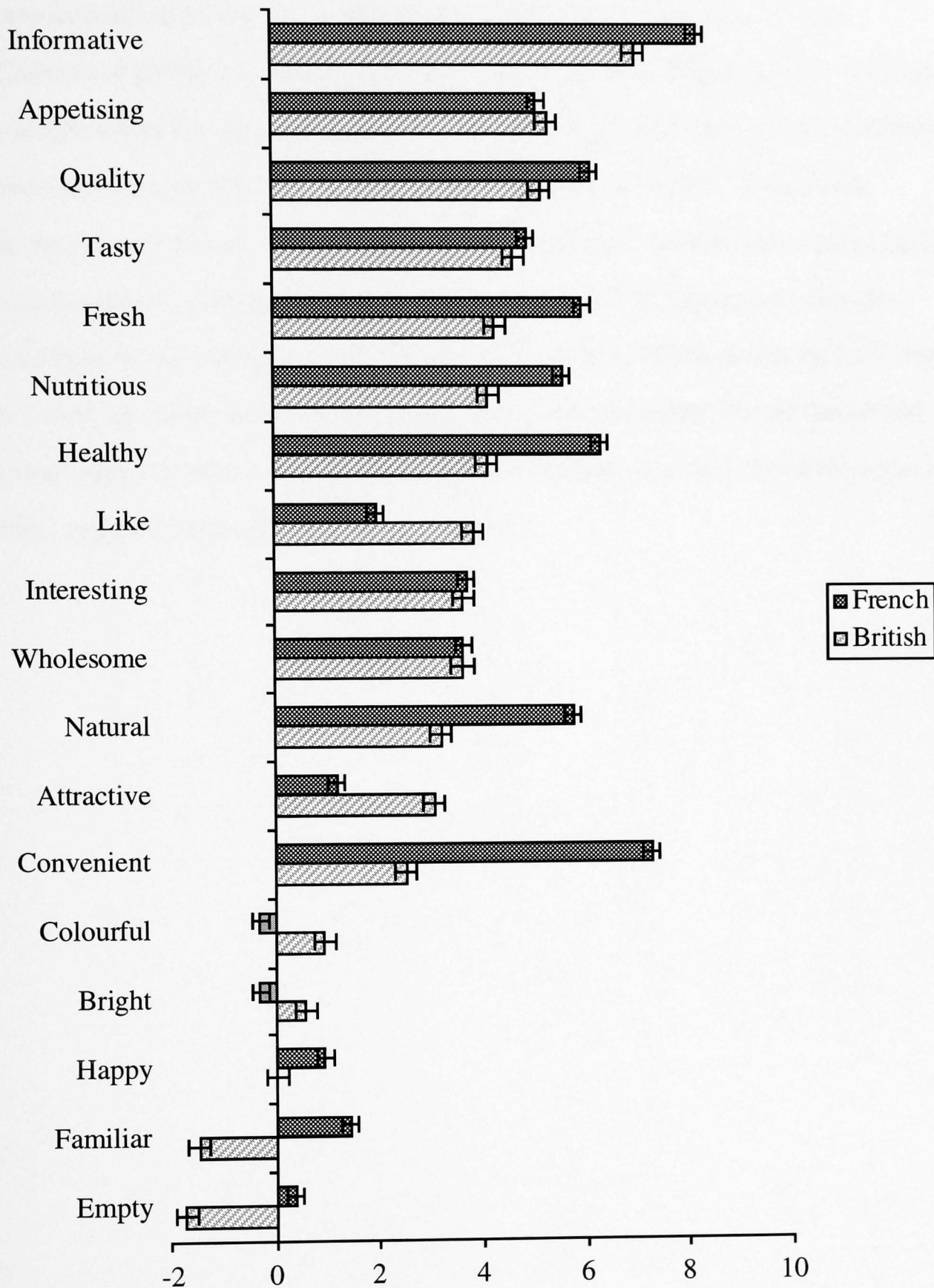


Figure 33 British and French mean outcome evaluations. Scores ranged from -10 to +10 (sorted on British results)

3.2.21 A note on the performance of the model

Although explanation of variance across the attitude analyses averaged nearly $R = 0.80$, the variance accounted for in percentage terms equals just 64 per cent. The external examiner pointed out that this is because the model tends to analyse conceptual differences in people's thinking, rather than make a causal explanation. Put differently, the results reveal the aspects that influence the attitudes of various types of individuals. It does not give a detailed explanation for any particular individual. To explain a specific person's attitude would require using the complete method, including eliciting the salient beliefs, with just that individual. Enough repeated measures to provide at least a three to one ratio of repeated measures to beliefs would be necessary. Less than this would not enable satisfactory regression analysis. Obviously, this method could become unwieldy where a large set of salient beliefs was identified. However, almost perfect explanation of variance should then result.

4. Neural Network Analyses of the Reasoned Action Model

The belief times outcome evaluation analyses in this section, were presented as a paper at the Cognitive section conference of the British Psychological Society (Corney, M.J., Wright, M. & Shepherd, R., 1996). They were also presented at the Twentieth Annual German Artificial Intelligence Conference (Corney, M.J., Wright, M. & Shepherd, R., 1996). They are shortly to be published by Logos Verlag.

4.1.1 Introduction

The review of the attitude measure literature revealed that the theory of reasoned action is an effective and widely used approach. It also indicated that there has been some uncertainty regarding the validity of the multiplicative relationship of beliefs and outcome evaluations. Evidence for and against the multiplicative method was discussed and the balance of evidence reviewed rested with the established method. There was also reference to research calling into question the overall structure of the theory. This path analysis research revealed that the links between beliefs and intentions are not always mediated through the general attitude. The theory of reasoned action also assumes a linear relationship between the component elements and although this is justifiable an analysis technique that allows this to be tested could prove useful. In the description of the neural network approach, it was shown that the aforementioned problems could receive novel investigation. A further interesting aspect is that connectionist networks in some ways capture the learning method and knowledge representation present in the human brain.

4.1.2 The reasoned action model network structure

In chapter 1 a description was given of a backpropagation network structured on the reasoned action model (see page 30). This consisted of an input layer, two hidden layers and an output. The input was data from the claim deletion study (as reported in the previous chapter). The data (-10/+10 integer value range) consisted of the belief and outcome evaluation scores. It also included the secondary stage variable scores, *attitude*

to purchase, subjective norm, attitude to the label, perceived control and expectation of purchase. Thus there were 21 beliefs, 21 corresponding outcome evaluations and five secondary stage variables. *Purchase intention* was the output variable. The input layer (47 units) directed these primary and secondary stage variable's scores to the first hidden layer. *Purchase intention* was presented to the output unit for error estimation. The task for the network was to learn the relationship between the input variables and *purchase intention*.

The first hidden layer was constructed of 11 units (this number of units decided by exhaustive trials). It was partitioned so that eight of these were used for the primary stage variables (the beliefs and outcome evaluations) and the remaining three for the secondary stage variables. The outputs from the three secondary stage hidden units were connected directly to the output unit representing *purchase intention*. The outputs from the primary stage hidden units were connected to a second single unit hidden layer representing *attitude to purchase* (see Figure 34).

As explained in section 1.5.9, beliefs and outcome evaluations form the attitude. Attitude in turn predicts intention, which may also be partially explained by subjective norm and perceived control. By organising the network in the way described the structure of the reasoned action model was largely maintained.

Two separate networks were used. One network for the with-claims data and one network for the without-claims data. This training data excluded missing cases. Network training was continued until the error level was negligible. After four and quarter million cycles through the data for the with-claims condition (consisting of 225 input rows) the root mean square error was 0.001. A very low error indicates the network would be less likely to predict new data accurately. However, it also means that the hidden units have fully acquired a solution representation for the data set. Performance testing of a network trained to achieve good generalisation is reported in section 4.1.7 on page 102.

Figure 34 Structure of the backpropagation network, showing processing unit connections (note that for clarity, only the connections for the first belief outcome evaluation pair are shown)

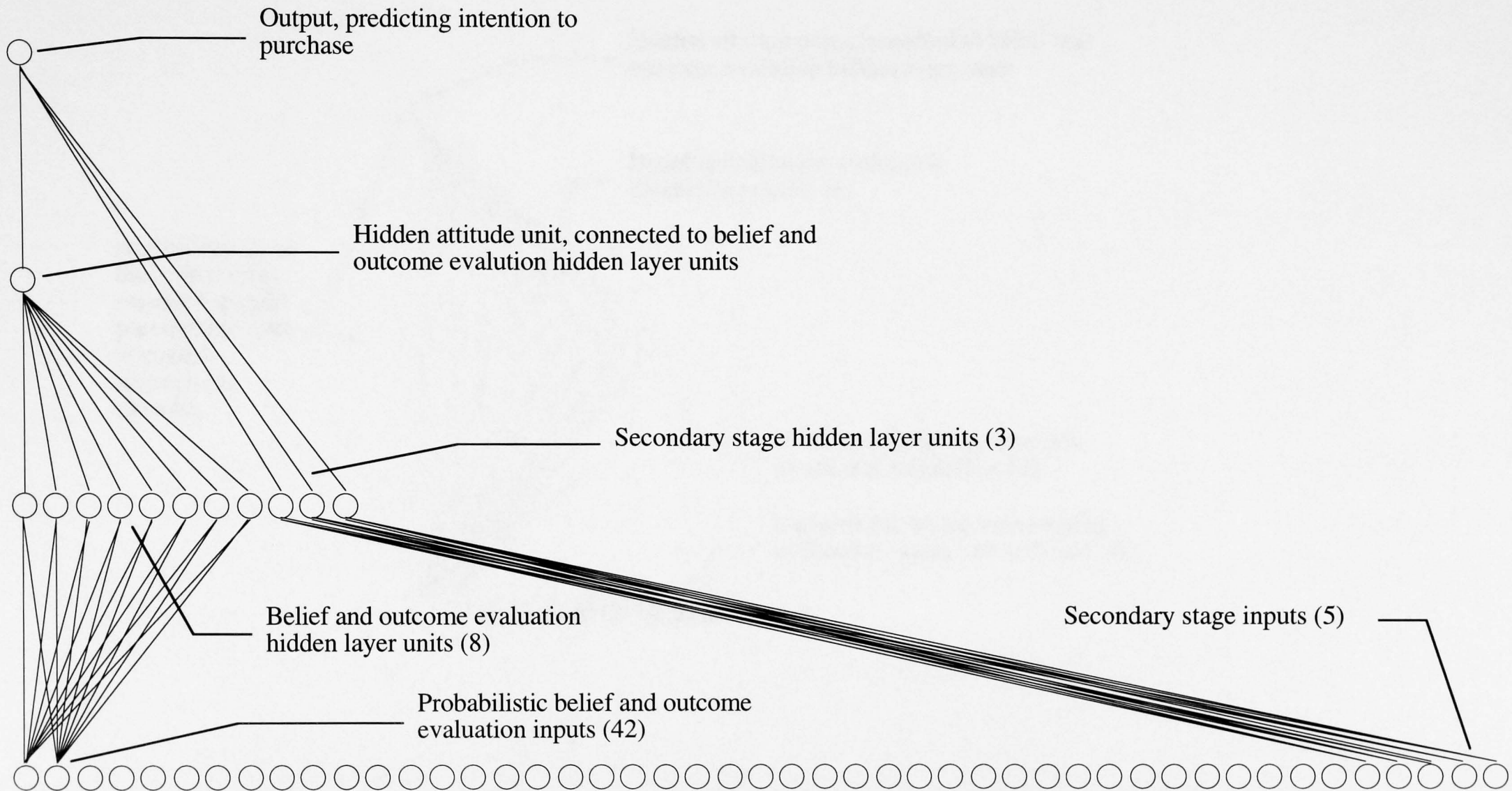
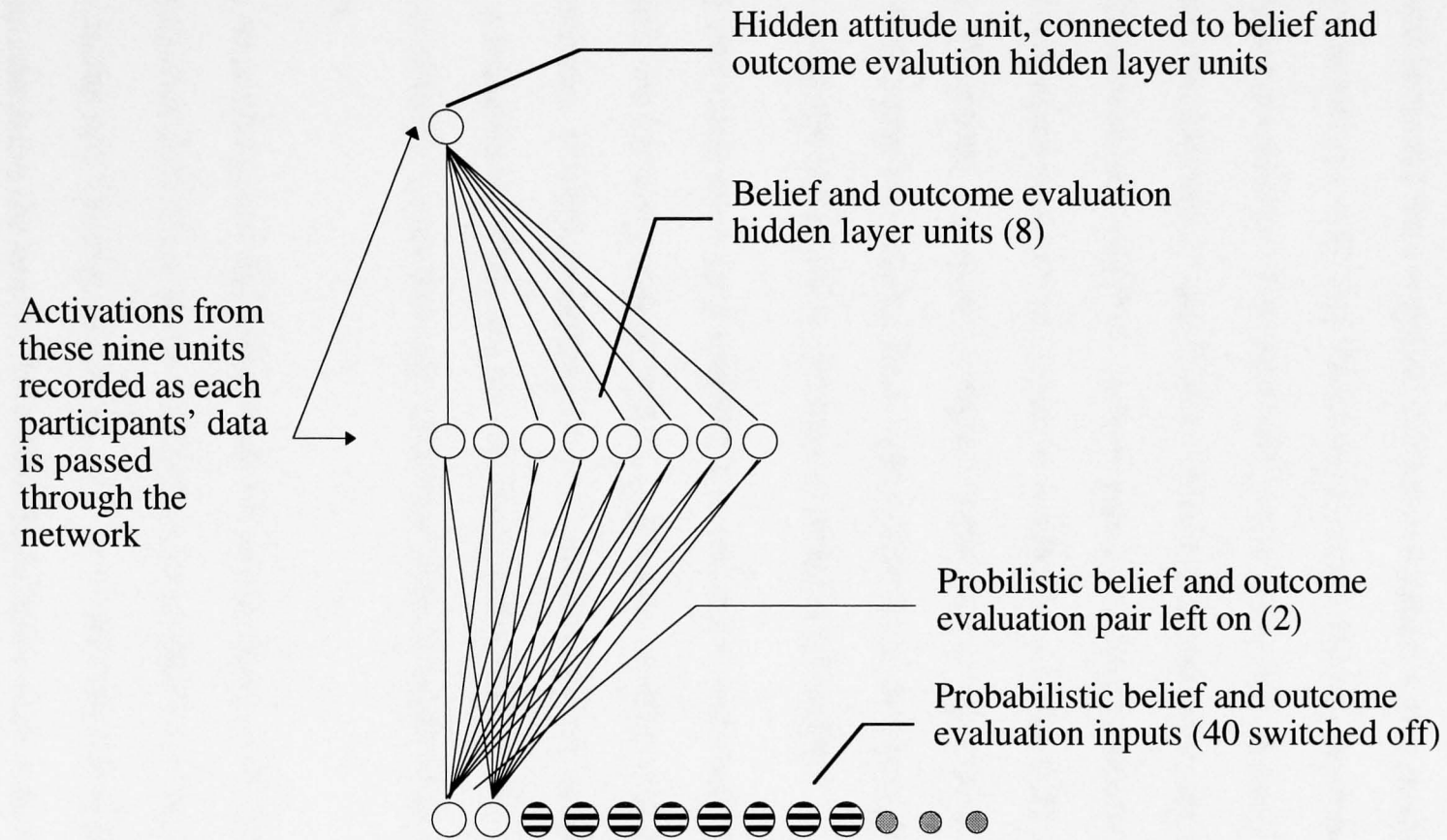


Figure 35 Processing units used for analysing the network's weighting of the data (showing examination of the first belief outcome evaluation pair)



4.1.3 Testing hidden unit outputs in regression analysis

Examination of how the networks were predicting intention was made using regression models. The sum of the activation across the primary stage and attitude hidden units was recorded for every pair of beliefs and outcome evaluations (see Figure 35). These data and the belief and outcome evaluation scores were used as inputs in regression analyses predicting beliefs multiplied by outcome evaluations.

There is a consistent significant relationship between a and b and $a*b$. For example, using 20 random numbers between zero and one the average correlation was 0.65. The same result will be found for a negative integer multiplied with a positive integer and where both are negative (-0.65 and 0.64 respectively). Hence, there could be expected to be a significant correlation of around 0.65 between the beliefs *times* outcome evaluations and the individual beliefs and outcome evaluations in the data. However, correlation between beliefs *and* their corresponding outcome evaluations need not be significant (correlation between the random numbers was 0.03, 0.11 and 0.21 respectively). Therefore, an equal (or higher) weighting in regression analysis, predicting beliefs times evaluations from hidden unit activation data, would indicate the network was using the belief times outcome evaluation procedure.

Initial testing was made upon beta weights from the regression analysis using Friedman analysis of variance for non-parametric data, as the beta weights will differ in relative size across analyses. The beta weights give an indication of each variables' importance in predicting a relationship. They are not expressed with proportions of explained variance, but as relative values that can differ markedly in magnitude dependent on the nature of data.

Beta weights were computed and tested with Friedman analysis of variance. The results showed a significant difference in the without-claims condition (Chi-Square 2.22, df 3, $p = 0.53$ with-claims and Chi-Square 14.22, df 3, $p < 0.01$ without-claims). In the without-claims condition the sum of the hidden layer mean rank was almost twice that of the outcome evaluation (3.40 v. 2.00 respectively). This result was also reflected

when results for both conditions (with and without-claims) were combined (Chi-Square 13.74, df 3, $p < 0.01$). The mean rank for the sum of the hidden layer activation was highest and the outcome evaluation lowest (3.13 v. 2.17). There was also a significant difference between the ranks of the sum of the hidden layer activation plus the hidden attitude activation and the beliefs plus outcome evaluations. The mean rank for the sum of the hidden unit activation was 1.75 and the belief plus outcome evaluation 1.25 (Chi-Square 10.00, df 1, $p < 0.01$).

These results reveal the hidden layer activation as the best predictor of the belief times outcome evaluation. The hidden layer and hidden attitude activation combined were significantly more predictive than belief and outcome evaluation scores combined. As explained previously, these will always be good predictors. The results clearly show that the belief times outcome evaluation procedure was used by the networks. They provide further support for the structure of the reasoned action model.

4.1.4 Examining the weighting placed upon inputs

An overall estimation of the weighting that this network structure was placing on inputs was made using the 'explain' function provided with NeuralWorks II. This procedure dithers each input data stream in turn plus and minus a set percentage (in this case 5%). It records percentage changes in the output value. Here this was the *intention to purchase*. Each row of data is dithered this way and the resultant file produced contains as many percentage changes as input rows. Means were taken of results of the process. Those showing a relatively high positive value indicates a variable heavily weighted as a positive factor. Results showing a relatively high negative value are being used by the network to weight against *purchase intention*. Values around zero show low importance. This analysis is similar to obtaining beta weights in conventional regression analysis. Basically, the backpropagation network is performing a similar function, but may also compute non-linear relationships when a hidden layer is used.

The results of running the explain function was similar for both with and without-claims conditions. There was a 0.99 correlation between with and without-claims percentage changes. The combined results are displayed in the listing below.

expectation	50.76%	crunchy	0.07%
attitude	37.05%	healthy outcome	-0.22%
norm	21.80%	nutritious	-0.86%
wholesome	15.29%	happy	-1.21%
tasty outcome	13.93%	informative outcome	-1.77%
nutritious outcome	9.30%	sweet	-3.67%
ease of purchase	8.16%	attitude to label	-3.98%
sweet outcome	7.71%	fresh	-4.02%
informative	7.40%	quality	-4.09%
colourful outcome	6.62%	healthy	-4.29%
tasty	6.37%	convenient	-5.28%
fresh outcome	6.11%	happy outcome	-5.35%
full	5.56%	plain outcome	-6.29%
natural outcome	5.44%	attractive outcome	-7.30%
familiar outcome	5.02%	natural	-7.52%
colourful	4.69%	crunchy outcome	-9.74%
full outcome	4.18%	like	-10.09%
like outcome	3.73%	quality outcome	-10.37%
interesting	3.19%	convenient outcome	-12.42%
familiar	1.72%	interesting outcome	-12.44%
appetising	0.65%	plain	-13.51%
bright outcome	0.44%	appetising outcome	-13.65%
wholesome outcome	0.38%	bright	-13.93%
attractive	0.30%		

The very high correlation between these results is remarkable. Taking account of the independence between the data it would seem unreasonable to expect any more than moderate correlation. In contrast to regression analysis using factors (reported in the conventional analyses in the preceding chapter), interpretation of this many variables is difficult (principle component analysis of the results is reported below). It can however, clearly be seen which variables were having the most positive, negative and least effect on *purchase intention*. *Expectation of purchase*, *attitude to purchase* and *subjective norm* are highest ranked at the positive end of the scale. Although this indicates their relative importance, they were given a separate section of the hidden layer and direct connection from this to the output. However, this result would tend to

support the reasoned action model, as they would be expected to separate from beliefs and outcome evaluations. Perceived control (*ease of purchase*) was placed twelfth in the list of 47 items and these products were not expected to show any particular perceived control effect. It seems odd that having a liking for a product should be placed within the most negative half dozen variables, but the corresponding outcome evaluation is within the top twenty most positively ranked. Similarly, the outcome evaluation for having an *appetising* product is ranked the most negative and the corresponding belief also receives a very low positive rank. However, the synonymous variable *tasty* and its outcome evaluation are ranked high on the positive end of the scale (fifth and seventh respectively).

It would seem therefore that the combined ranking of the with and without-claims percentage changes bear intuitive interpretation. In regression analysis, forced entry of too many independent variables can create a result where the signs of the beta weights appear incorrect. Subsequent stepwise or backward elimination methods can show that when variables are not forced a better result is often achieved. A backpropagation solution can virtually ignore some inputs, by using weighting between layers that effectively cancels their input. Hence the problem of having to fit every variable need not occur.

4.1.5 Generalisation performance of the structured network

As one of the main functions of regression analysis and backpropagation is accurate prediction from new data inputs, generalisation performance of the reasoned action network was examined next. This was accomplished within NeuralWorks II by testing the network on data from the opposite condition to that on which it had been trained. Because backpropagation generalisation performance decreases as performance on the training set increases, tests were made on performance across both conditions at a series of training intervals (see Figure 36). The optimum point at which to cease training can be determined by examining the relative accuracy of prediction at each step.

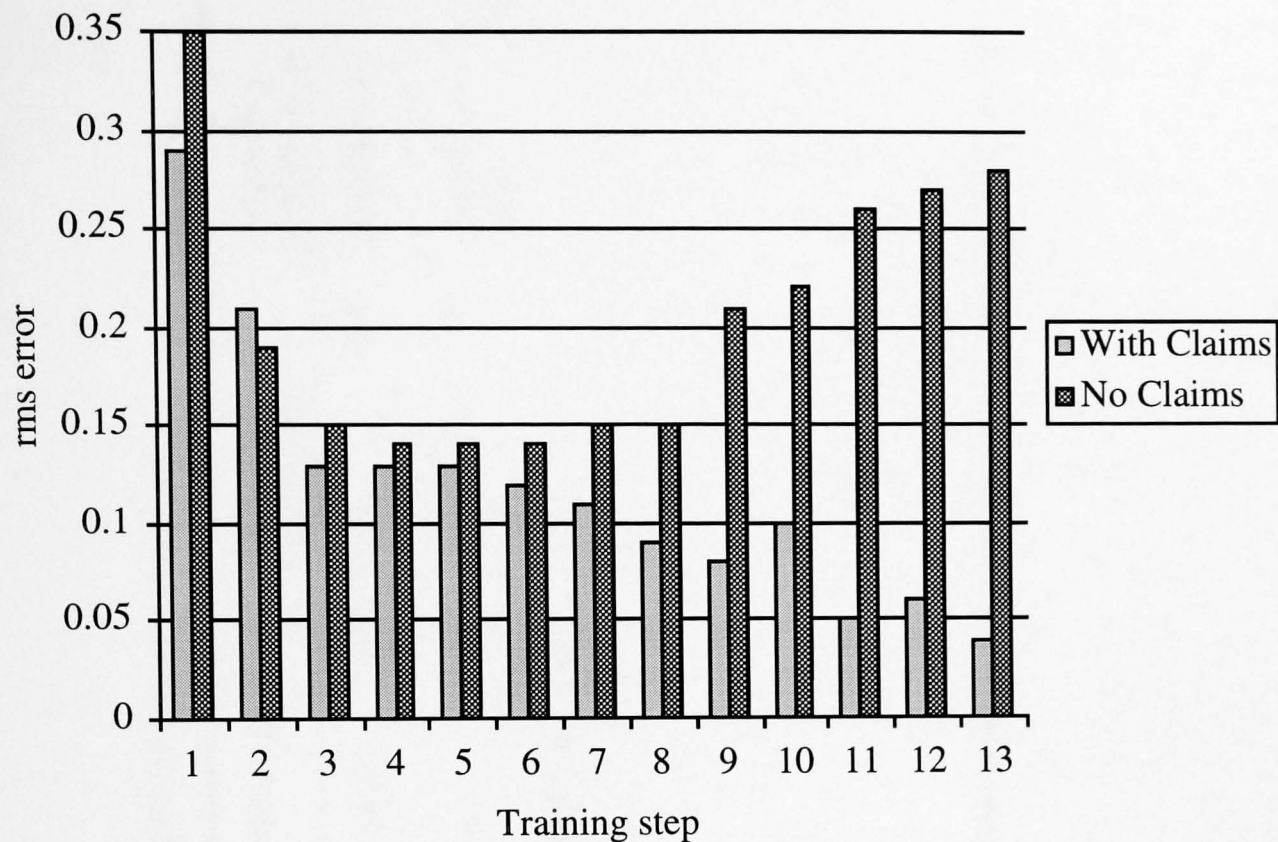


Figure 36 Showing the root mean square error for the training data (with-claims) and the generalisation data (without-claims) over 13 training intervals

Testing was conducted with results at step four as this was the first step at which performance on the without-claims data reached the base of the scree (downward slope) in error descent. Testing revealed a correlation of 0.94 on training data and 0.92 on without-claims data. The high correlation level when testing on training data may have been due to inclusion of *expectation of purchase*, *attitude to purchase* and structured format of the network. However, this level of correlation could prove very useful to market researchers if it were shown to extend to completely different brands of the same type of product.

4.1.6 Principal components analysis of network weights on inputs

Comparison was also made of factors produced with the raw data and those from the 'explain' function in NeuralWorks II. Unlike analyses with raw data these were made using principal components analysis. This was because of the very high communalities that precluded the use of principal axis factoring. The high communalities (which are the degree of mutual explanation of variance by variables on the principal components) are almost certainly due to the distributed nature of the representation.

Table 13 Principal components^a produced using varimax rotation with the 'explain' data (94% of variance explained)

Sensory / nutrition		2nd stage / surface appearance		Healthy / fresh / easy to buy		Pleasing appearance		Familiar / pleasant		Liking for information		Appetising presentation	
Attractive	.94	Attitude to purchase	.94	Healthy	.81	Colourful	.87	Familiar	.84	Like	-.84	Appetising	-.51
Nutritious	-.93	Expectation	.83	Fresh	.79	Happy	-.81	Natural	-.64	Informative	.55	Attitude to label	.94
Tasty	.90	Subjective norm	.72	Wholesome	-.77	Appetising	.75	Interesting	.55				
Empty	-.89	Plain	-.60	Crunchy	-.77								
Convenient	.80	Bright	-.60	Ease of purchase	-.57								
Natural	.67												
Interesting	.65												
Sweet	.50												

^aOnly loadings greater than 0.5 are shown

To some extent output is dependent on every input and connection. Another feature of the analysis is that principal component analysis of the network accounted for 94% of variation in the data compared to 58% with the raw data.

Seven principal components were extracted (see Table 13). Examination was made only of those factor scores that exceeded 0.5. An unusual pattern was revealed whereby principal components included variables that were negatively scored, but not produced with positive scorings elsewhere in the output (except for *natural*). These results are largely due to the highly interconnected representation of the networks' solution. Further principal components analysis using only the secondary stage variables explained 77% of the variance and two components were produced. *Attitude to purchase*, *expectation of purchase* and *subjective norm* separated from *attitude to the label* and *ease of purchase*. This result seems entirely plausible as the *attitude to the label* and *ease of purchase* (perceived control) received relatively low weighting. Also, *attitude to purchase* and *subjective norm* would be expected to form a separate component if the reasoned action model were to be supported.

4.1.7 Generalisation performance of a non-reasoned action structure network

Finally, comparison between the generalisation performance of a non-reasoned action structure network was compared with that from a conventional statistical approach (regression analysis). The non-structured network excluded all the secondary stage variables, *subjective norm*, *attitude to the label*, *expectation of purchase* and *ease of purchase*, as the objective here was the prediction of *attitude to purchase*. Beliefs and outcome evaluations were used in the input layer. There was an 11 unit first hidden layer and one unit second hidden layer (see Figure 37).

The same technique of testing the network at set steps on data from the opposite condition to that used for training was applied (with-claims tested on without-claims). This showed that at step four (9280 presentations of the data) generalisation to without-claims data produced a correlation of 0.67 $p \leq 0.001$. Four steps further into testing

(18560 presentations) correlation between predicted and actual values on the training data was 0.91 $p \leq 0.001$.

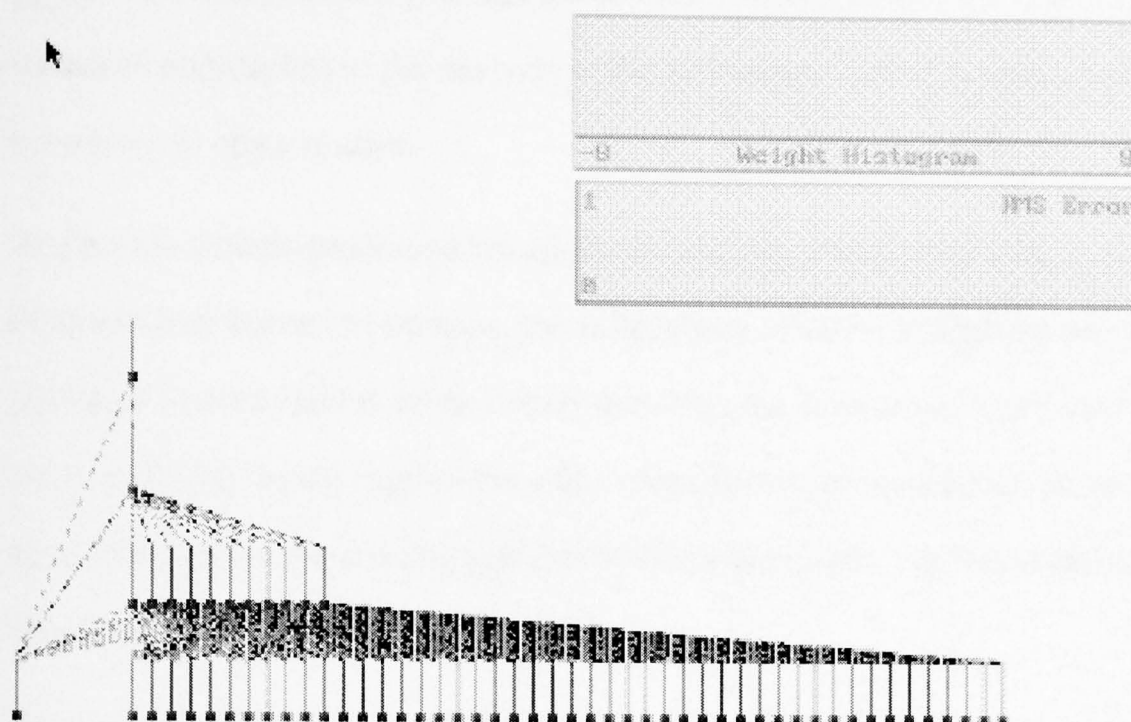


Figure 37 Reasoned action structure network used for generalisation testing, showing rms. learn and recall error graphs on upper left

The conventional statistical approach was conducted by a statistician at the Institute of Food Research. He used principal components analysis to reduce the number of variables, followed by regression analysis against *attitude to purchase*. This produced weights for each variable, that were then used to predict without-claims data. The data reduction produced three components consisting of 13 variables, *appetising, attractive, convenient, familiar, healthy, informative, interesting, like, natural, nutritious, quality, tasty* and *wholesome*. The conventional approach also produced a correlation of 0.67 $p \leq 0.01$. Apart from obvious technical differences between these approaches it should be added that the similarity of the results indicates the solution computed by the network was linear. There would otherwise have been an advantage expected for the network method.

4.1.8 Conclusions

These tests of network performance have answered several important questions regarding their usefulness in this area and have provided further support for the

structure of the reasoned action model. First it has been shown that it is possible to structure a backpropagation network on the model and train it to a very low error level using a significant quantity of real world data. It was also the case that conventional statistical approaches to the analysis of the hidden units were as useful here as they have been in other studies.

Regression models predicting beliefs times outcome evaluations clearly showed that the networks had learned to compute the belief times outcome evaluation procedure. They predicted it more fully than the beliefs and outcome evaluations combined. This provides highly novel support for a key element of the reasoned action model. It also has further psychological implications owing to similarities between network and brain functioning.

Analysis of the weighting placed on inputs within the networks showed a separation of the secondary stage variables *attitude to purchase*, *subjective norm* and *expectation of purchase*. This was revealed both in the 'explain' function results, showing the highest loading for these items and in the principal components analysis. The principal components produced from the 'explain' data were more difficult to categorise than those produced using conventional statistical methods. They were nonetheless highly explanatory (in statistical terms)

Finally, generalisation performance of a fully trained network was very high, suggesting its usefulness as a marketing tool in addition to use for psychological modelling. The network approach matched the performance of conventional statistical methods that required data reduction to use a sub-set of variables. These results suggest that the use of backpropagation techniques for further analysis of the model and marketing research could be highly profitable should they be continued.

5. The Cognitive Representation of Implied Nutrition and Health Claims

The material in this section has been presented at the XIII International Home Economics & Consumer Studies Research Conference (Corney, M.J., Shepherd, R. & Griffin, K., 1993); at the Cognitive section conference of the British Psychological Society (Corney, M.J., Issanchou, S. & Daillant-Spinnler, B., 1993) and at the IV International Food Choice Conference (Corney, M.J., Issanchou, S. & Daillant-Spinnler, B., 1995).

The literature review reported in the introduction revealed two key elements that could be expected to surface in the experiments. First, repeated exposure to stimuli creates expectations and these expectations can determine recollection where memory traces have decayed or are weak. Second, there is a general tendency not to distinguish between the meaning of information that has been asserted from that which has merely been implied. The description of the results of the experiments reported in this chapter shows that these aspects of cognitive processing can appear to be rather contradictory. However, even where this is the case sentence memory levels of processing theory provides a satisfactory explanation.

5.1 Testing recognition of probabilistic claims

In the first study, probabilistic statements were used as the stimuli to compare with assertions. On examination, many of the claims made on food labels are of the probabilistic type, rather than true implications. For example, 'Munchy Bran is a rich source of soluble fibre and when eaten regularly, as part of a fat reduced diet, *has* the effect of lowering blood cholesterol levels' is as an assertion. Stating it *can have* the effect of lowering blood cholesterol levels' is probabilistic.

An implication generally requires some form of bridging inference to be made by the recipient of the communication (Bransford, Barclay & Franks, 1972). The texts used in the present study could be described as hedged pragmatic implications, because of the

propositions they contain (healthy lifestyle for instance). By focusing on individual sentences we were dealing with probabilistic statements.

Following Harris (1983), a tendency to pick asserted claims as the versions shown in the stimulus set was expected. The hypothesis was partly formulated because the syntactic representation, although available in the test set, would be subject to interference from the textbase and situational model levels. This would result because of the delay between presentation and testing. The other aspect was that if we do not generally distinguish between statements of fact and implied information, participants shown probabilistic versions would presumably overlook that the stimuli had not been asserted. The hypothesis therefore, was that those in the group shown asserted claims would tend to be more accurate in their recognition than those who were shown the probabilistic versions.

5.1.1 Method

5.1.2 Participants

There were two separate experiments with slightly different procedures. In the first, thirty-one Food Science undergraduate students took part and in the second thirty members of the public. There were roughly equal numbers of males and females in both participant groups. Participants were paid five pounds and the experiment was described as a computer based analysis of ‘...how people process food labelling information’.

5.1.3 Design

The experiments were between-subjects designs. In both experiments the participants were given the same test sentences. The independent variable was presentation of either assertion or probabilistic forms of predominantly diet related label marketing texts as stimuli.

5.1.4 Materials and Procedure

The texts were presented on computer using a software package that allowed automatic randomisation and data collection. Mouselab (Johnson, Payne, Schkade & Bettman,

1986) allows control of the presentation of material by the participants' use of a mouse (an example of program code used is given in section 7.8 on page 178). After reading through the instructions, participants were able to progress through the experiment by clicking on the response box at the base of each screen.

Test and stimulus screens (separate displays of information on the same computer monitor) were independently randomised for each participant. Presentation of test sentences within screens was also randomised. Participants were given a typed sheet that contained the following information:

'The experiment will show you a series of product information texts. Following the presentation of this series you will be shown a presentation consisting of 3-way choice screens. Each choice screen gives you 3 alternative texts, one of these you will have seen in the first presentation series. Your task is to select the text you saw previously by clicking the appropriate selection box at the bottom of the screen'.

The stimuli consisted of 14 product marketing texts. Texts were taken from products obtained in a local superstore. Products consisted of the following: Three varieties of bran cereal. Two varieties of high bran bread. One variety of low salt cracker. One mouthwash. One toothpaste. Two varieties of soap. Two varieties of shampoo. Two varieties of vitamin supplements.

Two alterations were made to texts, brand name changes and conversion of probabilistic statements to assertions for the assertion set. Shown next is an example of one of the texts; note that highlighting of differences is only for clarification.

Probabilistic version

'Suffolk's Natural Bran

Nowadays we tend to eat less fibre than we used to in the past as the modern processing of food like white flour involves the removal of much of the raw materials. Because of these changes, we should try to

eat plenty of roughage and Suffolk's Natural Bran *can help to / provides* the dietary fibre that is an essential part of a well-balanced diet'.

Following presentation of the 14 stimulus texts, the test items were presented. Three sentences were displayed on each test. The following is an example of the test and was used for the text shown above.

Suffolk's Natural Bran

Sentence 1. Suffolk's Natural Bran provides the dietary fibre that is an essential part of a well balanced diet

Sentence 2. Suffolk's Natural Bran can help to provide the dietary fibre that is an essential part of a well balanced diet

Sentence 3. Suffolk's Natural Bran gives you a sugar coating that you will find an irresistible part of your breakfast

Items one and two were respectively taken from the assertion and probabilistic stimuli. Item three is a false control; either a false control or an indeterminate sentence was included in each test. False controls were either unrelated to the targets, or as in this case, related but having a different meaning to the stimuli. Indeterminate items were constructed to reflect half the original information. The remaining portion of the indeterminate sentence was designed to follow the false control construction. This enabled checking participants were attending to the task.

Using a text analysis program, comparison was made between the two sets of stimulus materials to examine whether they differed grammatically. The differences were found to be slight (CorrecText, 1990). All the texts used in the British experiments are listed in section 7.9 on page 182.

At the bottom of each test screen the following visual reminder was set above three check boxes; 'Which sentence did you see?' In experiment two, participants were also asked to write down why they chose each of the fourteen texts. The penultimate screen

allowed participants to record their confidence level on responses to the test items. Confidence scaling was continuous on a scale of 1 to 10. Scale anchors used were 'not confident' and 'completely confident'. The final part of the test recorded the method of recall by using a choice of five options: 'Memory'. 'Strategy'. 'Don't know'. 'Other'. 'Guessed'.

5.1.5 Results

Results from the two experiments were very similar (see Figure 38). Those in the probabilistic condition (i.e. shown probabilistic stimuli) scored significantly higher than those in the assertion condition. A negligible number of fillers and false controls were picked. For the students, the mean number correct in the probabilistic condition was 8.5, versus 5.1 for the assertion condition ($t(28) = -3.85, p < 0.001$). From the public there was a mean score correct of 8.7 in the probabilistic condition, versus 5.3 in the assertion condition ($t(28) = -3.91, p < 0.001$). No correspondence between confidence level and the number of correct scores was detected. These results show that the hypothesis that greater error would occur in the probabilistic condition was incorrect.

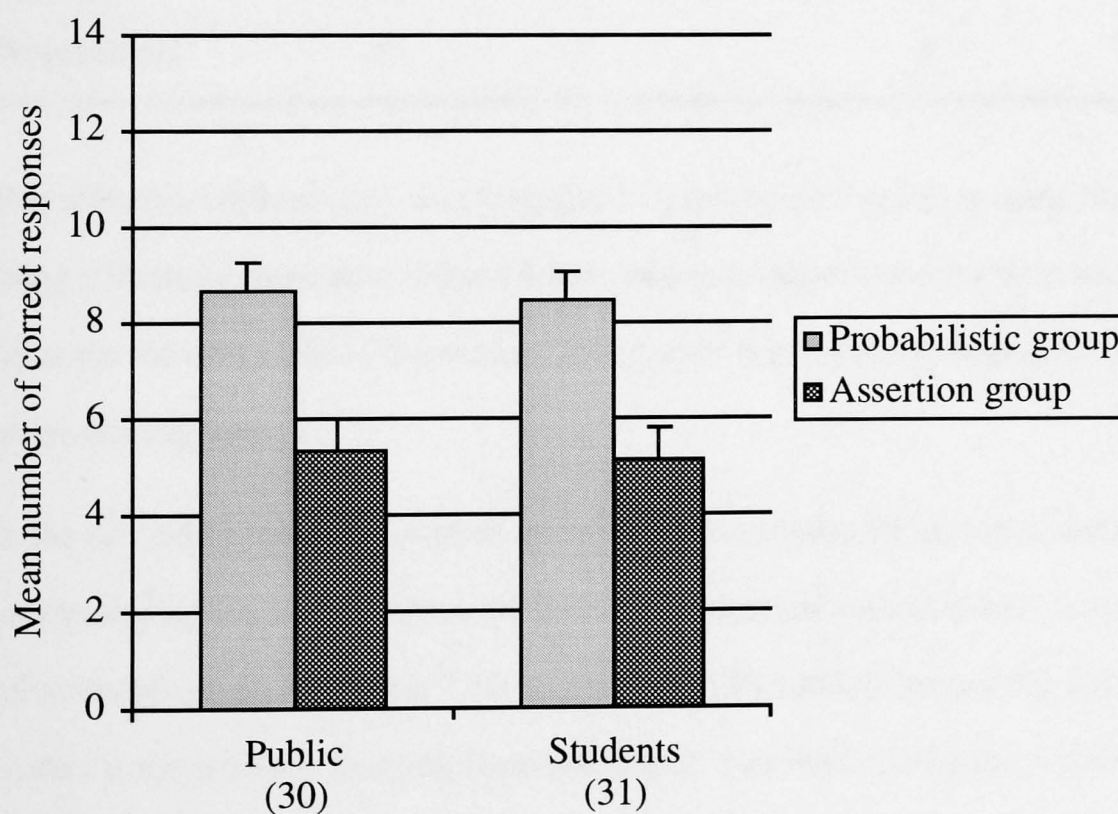


Figure 38 Probabilistic versus asserted mean scores from both studies

A significant condition by product text interaction was found in both sets of results. The data from the students showed that on eight of the fourteen products recognition scores differed significantly between conditions and that on all but one of these recognition scores were higher in the implication group. The result from the members of the public was six significant differences in favour of those shown implications.

The consistency of each participants' responses was also examined. For each participant, the probability of the responses occurring by chance was calculated, with a criterion value of $p = 0.05$. Thus a subject could be responding at a chance level, be consistently correct, or be consistently incorrect. It is striking, that those in the assertion condition were consistently incorrect, i.e. they were not simply responding randomly, but consistently picking probabilistic versions (see Table 14).

Table 14 Showing the numbers of consistent scorers in the recognition task (11 or more texts selected from the same condition)

Condition	Food Science Students		Members of the Public	
	Correct	Incorrect	Correct	Incorrect
Assertion	1	7	1	4
Probabilistic	8	1	8	0

The selection method used data revealed 21 participants reporting using memory, 24 using a strategy, zero who did not know, two used some other method and six guessed (data for the first eight of the student group were not recorded because of a programming error).

In the second experiment, content analysis of the reasons for selection data was based on identifying the classification method (an example of a participants' reasons for selections is given in section 7.10 on page 186). Responses were only deemed to be correct if the relevant wording from the stimuli was used. Using the Suffolk's Oat Bran example, correct responses would include the words 'helps' or 'provides' to be classified as correct ('helps' would be correct for the probabilistic stimuli and 'provides' for the assertion stimuli). This showed that a similar number in each group

were making selections based on whether the sentence was probabilistic or asserted. Assertion and probabilistic groups were scored as having 48 and 66 correct reasons (respectively). The difference between the groups was made up by the number of responses that were unclear on the basis for selection, 30 and 11 (respectively). As the number of participants selecting consistently in each group was similar this correspondence might be expected.

5.1.6 Discussion

The results led to a rejection of the hypothesis of a significant tendency to mistakenly recollect having been shown assertions by those in the probabilistic condition, as there was a highly significant effect in the opposite direction. This was also indicated very clearly on the consistency test.

The method used data showed that half of the participants reported using memory and half reported using a strategy to make their selections. Roughly half the participants in each experiment selected probabilistic or assertion versions consistently, 17 in the first and 13 in the second experiment. This result may indicate that approximately half of the participants were conscious of the salience of the assertion / implication difference.

The results can be interpreted as due to a situational model (Kintsch, Welsch, Schmalhofer & Zimny, 1990) / schema process (Brewer and Nakumara, 1984). Because we do not regularly see food products asserting beneficial effects for our health, we would tend to recognise the probabilistic forms, which are the more common occurrences. However, participants viewing these texts are not assumed to have completely distorted recognition processes. Rather, it is that the constructive nature of the memory process that allows inferences that lead to a recollection bias. In any case, not all instances of similar advertising texts follow avoidance of asserting claims. The memory bias may be consciously realised, leading to the adoption of a strategy, or its effect may be weaker and preconscious, leading to a relatively patchy realisation. However, the situational model / schema representation was sufficiently influential to submerge any textbase level effect found in Harris's results.

5.1.7 Conclusions

The present findings reveal a consumer who is aware of marketing techniques and able to differentiate between assertion and probabilistic forms of label information. That most UK consumers expect claims to have been regulated and appear in probabilistic form meant that those given assertions were consistently wrong in their recollections.

5.2 Testing recognition of paraphrased implied claims

This experiment examined using paraphrases of both implied and asserted forms in the test set. The hypothesis was altered to suit the findings of the previous experiment. The hypothesis therefore, was that participants in the implication condition should be more accurate in their recognition because of a situational model / schema representation indicating such claims would generally be implied.

5.2.1 Method

5.2.2 Participants

The experiment included 30 members of the public (25 females and five males). They were paid £5.00.

5.2.3 Design

A between-subjects design was used. One group of subjects received stimuli in implication form and the other group in assertion form. Recognition of the paraphrase matching the stimulus was required. The test set comprised an assertion paraphrase, an implication paraphrase and a filler item.

5.2.4 Materials and Procedure

Nine stimulus items were used, all extracts from then current UK food label marketing information. The brand names were altered to reduce the possibility of recognition. Three types of implication were used: expansion, uniqueness and reasonable basis. These have been identified as common types of implications in marketing material (Preston, 1977). An example of each type of implication used is given here:

Expansion implication, 'Choose Croxley's Lean Beef Lasagne. Low fat foods can be good for your body and figure'.

Uniqueness implication, 'Finnagan's Bran contains Wheatbran.

Emerging evidence suggests Wheatbran could play an important role in maintaining a healthy digestive system'.

Reasonable basis implication, 'Thames Toasted Wholegrain Oat Cereal Bars contain wholegrain. Dieticians' recommend Wholegrain because the body converts the energy they contain slowly, the way nature intended'.

The expansion implication allows a bridging inference, linking two statements, and is the most common type. '...Lean Beef Lasagne' may be linked to the follow-on sentence containing the statement 'Low fat foods can be good for your body and figure'. The bridging inference would link 'Lean' with 'Low fat foods can be good...' implying that the product *would* be good for your body and figure. Uniqueness implications imply that the product has a quality that is peculiar to it, or that the product contains an element that has unique properties. In the case of Finnagan's Bran, 'Wheatbran could play an important role in maintaining a healthy digestive system'. Reasonable basis implications, allow the inference that a particular condition exists because the information contained in the statement is authoritative. Thames Toasted Wholegrain Bars contain wholegrain which *Dieticians* recommend...'.

The paraphrases and fillers that were presented on the test, used with the implications referred to above, were as follows:

Expansion implication test set:

Assertion form; 'Croxley's Lean Beef Lasagne chosen because you care about your figure'.

Implication; 'Choose Croxley's Lean Beef Lasagne. Low fat foods can be good for your body and figure'.

Filler; 'Croxley's Lean Beef Lasagne is covered in a delicious red wine sauce for flavour'.

Uniqueness implication test set:

Assertion form; 'Finnagan's Bran contains Wheatbran which emerging evidence shows plays an important role in maintaining a healthy digestive system'.

Implication; 'Finnagan's Bran contains Wheatbran. Emerging evidence suggests Wheatbran could play an important role in helping to maintain a healthy digestive system'.

Filler; 'Finnagan's Bran contains Wheatbran. With three packet tokens you can send for your free inflatable beach ball. Why not start collecting your tokens now?'.

Reasonable basis implication test set:

Assertion form; 'Dietician's recommend Thames Toasted Wholegrain Oat Cereal Bars because the body converts the energy they contain slowly, the way nature intended'.

Implication; 'Thames Toasted Wholegrain Oat Cereal Bars contain Wholegrain. Dietician's recommend Wholegrain because the body converts the energy they contain slowly, the way nature intended'.

Filler; 'Thames Toasted Wholegrain Oat Cereal Bars contain a galaxy of wholesome ingredients. Eat Thames value for money bars and you won't be disappointed'.

The paraphrases were tested for accuracy (see Figure 39). Eleven Institute of Food Research staff and placement students rated the implication and assertion paraphrases against their corresponding and opposite stimuli. This was done to ensure that each assertion paraphrase was a satisfactory match for its stimulus item and not an equal or better match for the corresponding implication (and vice versa with the implication stimuli and test paraphrases). This analysis revealed no significant mis-matches.

Differences on grammatical construction were minor, e.g. the relative number of compound noun phrases (CorrecText, 1990).

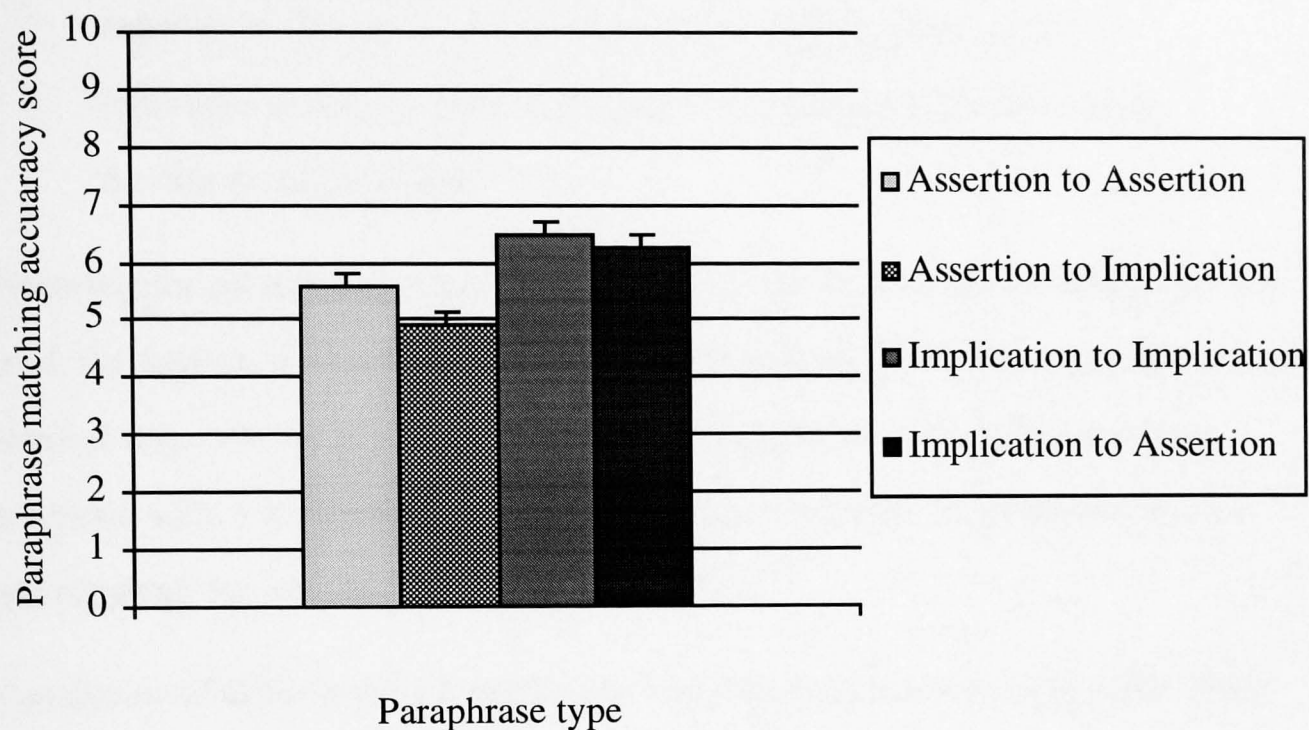


Figure 39 Paraphrase match ratings produced from the scores of 11 judges

The initial information given to participants in the first experiment was as follows,

‘The experiment requires that you examine the information on the following screens in order that you may be able to answer a series of straight forward questions about that information. The questions will be presented at the end of the series of presentation screens’.

Participants were given a trial run on a practice program to familiarise them with the use of the computer and making responses using the computer mouse. The experiment programming environment Mouselab, (Johnson, Payne, Schkade & Bettman, 1986) was again used to code the system. Orders of presentation of the stimuli and test paraphrases were independently randomised for each participant. Data were collected automatically by the system.

After presentation of the stimuli, participants were given the following instructions:

‘There will now follow a presentation of question screens. Each screen will contain three paraphrases. One of these is an accurate paraphrase of a portion of the original display of the advert seen in part one of the experiment. The other two are not accurate. Please select which you remember seeing by clicking on the relevant response selection box at the bottom of the screen’.

Following the paraphrase selection a confidence scale with a range marked 1 - 10 was used. Participants were asked: ‘Please state how confident you were the paraphrase you selected was an accurate paraphrase of the relevant portion of the advert you were presented with. 1 = not confident 10 = completely confident’. Participants moved a pointer along the scale to indicate their response.

Completion of this computer based testing was followed by a three item paper based questionnaire in which participants wrote down what they understand by the terms ‘paraphrase’, ‘implication’ and ‘assertion’.

5.2.5 Results

The number of correct paraphrase identifications was significantly higher from those participants in the implication condition (see Figure 40). The mean number of correct identifications in the implication condition was 5.5 (S.E. 0.38), compared to 4.0 (S.E. 0.48) for assertion condition participants ($t(28) = 2.52, p < 0.05$). This result confirms the prediction of greater identification accuracy in the implication group. There was no significant difference between groups on confidence of correct selection.

Although not principally interested in potential differences between texts, analysis of variance by condition and product revealed a significant interaction ($F(8) = 2.0, p < 0.05$) that merited examination. Individual testing across conditions for each text showed only two differed significantly. The first of these was the Croxley’s text given as an example of an expansion implication (implication group 7.2 (S.E. 0.86), assertion group 1.2 (S.E. 0.82), $t(28) = 4.75, p < 0.001$).

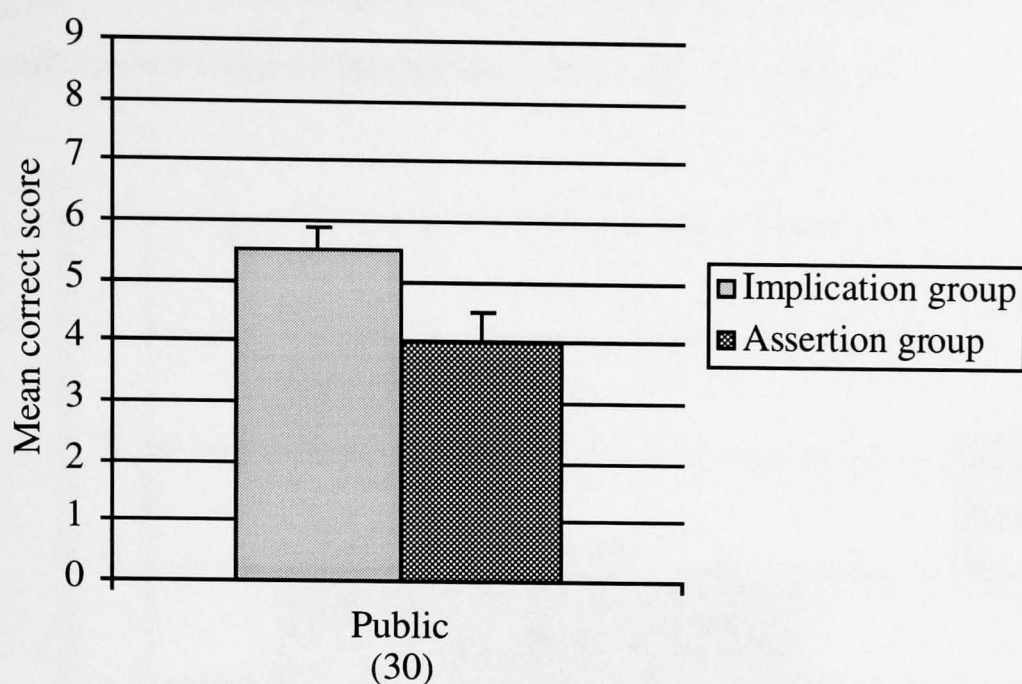


Figure 40 Intermediate term memory results, showing the mean correct scores

The second text that differed significantly was a reasonable basis implication; the implication paraphrase was 'Aloha Crackers contain fibre. Medical evidence shows a high fibre intake is necessary for a well-balanced diet' and the assertion form, 'Aloha crackers are the ideal way to increase the fibre intake medical evidence shows is necessary in a well-balanced diet' (implication group 7.8 (S.E. 0.82), assertion group 4.8 (S.E. 1.2), $t(28) = 2.07, p < 0.05$).

The results of the questionnaire testing comprehension of the terms 'paraphrase', 'implication' and 'assertion', revealed a mean overall score of two from a possible maximum of five (see Figure 41). Questionnaire data were analysed by taking the mean score rating given by four judges (Institute placement students). The judges rated the responses for accuracy of definition and were assisted in this by having to hand a printout of dictionary definitions and thesaurus entries relating to these terms.

Participants who rated 50% or better on accuracy of comprehension provided a 12 subject subset. No significant difference of correct identifications was found between the assertion and implication groups formed by this subset (5.1 from those shown assertion stimuli and 5.6 from those shown implication stimuli). This similarity may

suggest that the advantage shown by the implication group overall was not a result of explicit knowledge of the assertion / implication distinction.

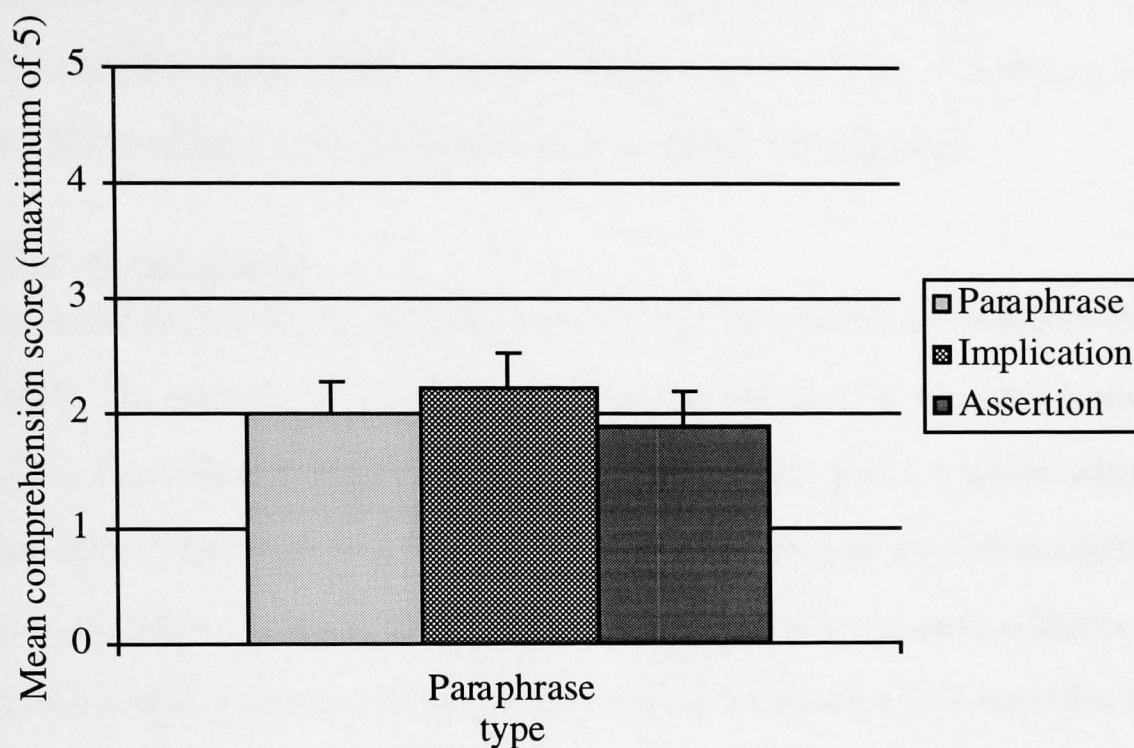


Figure 41 Comprehension of the terms paraphrase, implication and assertion

Participants who consistently made assertion or implication paraphrase selections provided a further subset. Participants were classified consistent if they picked seven or more paraphrases of one form ($p = 0.05$). There was little overlap between this subset of nine and that provided by selecting participants rating higher on comprehension accuracy; only two participants were in both subsets. The mean identification accuracy was 3.0 for those consistent who were shown assertion stimuli (S.E. 1.3) and 7.5 for those consistent who were shown implication stimuli (S.E. 0.3), ($t(7) = 3.09$, $p < 0.05$).

Because the higher scorers on the comprehension questionnaire were not consistent, this result could also support the argument that selection was largely due to inferential processing. If subjects have an implicit belief that claims are implied, those in the implication condition would have their recognition processes aided. Conversely, those in the assertion condition could experience an incongruence between their beliefs and memory traces of the texts. Most of the consistent assertion group scorers were less

influenced by memory traces than by their beliefs. You may recall that analysis of the transcripts of participants' reasons for choices on the task, in the previous experiment, suggested that people pick statements that use non-assertive phrasing like 'helps'. Similarly, participants tended to make comments such as 'I don't think they could say that'. This indicated a general belief that these claims are regulated.

5.2.6 Conclusions

The results show that UK consumers expect food label health and nutrition claims to be implied. The experiment used intermediate term memory. Experimentation testing recollection several days after presentation of the stimuli would establish whether any other effects tend to occur in long term memory. The tendency to select implication forms could be expected to increase because of the relatively greater influence of the situational model / schema level over the textbase level with an extended test delay. This could be anticipated to result in a significantly increased bias toward picking the implied claims.

5.3 Testing long term incidental memory of paraphrased implied claims

The next experiment therefore used the same basic methodology as the intermediate term memory test, i.e. it used nine stimulus texts in a between-subjects design with a forced recall test for each text. The same texts were re-used. A modification was that participants were given a cover task, rather than being told from the outset that they were taking part in a memory test. Therefore, it tested incidental rather than intentional memory. The hypothesis was that participants would show a greater tendency to select implied claims than in the test of intermediate term memory.

5.3.1 Method

5.3.2 Participants

Twenty-two females and three male members of the public from the Reading area were recruited by newspaper advertisement.

5.3.3 Design

A between-subjects design was used with half the participants seeing the stimuli in assertion form and half viewing them in implication form. Nine stimuli were used and the test materials each consisted of an assertion and implication paraphrase and a filler. The design included measures of confidence of correct selection and paraphrase accuracy.

5.3.4 Materials and procedure

Nine stimulus texts, previously used and described in the intermediate term recognition test, were presented one at a time on a computer screen in randomised order for each participant. Participants were instructed to read each product text and then give an attitude rating toward it and their likely purchase intention, using scales displayed on the screen. They had already been informed two sessions would be necessary. They were asked to return at the same time the following week to rate more product texts. In most cases this initial task took less than 30 minutes.

Upon their return the following week, participants were informed that they had previously been given a cover task and that what was really required was a measure of their memory of the texts they had been shown seven days ago. They then completed the procedure in much the same way as in the intermediate term study. This task was completed in around 20 minutes. Participants were then given a combined payment of £16.00 for their two visits.

5.3.5 Results

The dual hypotheses of larger error from the assertion condition participants and a more significant difference between the groups were supported (see Figure 42). Differences on attitudes toward the texts, purchase intentions and viewing times were not significant.

The mean score correct in the implication condition was 5.92 (S.E. 0.56) and in the assertion group 2.92 (S.E. 0.33), ($t(23) = 4.72, p < 0.001$). Analysis of variance revealed no significant interactions across product texts on any of the measures

reported. Although, the intermediate term memory result was also significant ($p < 0.5$, 5.5 versus 4.0), the size of the effect was obviously much smaller. As the surface and textbase levels had faded from memory, recognition had to rely virtually completely upon the situational model / schema level.

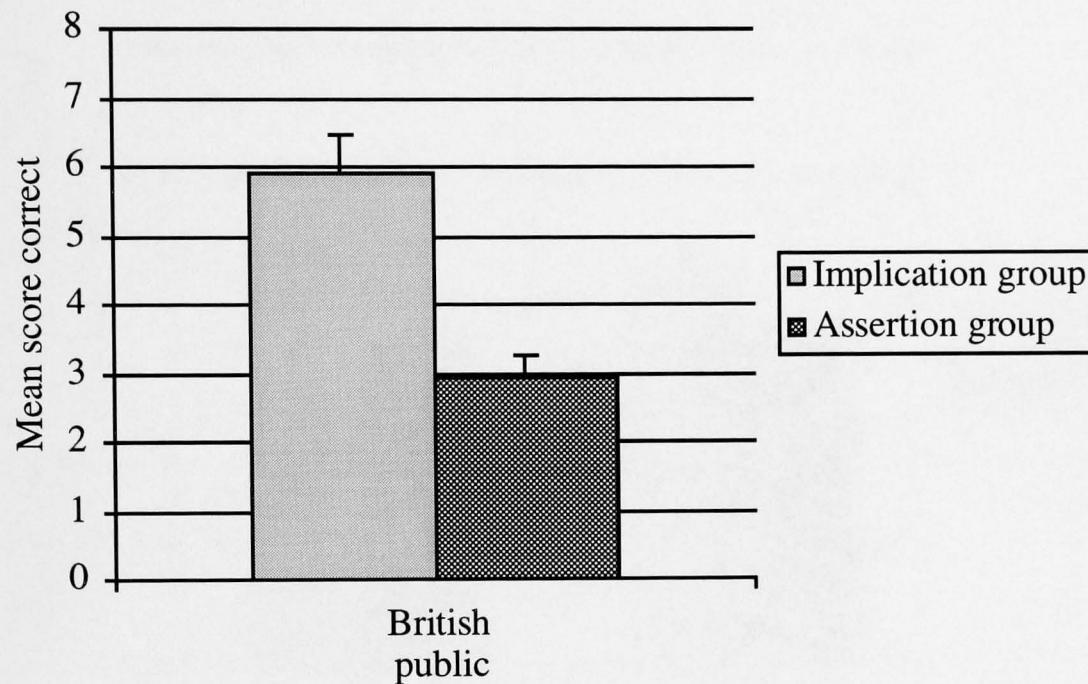


Figure 42 British long term memory mean correct scores

The confidence and accuracy scores also differed significantly, the scores once again higher from those in the implication condition in both cases (see Figure 43).

Confidence of correct paraphrase selection in the implication condition was 6.62 (S.E. 0.38), versus 5.24 (S.E. 0.31) in the assertion condition ($t(23) = 2.80, p < 0.01$). The paraphrase accuracy ratings were 6.42 (S.E. 0.38) in the implication condition and 5.29 (S.E. 0.29) in the assertion condition ($t(23) = 2.46, p < 0.05$). Still using the mean scores from each participant, there was a much higher correlation between confidence and accuracy scores from those in the implication group ($0.96, p < 0.001$) than in the assertion group ($0.61, p$ not significant).

5.3.6 Conclusions

These results offered convincing support for interpretation by sentence memory levels of processing theory. If the item to be recognised is congruent with your experience (i.e. your situational model / schema) you should have relatively higher confidence that

the correct paraphrase has been selected than if shown assertion stimuli (where a lower level of confidence, perceived accuracy of paraphrasing and correlation between these would be likely). The results also showed the expected significant increase in the effect of the situational model level bias toward choosing implied versions of the claims.

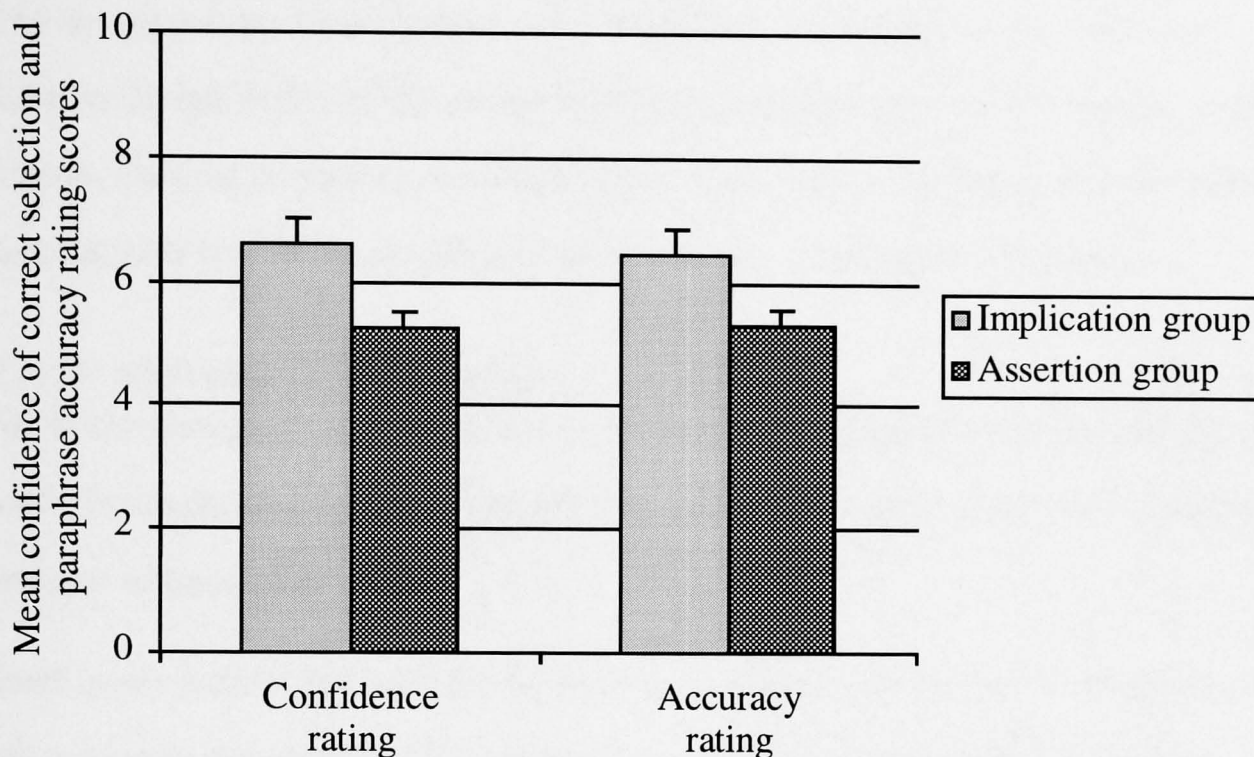


Figure 43 Long term memory confidence of correct selection and paraphrase accuracy rating scores, showing significantly higher confidence and accuracy ratings from those in the implication group

5.4 Long term incidental memory of paraphrased implied claims in France

The same methodology was then tried with French members of the public in France. As well as it being important to understand our European partners, a cross-cultural approach would be a useful further test of the situational model / schema explanation. The hypothesis was that French members of the public would also show a significantly greater tendency to choose the implied versions as the relevant legislation in France was similar to that in the UK. However, the effect size was anticipated to be smaller owing to a relatively lower level of the use of such claims in the supermarkets we surveyed in the area of the study (Dijon). Therefore there was less likelihood of a well-established situational model / schema.

5.4.1 Participants

Forty-two females and eight male members of the public from the Dijon area were recruited. It was stipulated that participants must be responsible for at least half of their families weekly shopping.

5.4.2 Design

The design was the same as that used in the British experiment. It was a between-subjects design, with half the sample viewing asserted stimuli and half viewing implied stimuli. Data for confidence of correct selection, paraphrase accuracy, stimuli viewing time, attitude toward the stimuli and likely purchase intention were collected.

5.4.3 Materials and procedure

Six of the stimuli and test sets, used in the British experiment, were translated and used with French product and brand names. Three texts were replaced with new versions because of translation issues.

Participants came to the Agricultural Research Institute in Dijon, made their ratings of the randomly presented stimuli and then returned the following week. The actual purpose of the experiment was only revealed on their return, when they were instructed to perform the same selection process as the British sample. They were each paid 80 francs.

5.4.4 Results

Contrary to the hypothesis that the French sample would show the same, but relatively smaller effect, no effect was found (see Figure 44). Both groups were simply scoring at chance level. The implication group produced a mean score of 4.24 (S.E. 0.37), versus 4.48 (S.E. 0.36) from the assertion group. The other measures also revealed no significant differences between conditions.

However, analysis of variance of product text by condition revealed a significant interaction, with three texts differing significantly across conditions. The results showed that in two cases the assertion group selected significantly more accurately and in one case for the implication group.

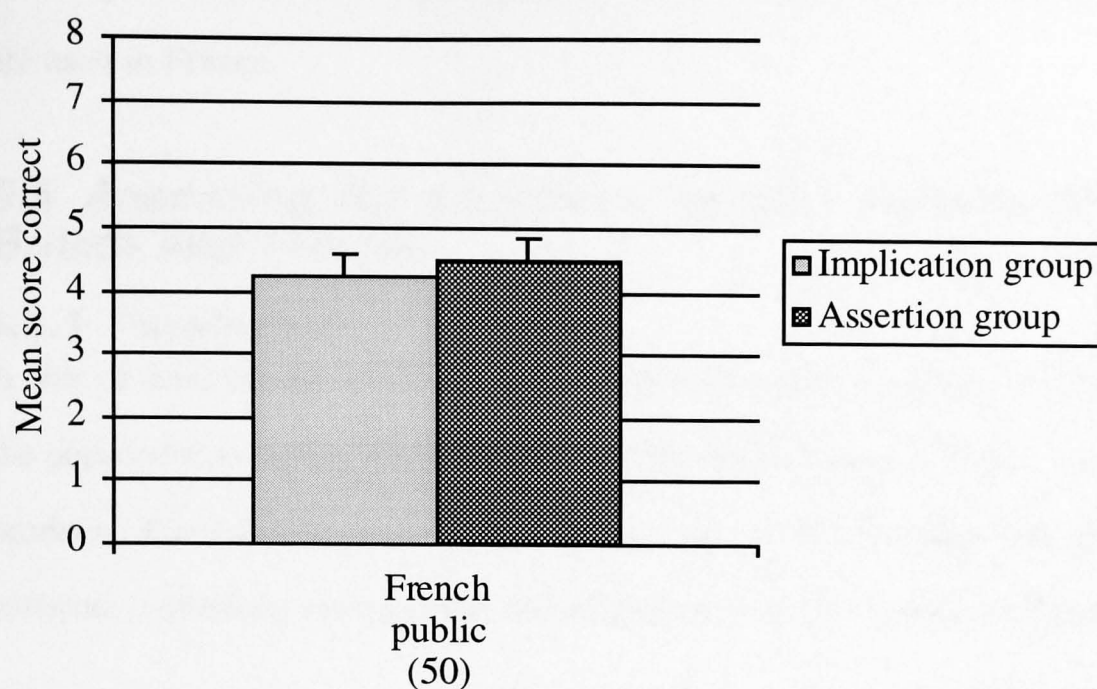


Figure 44 French long term memory mean number correct per condition

Presenting the implication then assertion scores, the results were as follows; 6.48 (S.E. 0.46), versus 3.24 (S.E. 0.49), ($t(48) = 2.68, p < 0.01$) for product one; for product two, they were 3.24 (S.E. 0.49), versus 6.12 (S.E. 0.48), ($t(48) = -2.34, p < 0.05$) and for product nine, 2.88 (S.E. 0.48), versus 6.84 (S.E. 0.44), ($t(48) = -3.41, p < 0.001$).

Product one, an expansion implication, was a translation of the Croxley's text given as an example above and found to differ significantly across conditions in the interaction analysis of the British intermediate term test. The result was the same, the implication group significantly more often picked the right paraphrase. Product text two was also a translation, but did not differ significantly in the British results. It was a translation of the Finnigan's Bran text, given as an example of a uniqueness implication in the British materials and procedure section. Product text nine was a uniqueness implication and one of the three texts that were not used in the British test materials. This gives some indication that the French were inclined to believe the uniqueness claims.

5.4.5 Conclusions

It must be the case that the French sample did not have a situational model / schema that would lead them to infer that the health and nutrition claims would be implied. This was

probably because a stable representation had not been formed as far fewer such claims are used in France.

5.5 Assessing the situational model / schema of the British and French

5.5.1 Introduction

A way of determining whether it was a situational model / schema difference between the population samples was provided by using photographs of French and British products. These had been electronically scanned and manipulated with photo-editing software to produce versions that had all their textual information removed.

They were then printed in colour at actual size and given to participants with the request that they should fill in the information that we had removed (see Figure 45). If the participants had expectations that marketing health and nutrition claims would be used, they could reproduce them, along with brand names, logos and other information that they would expect to appear. The hypothesis was that the French sample would produce relatively fewer health and nutrition claims than the British.

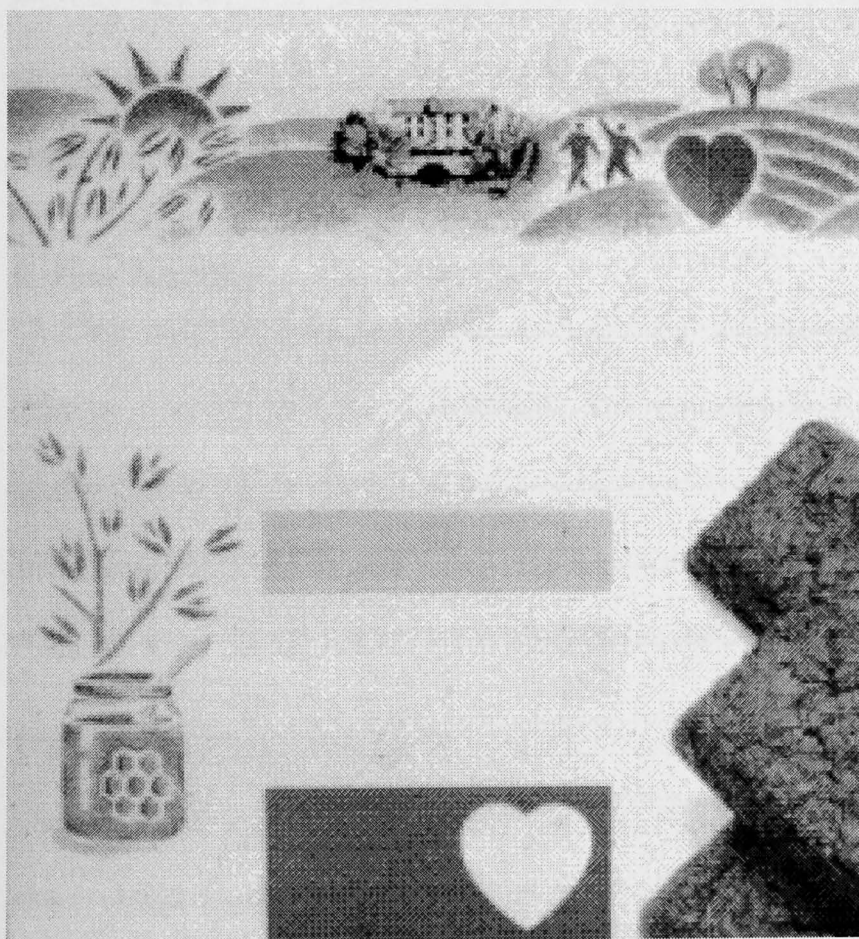


Figure 45 An example of one of the drawing sheets given to participants

5.5.2 Method

5.5.3 Participants

Twenty-one French members of the public from the Dijon area and 34 British members of the public from the Reading area participated.

5.5.4 Design

A content analysis of British participants' responses was made by the author and then the French participants' responses by the collaborating French researcher (Sylvie Issanchou), following joint consultation. Having categorised responses, a comparative frequency analysis was made between population samples.

5.5.5 Material and procedure

Each participant was given several life size full colour photo-edited images of locally available food packages. All textual information had been removed from the images leaving them purely graphical in their presentation. Where text had been removed, colour and texture from the surrounding area were cloned-in to replace the resulting gaps. French participants were given nine images and the British sample seven images. Participants were informed about our manipulation of the images and were instructed to use colour pens to replace the information they thought had been removed or would expect to see on such packages (see Figure 46 and Figure 47).

5.5.6 Results

Thirteen categories were identified in the content analyses. Of these categories two were related to health and nutrition claims. The percentage of responses falling into these health and nutrition claim categories was just short of four times greater in the British group (see Figure 48). This clearly supported the situational model / schema hypothesis and provided explanation of the population differences on the memory tests.

The percentage of direct health claims in the British sample was 7.2% of all items produced and 2.6% in the French sample. Nutrition claims accounted for 15.8% of the items in the British and 3.6% of items in the French sample.

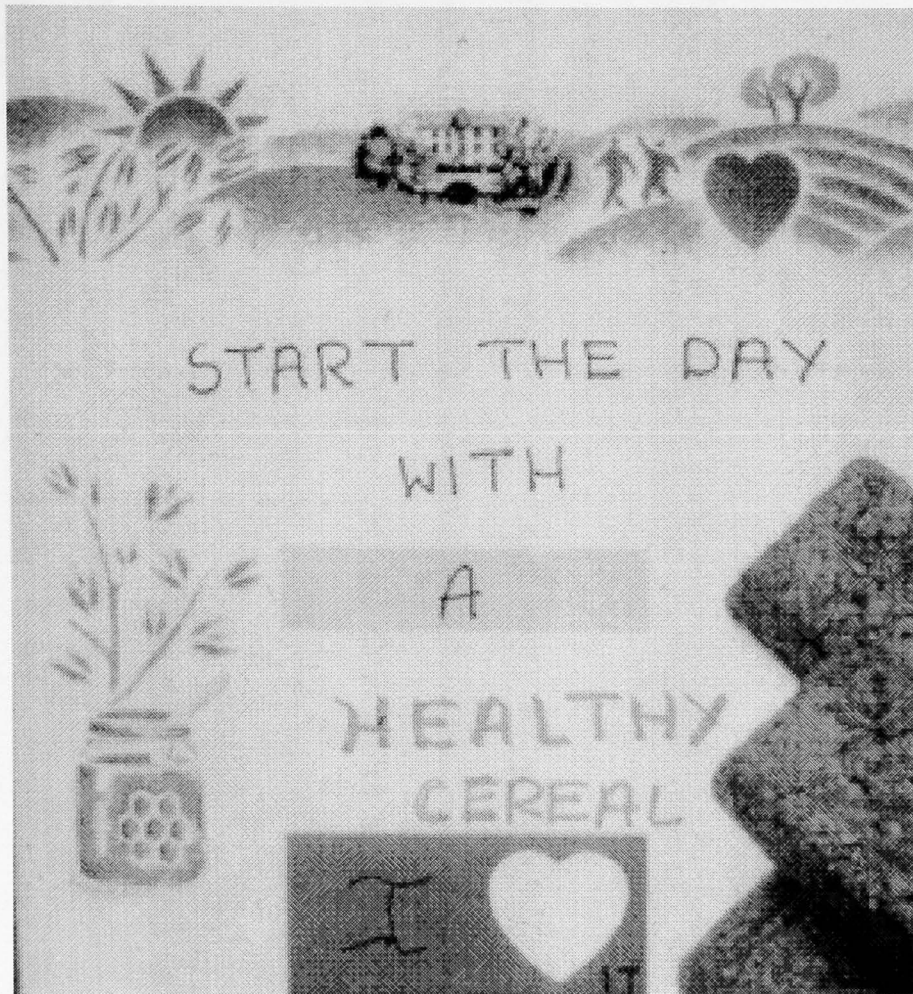


Figure 46 Example of a health claim

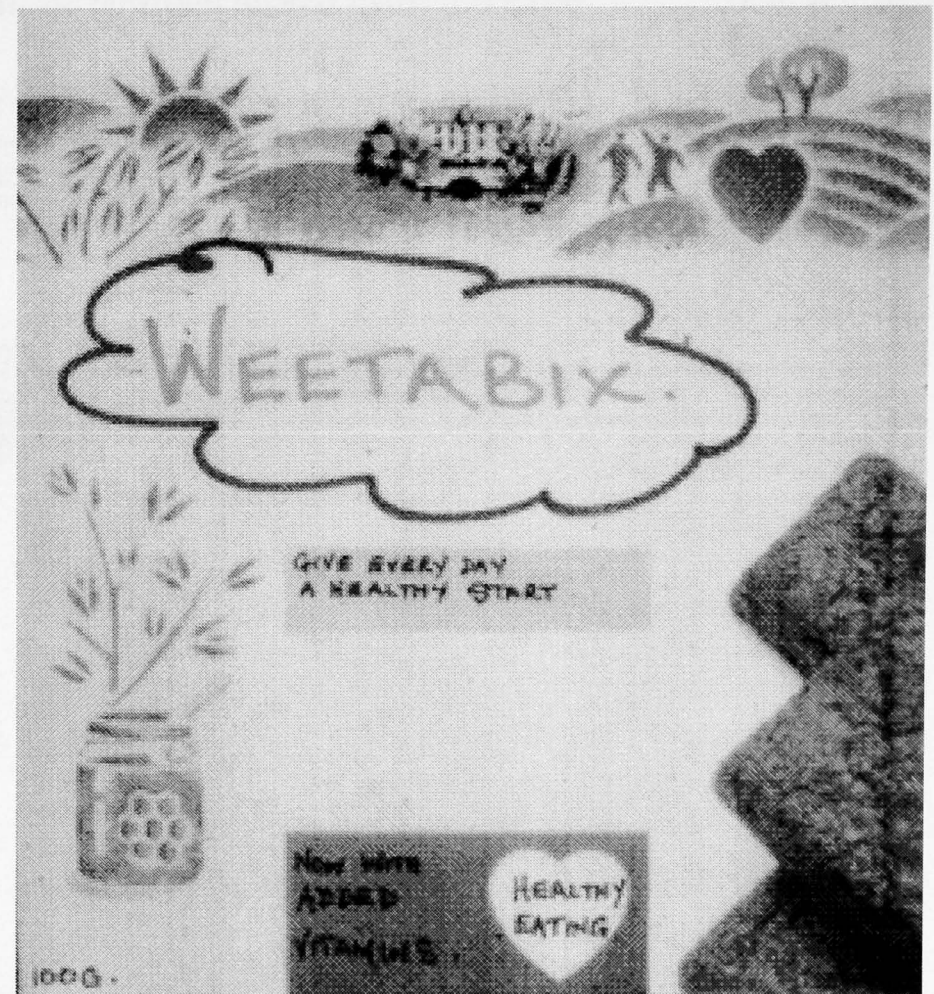


Figure 47 Example of health and nutrition claims

In total, therefore, almost a quarter (23%) of the items produced by the British were related to health and nutrition claims while only 6.2% of the items were thus related in the French sample. Clearly, the health and nutrition claims were a significant preoccupation of the British participants.

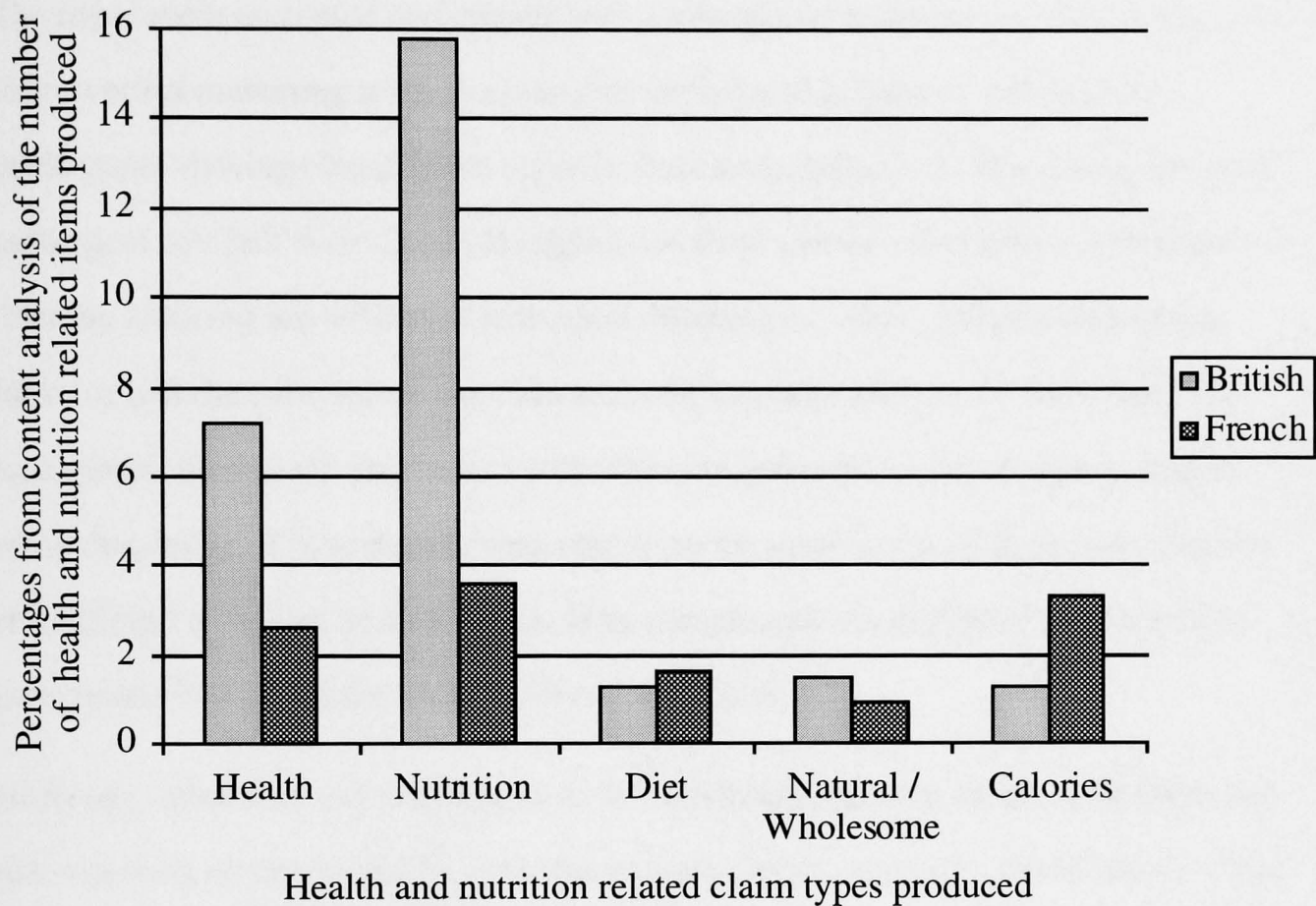


Figure 48 Percentages of responses falling into health and nutrition claim categories, from the British and French label information expectation studies

5.5.7 Conclusions

The French sample showed relatively lower expectations that health and nutrition claims will appear on their food packages. Because their expectations are much lower and they see far fewer claims, a situational model / schema has not been formed. This is why there was no bias toward either asserted or implied claims in the memory task.

5.6 An improved version of Harris's methodology

Finally, replication of Harris's (1983) result was sought, using the same computer based approach as the earlier experiments.

5.6.1 Method

5.6.2 Participants

Twenty-nine members of the public were recruited by newspaper advertisement (22 females and seven males). Participants were paid £5.00.

5.6.3 Design

The experiment presented participants with a mix of four assertion and four implication form product marketing texts. A cross-over design was employed with half the participants viewing claims in the opposite form to the other half. This meant that each participant saw half their stimuli in implication form and the other half in assertion form (thereby reducing any effects of individual differences). Also, claims shown in one form for half the participants were shown in the opposite form to the other half. The nine stimuli used in the previous experiment were reduced to a set of eight to enable using this design. The materials were otherwise the same in the stimulus sets. The test sets differed in having no implication form paraphrases. As in Harris's experiments, participants had to rate the assertion forms and fillers only.

However, rather than ask participants to rate marketing material on its truthfulness and risk receiving scores tainted by cynicism of such claims, we used a modification of the paraphrase accuracy measure of our previous experiments. This would assess whether participants differed in their relative belief of the claims without implying that they should be judgmental about their actual validity. Two questions were used to minimise this possibility that participants might misconstrue a request for paraphrase accuracy rating with one for confidence of correct selection: The first question was, 'How confident were you in your selection?'. The second question was 'How accurate do you think the paraphrase was?' Both questions were responded to using scales ranging from 1 to 10.

5.6.4 Results

It was revealed that participants consistently picked the assertion forms as accurate paraphrases of the stimulus set. Considering the marked difference between the meaning of the fillers and the assertions this was to be expected. The fillers were

originally used by Harris to reduce a ceiling effect in the truthfulness scores (Harris, Dubitsky, Perch, Ellerman & Larson, 1980) and this result indicates that participants were attending to the task.

Confidence of correct selection did not differ between conditions (see Figure 49). The mean scores were 8.5 (S.E. 0.23) and 8.6 (S.E. 0.24) for the assertion and implication conditions respectively (remember that subjects each received a mix of half assertion and half implication stimuli). The critical finding was that paraphrase accuracy scores did not differ significantly between conditions either (see Figure 49). Mean scores were 6.7 (S.E. 0.32) in the assertion condition and 6.9 (S.E. 0.25) in the implication condition; thus this result replicated and extended Harris's research.

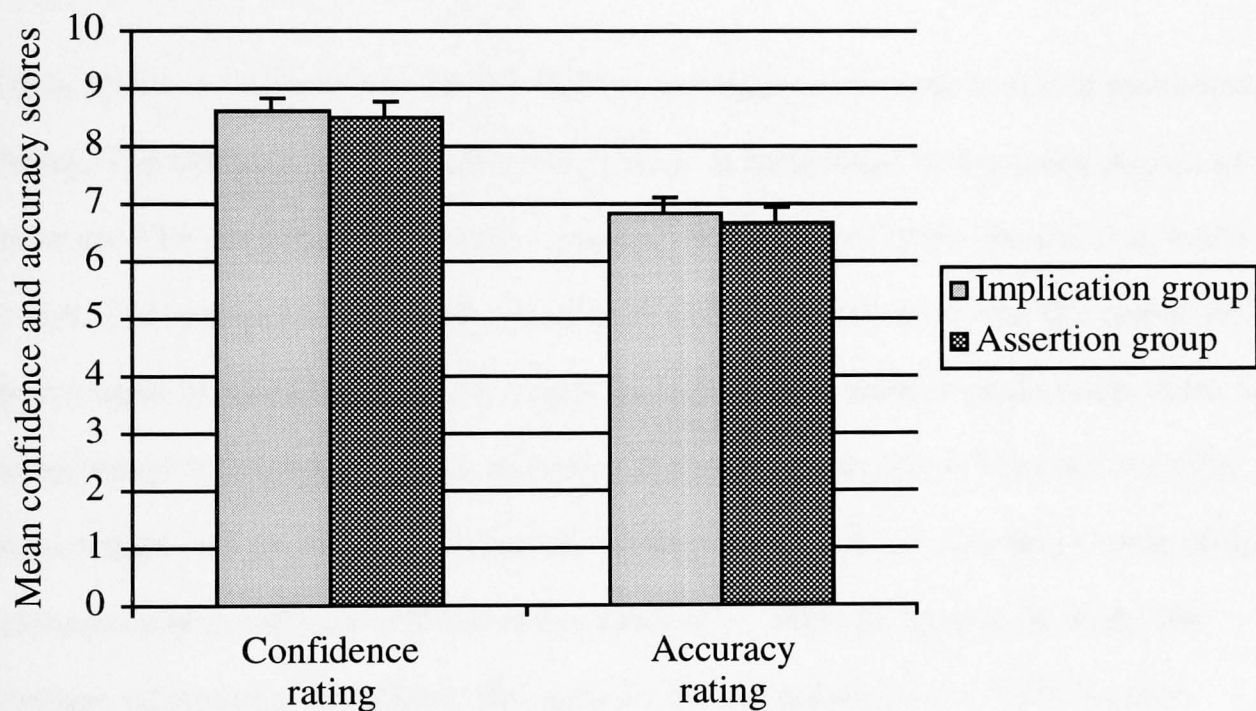


Figure 49 Confidence of correct selection and paraphrase accuracy ratings from the replication of Harris's methodology

5.7 Final conclusions

Unlike Harris's work, the first experiments dealt with direct recognition of implied and asserted claims and not truthfulness ratings of just assertion paraphrases. The results showed that most participants thought they had been shown probabilistic rather than asserted versions of the claims. This appeared to be the result of participants' general expectation of the form these claims would take. This was confirmed to be due to a

situational model / schema level representation in the final study. This compared French and British groups' expectations of what sort of textual material would appear on packaged food products. The filling in of missing information revealed the British sample had a significant preoccupation with health and nutrition claims. They produced four times more of them than the French sample and these claims accounted for almost a quarter of all the items they produced.

Therefore, the British tend to expect such claims to be in implied form, often because they know that there is legislation designed to protect them from their improper use. The question of whether we generally believe such claims was affirmed by the extension of Harris's (1983) approach, showing that both implied and asserted versions have the same semantic force.

These results closely follow the predictions of sentence memory levels of processing theory. The syntactic detail of the probabilistic or paraphrase text quickly decays from memory. The semantic, or textbase level as it is referred to in the theory, is retained longer. The representation at the situational model / schema level was the cognitive level drawn upon by most of our participants. In line with theoretical predictions, there was an increased bias toward selecting implied claims when the delay between stimulus presentation and recall was lengthened. With the intermediate term delay some of the textbase level detail may still have been accessible. With the long term delay, the textbase information had faded. Reliance on the situational model / schema then increased the tendency to believe the claims had been implied.

However, in the French group there was no significant situational model relating to the use of these claims. This was evidenced by their much lower expectation that such claims will be used on food packages. In long term recall testing, without a situational model / schema, these participants were forced to guess. That they did so is indicated by the almost perfect binomial distribution of their scores.

The result from the replication of Harris's work is different, as it directly examines perceived meanings. Although still relying on memory, the question is, not which

version did you see, but how accurate was it? Therefore, although participants in the implication condition might not think that such claims would be asserted and could possibly be aware that the ones they were shown were not asserted, they might still rate the claims as accurate. This is because they perceive that the implication and assertion versions mean essentially the same thing.

In sum therefore, the cognitive representation of these claims was established. While the British public tend to believe that they are mostly implied due to legislative requirements, they do not tend to differentiate the truth value of implied from asserted versions. The ramifications of this are clear; consumers believe they are protected and choose products making implied claims confidently. There is a strong case therefore for prosecuting marketers who falsely imply benefits, using consumer protection legislation that prohibits the use of unwarranted or dubious claims.

6. Conclusions

This chapter will refer back to the objectives stated in the introduction. It will examine to what extent the results from the experiments have answered their objectives and what implications result from the findings. Examination will also be made of the interconnections between the chapters and of directions for further research.

6.1.1 The objectives posed in the introduction

1. 'The logical starting point is the precise measurement of how much attention is paid to the information on packaged foods. The question is, how important are health and nutrition claims in comparison to price, brand and nutrition-table information?'
2. 'Having established the relative levels of use of the different kinds of information, examination can be made of the major evaluative dimensions customers use in their decision making. An estimate of the input of health and nutrition claims to these dimensions, and their relative importance to food choices should then be made.'
3. 'Finally, the question of deception needs to be addressed, to determine whether marketing methods that imply health benefits are effectively having the same result as directly asserting them.'

6.1.2 Objective one, establishing the attention given to and relative importance of claims

The aim of this chapter was to establish how important health and nutrition claims are to customers' purchasing decisions. Marketers can gather this information by examining sales data before and after adding health and nutrition claim information to packages. They may also conduct market research to establish whether the customer segment, that the product has previously sold well to, has altered as a result of the changes. However, this sort of data would usually only be circulated within a company and is not therefore generally available.

At the time of conducting the information acquisition experiments (reported in chapter 2) the author had subjectively noted an apparent rise in the use of health and nutrition claims. It seemed plausible that this increase was directly related to their ability to

increase sales. However, without access to comparative sales data evidence of their impact was gained by carefully controlled measurements.

Three experiments were conducted, which in addition to the statistical evidence, provided essentially perfect replications of results. This gave good reason to assume that the effects revealed were valid. There was no significant difference between ordinary members of the public and those who may be expected to have relatively higher expertise, i.e. those studying in a food science department. However, the initial assumption that the duration of information acquisition would be directly related to its subjective importance was incorrect.

The second group of members of the public usually mentioned that their selections were influenced by the marketing claims. But it was brand information that received the most visual inspection. The claims were given only average inspection times. This result was reflected in the number of times each type of information was accessed. Brand information received more acquisitions than claim information, which again received relatively average numbers of inspections.

Examining the reasons participants gave for their selections and the duration and number of visual acquisitions made it possible to infer the true importance of each type of information. The relative levels of importance produced by this means agreed with that of the data on awareness and importance of food label information from earlier questionnaire based data (National Consumers Council, 1985).

Therefore the first objective, of establishing the relative attention given to and importance of the different types of information, was achieved. That marketing claim information can be predominant in importance underlines the relevance of the findings in the subsequent chapters. If the results had revealed that marketing claims were of relatively low importance, the results from the analyses of attitudes and cognitive representation would not have had significant implications. This chapter therefore provided the basis for the following chapters because it showed the significance claims can have in consumer choices.

However, there is an apparent anomaly between this result and those reported in chapter 3, where the effects of claims on attitudes and intentions were measured. In these analyses no significant effect upon the intention to purchase was noted relating to claim use. It may be that this was because choices were not being made and that these experiments did not take any account of individual differences.

Further similar work might take two directions. One aspect that was not fully controlled in the present work was the position of information display. A Latin square design could be tried. In such a design, each item of information sequentially occupies every available information display position. This positional balancing would preferably be designed to occur so that each participant sees the information categories in every position across the brands. The group as a whole would see the information for every brand balanced across the complete range of positions. It would be advisable not to exhaustively re-display items to participants. Doing so could lead to erroneous responses arising as a result of irritation or boredom.

An alternative approach would be to use three-dimensional photo-realistic images of products. Several brands could be simultaneously displayed and the participant asked which they would prefer to buy. Choices could be made after examining package information. This could be facilitated by using system software, provided with the latest Macintosh computers, that incorporates such three-dimensional object manipulations. Visual acquisition patterns and their duration could be recorded using an eye tracking methodology in which the eye movements are recorded on a second computer display (Crosby and Peterson, 1991).

In either of these approaches, it would be important to measure participants' familiarity, frequency of buying and liking for the products. These data could then be used as covariates in ANOVA, thereby avoiding their potential confounding of the analyses.

6.1.3 Summary of establishing the attention given to and relative importance of claims

- Brand and price received most visual attention and claim information second lowest.
- Claim was the most frequently mentioned reason for selection, along with price, fat and brand.
- Combining visual attention and reasons for selection scores gave the following ranking of importance: claim, price, brand, fat, protein, energy and carbohydrate.
- Thirty-six per cent of visual processing was attribute based, seven per cent brand based and the rest made up of diagonal inspection patterns.
- There were no differences on these patterns of inspection between two groups of members of the public and students and staff of a Food Science department.

6.1.4 Objective two, establishing the relative input of evaluative dimensions

2. 'Having established the relative levels of use of the different kinds of information, examination can be made of the major evaluative dimensions customers use in their decision making. An estimate of the input of health and nutrition claims to these dimensions, and their relative importance to food choices should then be made'.

It was now necessary to examine the effect health and nutrition claims have on the major evaluative dimensions upon which packaged foods are evaluated. The first step was to establish these dimensions. There appeared to be no discussion in the literature of what these would be. Frequency analysis was made of attributes produced in response to images of packages shown with and without graphical and textual information. From this a set of attributes was derived and packages rated on these. The scores were then used in factor analyses and these revealed the evaluative dimensions.

These dimensions, or factors, were quite similar from both the British and French participants. They consisted of factors covering 'enjoyment' and 'nutrition'. There

were also two further factors; how 'colourful' the packages are, from the British data and how 'appetising' the product appears, from the French data.

Participants' reasons for the attribute ratings they gave revealed that the British sample used health and nutrition claims for making judgements about the nutritional and health aspects. They often mentioned 'information' and 'writing' as reasons for these ratings. By contrast the 'contents' were referred to when the products were shown in the without-claims condition.

However, differences were not significant between the with-claims / without-claims conditions on any of the health or nutrition aspects from either the British or French sample. But, further evidence that the British group noticed the claims came from the significantly higher rating for the *informative* attribute in the with-claims condition.

It was perhaps surprising that this subjective importance and use of claims, did not translate into significant differences across conditions; although this may be explained by the finding that the 'picture' and the 'contents' were the reasons mentioned most frequently overall. It may be that participants already regarded these as healthier products and therefore found the claim information superfluous. Further experimentation might examine whether the nutrition and healthiness scores of relatively unfamiliar products would be significantly altered by claim use. But this finding would not have the same practical impact as most packaged food products are familiar ones.

Of considerable importance is that British consumers believe, that others whose opinions they regard as important, think they should buy products displaying health and nutrition claims. This effect was not found with the French group and this difference probably results from less use of such marketing devices in France.

Therefore, there is an effect resulting from the use of these claims, but at a general level. With familiar and relatively healthy products it does not translate into specifically higher expectations of nutrition or healthiness, or of attitude toward and intention to

purchase a product. Prior to these results it was suspected that products displaying these claims would receive higher ratings. Otherwise, why should there be a rapidly escalating trend toward their use? But more recently it appears that their use may have been less than successful. For example, Findus's Lean Cuisine range (see page 157) was an early and prolific user of such claims, but has since either reduced their prominence or removed them altogether (see Figure 50). Apparently their use had confused the pre-established market segment.



Figure 50 The new style package with far fewer claims displayed than previously

Overall then, the aim of identifying the major evaluative dimensions used when assessing packaged food products was achieved. Of course, other factors are taken into consideration, not least of which is cost. This was an aspect that received some coverage in the analysis of information acquisition in chapter 2, showing that price was only second in importance to marketing claims. Similarly, customers might be expected to consider the brand which was shown to be of roughly the same importance as price.

Several further studies, not reported here, were conducted. Brand names were changed, graphical claims were removed (e.g. a heart shaped cereal bowl replaced with a round bowl) and a Latin square between-subjects design used to examine the contextual effects of claims on brand choices. The results of these studies, while of some interest, did not add anything of particular substance to those already described. Even taking account of participants' health control beliefs in the Latin square design did not reveal any general effects. In fact, these results appeared to indicate that it would be necessary to ensure that every participants' liking for each variety of each food shown (e.g. high or low fat, high or low fibre) would need to be entered as covariates to obtain any clear between-groups differences.

An alternate approach could be used for further work. Although this is not the place to go into a detailed explanation of the method, the repertory grid approach to personal construct analysis would appear to be well suited to further investigation of these types of products. In the repertory grid method constructs are used to map the perceptual basis of evaluations (Kelly, 1991). Constructs are dimensions along which a person perceives the elements under consideration. A construct consists of bi-polar opposites, such as healthy and unhealthy. The objects in this case would be food packages with and without health and nutrition claims.

A simple method of using the repertory grid simply requires that the elements be in the form of cards, e.g. photographs of foods and these are sorted into groups according to their perceived similarity. This establishes the emergent construct poles (e.g. healthy products). Then the contrast poles are found by asking that the opposite elements be selected and labelled (e.g. unhealthy).

This method might produce a different variety of attributes than the method used in chapter 3. The packages would be scored or ranked on each construct and principal components analysis made of the data. The scores on the components can be used in regression analyses. They may also be used with procedures like Procrustes analysis

(Thomson & McEwan, 1988) which would show how the constructs and foods cluster by population sample (e.g. males and females or low or high health consciousness).

6.1.5 Summary of establishing the relative input of evaluative dimensions

- Attributes participants connected with packaged food products fell into six categories: affect, sensory, surface appearance, nutritional, presentation and usage.
- British participants gave packages displaying claims significantly higher scores for informativeness and ease of purchase.
- Participants' reasons for ratings indicated they used the claims when deciding the nutritional value and the brand names when judging the quality.
- Factor analysis of participants' attribute scores produced three factors covering enjoyment, nutrition and surface appearance.
- The enjoyment factor was approximately twice as important as the nutrition factor in the attitude to purchase.
- When rating the packages with claims there was a significantly greater tendency to believe that others would also think they should be purchased.
- French participants shown packages with claims showed a marked trend to think that their flavour would be less satisfactory.
- Factor analysis of their rating scores produced four factors covering enjoyment, nutrition, how appetising and informative.
- Combining the enjoyment and appetising factors showed 'enjoyment' was approximately twice as important in the attitude to purchase than nutrition.
- French participants did not show any increased belief to believe others whose opinion is important to them would think they should buy packages displaying claims.

- Both French and British participants thought the provision of information more important than any of the other aspects.

6.1.6 Examining belief times evaluation with a backpropagation network

The neural network analyses of chapter 4 marked a distinct shift of focus in the thesis. They were justifiable because of the pivotal bearing of the multiplicative relationship between beliefs and outcome evaluations to the theory of reasoned action. A consistent multiplicative relationship seemed more of a theoretical ideal than something that would occur in practice. Discussion with food choice researchers experienced in using the theory revealed similar doubts.

Regardless of any shortcomings of the backpropagation network used for the analyses, there was certainly no doubt that it was using the multiplicative procedure. That the hidden unit activation predicted beliefs times evaluations better than the belief and evaluation scores was conclusive evidence of this.

Another motivation for using a neural network was it might prove better at data fitting and generalisation than linear regression. The theoretical justification for this is that backpropagation can compute non-linear relationships and could therefore prove more flexible than linear regression analysis. As it turned out the relationships in this case were linear and no advantage was gained. The performance of both approaches proved to be exactly equal; although linear regression required using principal component data reduction to match the network.

It was also interesting to know what sort of representation would be formed within the network's hidden layers. Would it be similar to a standard factor analysis? There were similarities, but because the network had the representation completely distributed throughout hidden layers, the results did not closely match the factor analysis.

Further work using backpropagation networks could be useful where analyses of the structure of the theory are sought, or where very large quantities of data are available.

Where sample sizes are relatively small, conventional analyses are more suitable as they provide better descriptive and diagnostic information.

An alternative statistical approach is to enter all belief evaluation products and secondary stage variables into a principal components analysis and use factor weighting scores from these to predict intention. Corney, Eves, Kipps & Noble (1996) successfully used this method with two data sets. If there is a good correlation between the attitude and intention it should not be essential to perform a two-stage analysis. Using this approach simplifies the analyses and makes their interpretation to a wider audience far easier.

6.1.7 Summary of examining belief times evaluation with a backpropagation network

- Hidden unit activation of two networks structured on the theory of reasoned action supported the belief times outcome evaluation relationship.
- Generalisation performance of the backpropagation and conventional regression approaches was equal (0.67 correlation).

6.1.8 Objective three, establishing the cognitive representation of implied and asserted claims

3. Finally, the question of deception needs to be addressed, to determine whether marketing methods that imply health benefits are effectively having the same result as directly asserting them.

In chapter 2 it was shown that claims provided easy to use comparative information. They were subjectively considered to be more important to making choices than the other information. Chapter 3 revealed that participants rated information provision highly and found packages with claims significantly more informative. However, their attitudes toward and intentions to buy did not significantly increase with-claims. Nonetheless, with-claims participants were significantly and consistently more likely to perceive that most people would think the packages should be purchased.

The only significant area left to examine was whether customers believe health and nutrition claims that are made in implied form to avoid being classed as medicinal benefits. The literature review presented evidence that information in implication form has the same pragmatic force as that which has been asserted. By implying benefits, the same level of influence on customers' beliefs can be obtained and the likelihood of damaging legal action minimised.

Unlike earlier work examining truthfulness ratings of paraphrases of asserted claims, the initial experiments reported in chapter 5 dealt purely with their recognition. The results contrasted with the earlier research by showing that most participants thought they had been shown probabilistic rather than asserted claims. This appeared to be the result of participants' general expectation about the form these types of claims would take.

This result tied in with the findings from the intermediate and long term memory studies. In recognition testing with paraphrases of asserted and implied claims, the British consistently more often picked implied versions. In the long term memory experiment twice as many implication versions were selected. The French sample showed no significant tendency to select either form and appeared to be guessing.

An adequate explanation of these results was provided by interpreting them according to schema and sentence memory levels of processing theories. British consumers often see health and nutrition claims on products and tend to expect these claims to be in implied form. This is because they usually are implied and because they are aware that there is legislation designed to guard against their improper use. Many are also aware that marketers will imply claims to avoid legislative infringements.

The question that remained was whether we generally believe implied claims? The results presented here, in line with previous findings, confirmed that we do tend to believe them. The replication of the earlier method of showing asserted paraphrased versions of claims and obtaining truthfulness ratings, showed that there was no significant difference between the accuracy ratings from either condition.

This is because the syntax is quickly lost and the representation at the situational model drawn upon. This was demonstrated by the increased effect in long term memory testing compared with intermediate term testing. In the intermediate term test some of the textbase level detail may have still been accessible. In the long term test reliance on the situational model level increased the tendency to believe that the claims must have been implied. However, as the French had little significant situational model level information, the only course of action available to them was to guess. That they did so was indicated by the almost perfectly binomial distribution of their scores.

The result from the replication of the earlier research was different. It directly tested how similar the information that had been presented was to the paraphrase that was being tested. The question was not which version did you see, but how accurate was it? Participants might not have thought that the claims they were shown were asserted. However, because they perceived they meant essentially the same thing, they still scored them as accurate.

6.1.9 Summary of establishing the cognitive representation of implied and asserted claims

- Recognition testing of members of the public and Food Science students revealed a significant tendency to recollect seeing probabilistic claims.
- Reasons given for selections indicated that the members of the public believed that legislative requirements would prevent the assertion of health benefits.
- Recognition of paraphrases of implied and asserted claims also showed a significant tendency to recollect seeing non-asserted (implied) claims.
- There was clear replication of earlier findings showing no differentiation between implied and asserted forms when only paraphrased asserted versions were shown.
- Understanding of the terms paraphrase, implication and assertion was fairly low.

- Long term incidental memory for paraphrases of implied and asserted claims, by British and French groups, showed an increased effect from the British and no effect from the French.
- Analysis of food label information expectations, revealed that British participants were much more likely to expect that health and nutrition claims will appear on food labels.
- These findings receive explanation from sentence memory levels of processing theory positing distinct syntactic, textbase and situational model levels of sentence representation.

6.1.10 Conclusions derived from the introspective reports

Introspective measures were used in each of the three strands of enquiry. This approach to ascertaining cognition can obviously be unreliable, less reliable for instance than participants' reports made during protocol analysis (Ericsson & Crutcher, 1991). This is because participants giving introspective reports usually have to go beyond reporting spontaneous thought processes. However, introspection is also undoubtedly an invaluable process. It can allow researchers to identify key issues that even exhaustive experimentation may miss.

It could have been very difficult to identify why people had spent relatively little time looking at claims without having their reasons for selections. Guidance from the literature reviewed would be rather ambiguous. Numerical information is relatively disliked and therefore should be relatively under used. Claims reduce information loading and should be popular. It would have been possible to overlook ease of comprehension without participants' reasons for selections data indicating claims were the key influence in making choices. They were mentioned more than twice as many times as the next most frequently mentioned information type. Therefore, the conclusion that the importance of information can be explained by visual acquisition

and ease of use had to be inferred from convergent evidence and was qualified as being 'tentative'.

In chapter 3 participants' reasons for ratings for informativeness, nutrition and healthiness differed depending on whether they saw the packages with-claims or without-claims. With-claims they referred to 'information' and 'writing' as their main reasons. Without-claims they most often simply referred to the 'contents'. Arguably, this is supportive to the conclusions from the introspective data from chapter 2. If claims are not subjectively important, why should another group of participants performing a different task make reference to them as such? They also mentioned 'brand' most frequently when giving the reason for their ratings on quality. It is very unlikely that quality would be considered subjectively unimportant for food products.

Further convergent evidence is to be found in chapter 5. Almost a quarter of all the items reproduced by participants in the British expectation of label information use study were health and nutrition claims. If claims are not attended to when examining products, why should this fresh group of members of the public have such strong expectations that they will be used?

The reasons given for selections in the recognition task indicated that participants believe such claims will be implied. It was hypothesised that this is because of their frequent exposure to them in this form. That these introspective reports appear to be valid and to have been interpreted correctly was indicated by the significant tendency for the claims to be recollected as having been implied by the British groups. Without sufficient exposure and attention given to them such expectations would not be found. Evidence of this comes from the French participants' lack of expectation of either their form or that they will generally be used on packages.

7. Appendices

7.1 Attention to information program code example

```
@begin<file>
```

```
@set<forceresponse= yes>
```

```
@set<datatrace= no>
```

```
@begin<text>
```

```
@begin<screentext>
```

In order for you to complete this experiment it is necessary for you to; examine the following screens, choosing 1 brand from the 4 presented, in each case.

(In some cases no information was available on some of the product attributes; These attributes are marked No info').

```
@end<screentext>
```

```
@end<text>
```

```
@begin<randomize>
```

```
@begin<block>
```

```
@begin<matrix>
```

```
@set<transpose=on>
```

```
@title<"Juices">
```

```
@set<datatrace= yes>
```

```
@set<responseline="Which brand would you buy?">
```

```
@set<alternatives=4;attributes=7>
```

```
@set<alt[1]="Orange J' A";alt[2]="Orange J' B">
```

```
@set<alt[3]="Orange J' C";alt[4]="Orange J' D">
```

```
@set<attribute[1]="Brand";attribute[2]="Claim">
```

```
@set<attribute[3]="Price";attribute[4]="Fat">
```

```
@set<attribute[5]="Carbohydrate";attribute[6]="Protein">
```

```
@set<attribute[7]="Energy">
```

```
@set<box[1,1]="Asda";box[2,1]="Del Monte">
```

```
@set<box[3,1]="Asda";box[4,1]="Kings">
```

```
@set<box[1,2]="No additives";box[2,2]="Pure">
```

```
@set<box[3,2]="Premium";box[4,2]="Concentrated">
```

```
@set<box[1,3]="72 p";box[2,3]="72 p">
@set<box[3,3]="74 p";box[4,3]="49 p">
@set<box[1,4]="Trace";box[2,4]="No info">
@set<box[3,4]="Trace";box[4,4]="No info">
@set<box[1,5]="9.6 g";box[2,5]="9.7 g">
@set<box[3,5]="10.1 g";box[4,5]="No info">
@set<box[1,6]="0.6 g";box[2,6]="No info">
@set<box[3,6]="0.4 g";box[4,6]="No info">
@set<box[1,7]="38 kcal";box[2,7]="39 kcal">
@set<box[3,7]="39 kcal";box[4,7]="No info">
@end<matrix>
```

```
@begin<text>
```

```
@title<"Sentence Screen.">
```

```
@begin<screeintext>
```

Now record why you picked that product.

Record your answer on the sheet provided.

```
@end<screeintext>
```

```
@end<text>
```

```
@end<block>
```

```
@set<forceresponse= yes>
```

```
@set<datatrace= no>
```

```
@begin<text>
```

```
@begin<screeintext>
```

The experiment is now complete; thank you for your participation.

```
@end<screeintext>
```

```
@end<text>
```

```
@end<file>
```


7.2 Attitudinal influences of claims program code

Project script

```
on startUp
  editor
  global fileName
  ask "Please enter the filename to use"
  put it into fileName
  open invisible window "graphics"
  sort by random (the number of cards)
  show window "graphics"
  put 0 into card field 2 of card 11 of window 1
end startUp
on closeProject
  set the topLeft of card graphic 8 of card 1 of window 1 to 273,132
  set the topLeft of card graphic 11 of card 1 of window 1 to 273,213
  set the topLeft of card graphic 14 of card 1 of window 1 to 273,289
  set the topLeft of card graphic 17 of card 1 of window 1 to 273,369
  put 0 into card field 1 of card 1 of window 1
  put 0 into card field 2 of card 1 of window 1
  put 0 into card field 3 of card 1 of window 1
  put 0 into card field 4 of card 1 of window 1
end closeProject
```

Instruments window script

```
on openWindow
  go card 1
end openWindow
```

Card 1 Instrument window script

```
on openCard
  enable card button "continue"
  set the visible of card button "continue" to true
  set the lockScreen to true
  show window "graphics"
  show window "instruments"
  set the topLeft of card graphic 8 to 273,132
  set the topLeft of card graphic 11 to 273,213
  set the topLeft of card graphic 14 to 273,289
  set the topLeft of card graphic 17 to 273,369
  put 0 into card field 1
  put 0 into card field 2
  put 0 into card field 3
  put 0 into card field 4
end openCard
on closeCard
  global fileName
  get card field "output 1"
  open file fileName
  write it & tab after file fileName
  close file fileName
  get card field "output 2"
  open file fileName
  write it & tab after file fileName
```

```

close file fileName
get card field "output 3"
open file fileName
write it & tab after file fileName
close file fileName
get card field "output 4"
open file fileName
write it & tab after file fileName
close file fileName
end closeCard

```

Card 5 Instrument window script

```

on openCard
  enable card button "continue"
  set the visible of card button "continue" to true
  set the lockScreen to true
  show window "graphics"
  set the topLeft of card graphic 8 to 273,132
  put 0 into card field 1
end openCard
on closeCard
  global filename
  get card field "output 1"
  open file fileName
  write it & tab after file fileName
  close file fileName
  open file fileName
  write lineFeed after file fileName
  close file fileName
  add 1 to card field 2
  if card field 2 = 5 then
    set the lockscreen of window 1 to true
    set the lockscreen of window 2 to true
    close all windows
    exit to supercard
  end if
  open window "graphics"
  go next card
end closeCard

```

Indicator script

```

on mouseDown
  get the rect of grc "attractive"
  put item 2 of it + 8 into centerline
  put item 1 of it into maxleft
  put item 3 of it into maxright
  repeat until the mouse is up
    get the mouseLoc
    put item 1 of it into indicator
    if indicator < maxleft then put maxleft into indicator
    if indicator > maxright then put maxright into indicator
    set the loc of me to indicator, centerline
    put round of ((287 - indicator) / 12.5) * -1 into cd fld "output 1"
  end repeat
end mouseDown

```

Graphics card 1 script

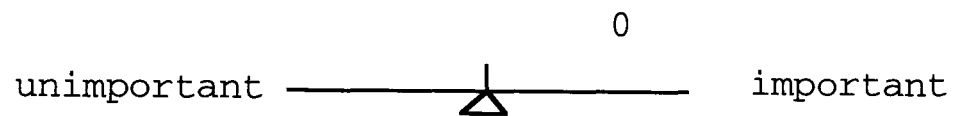
```
on openCard
  global fileName
  get the name of this card
  open file fileName
  write it & tab after file fileName
  close file fileName
end openCard
```

Graphics card background script

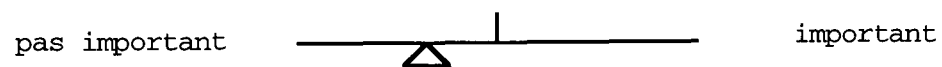
```
on openWindow
  openCard 1 of window "instruments"
end openWindow
on openCard
  open window "instruments"
  show window "instruments"
  set cursor to "hand"
end openCard
on closeCard
  set the cursor to 4
end closeCard
```

7.3 Attitudinal influences of claims rating scale examples

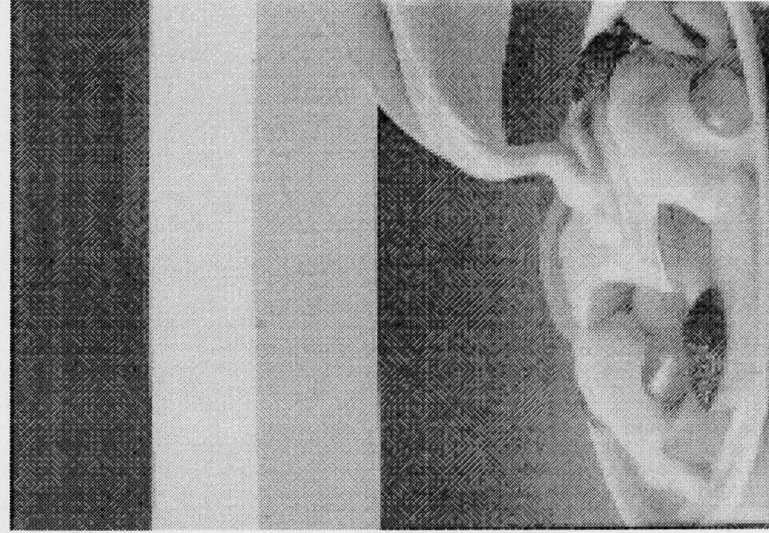
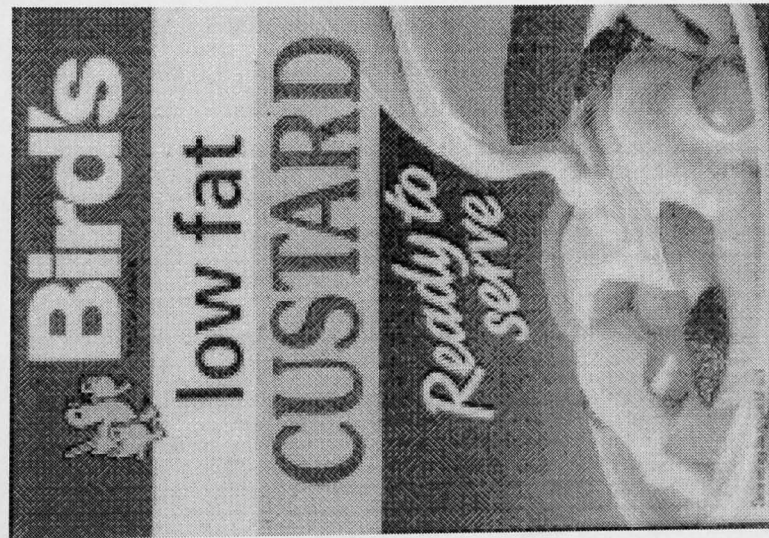
For me buying food with an attractive label is

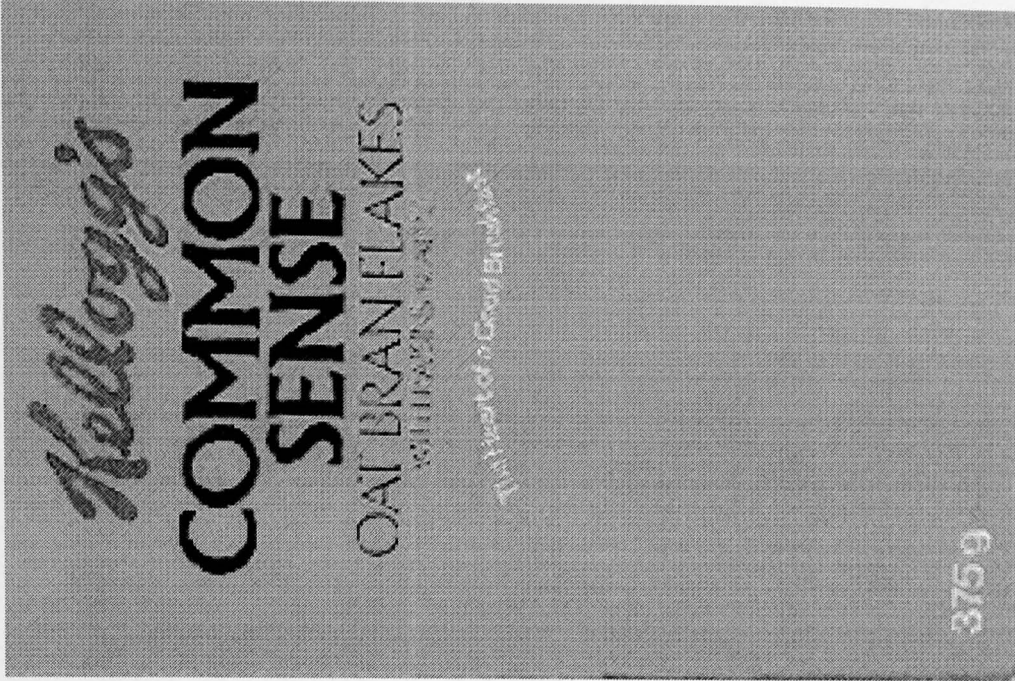
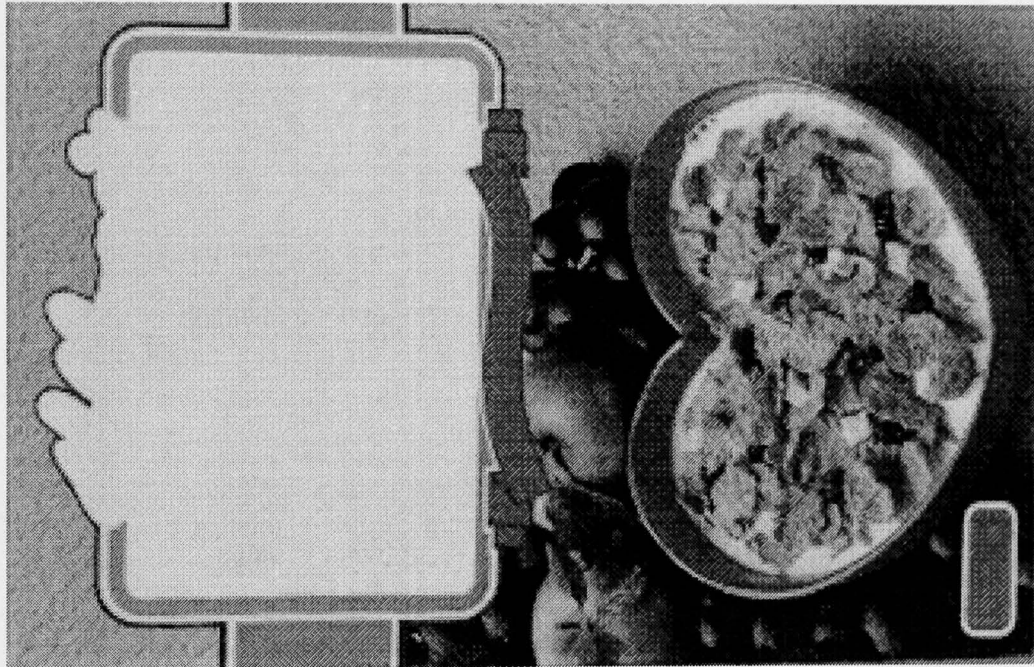
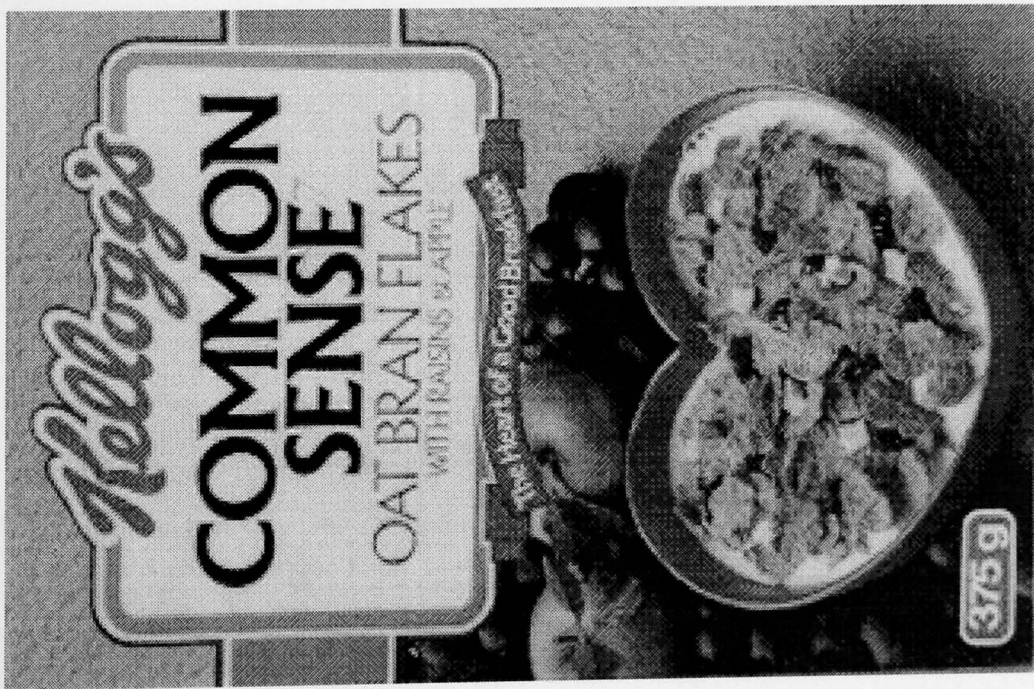


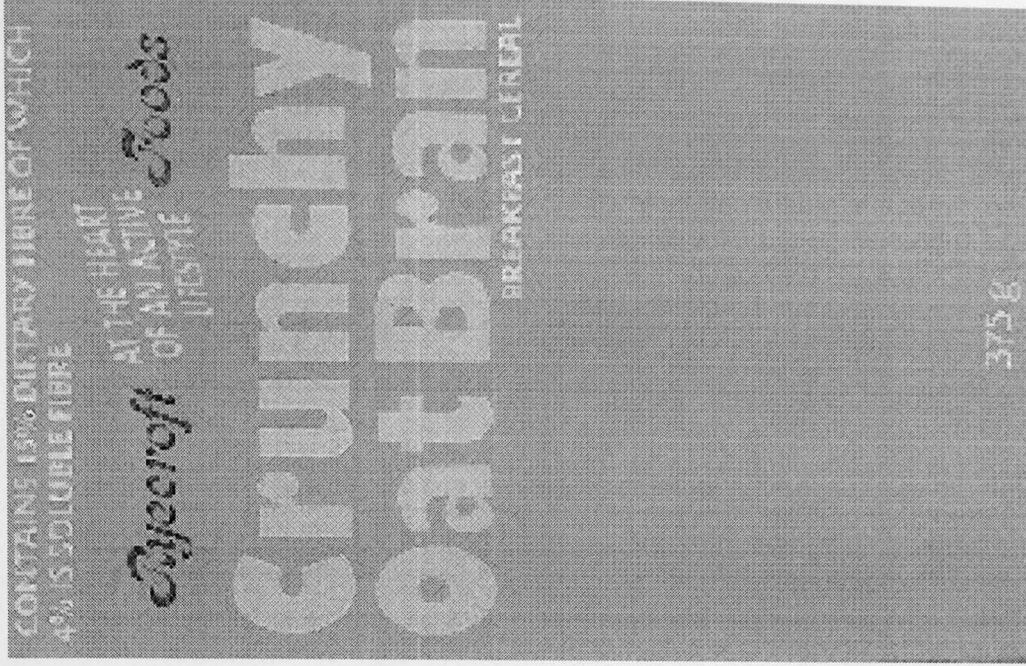
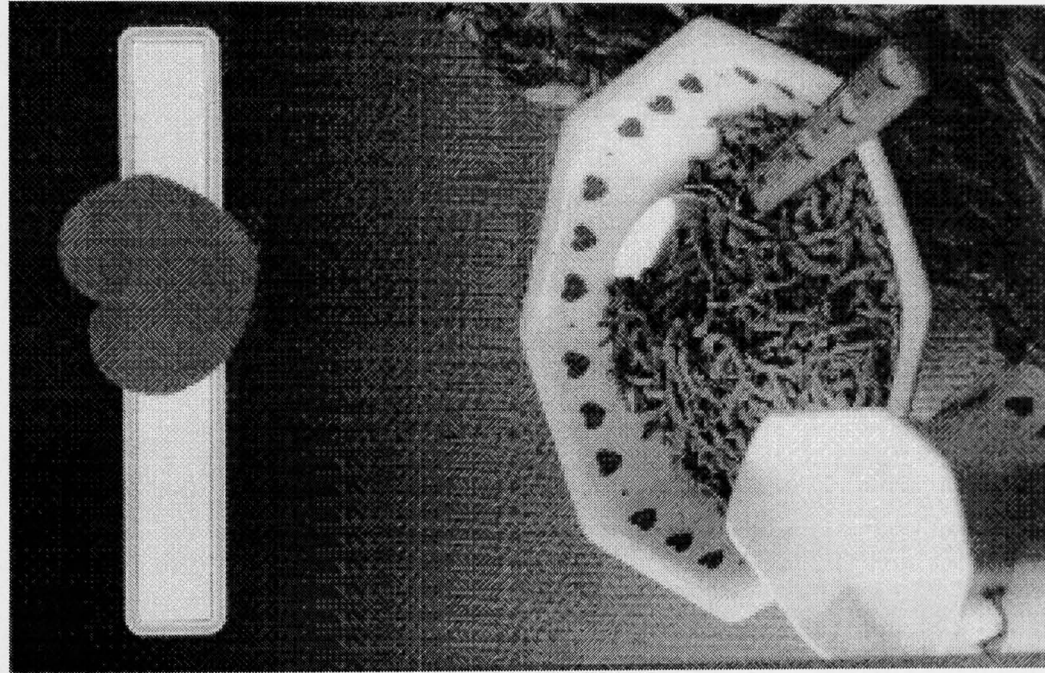
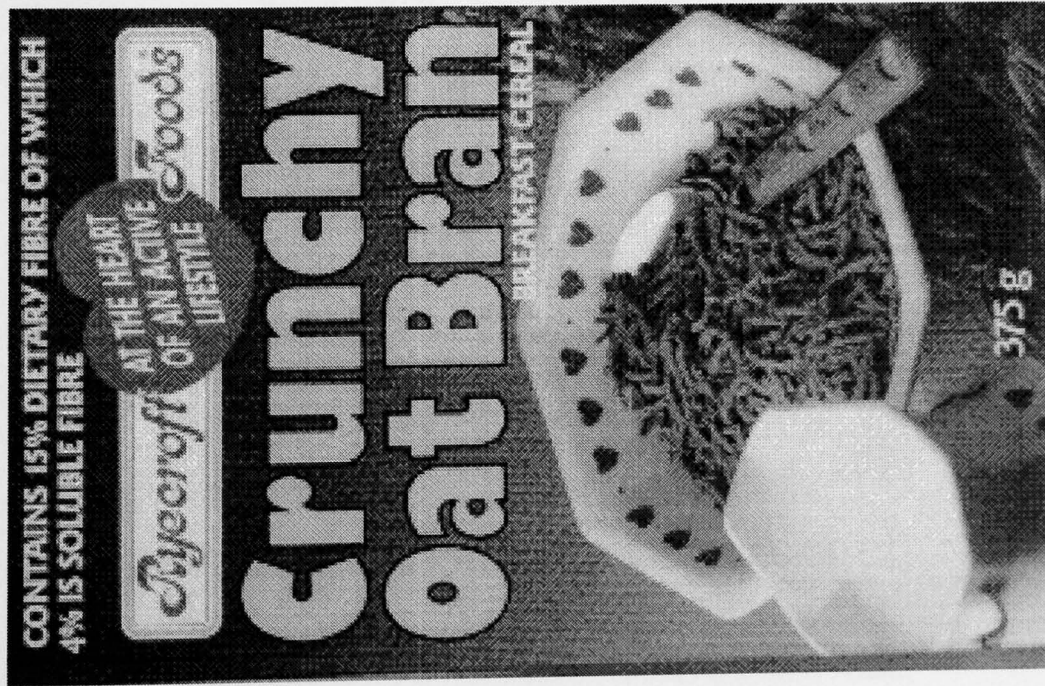
Pour moi, acheter un produit alimentaire avec un emballage attrayant est



7.4 Attribute eliciting images







JORDANS
 OAT BRAN CAN HELP REDUCE CHOLESTEROL

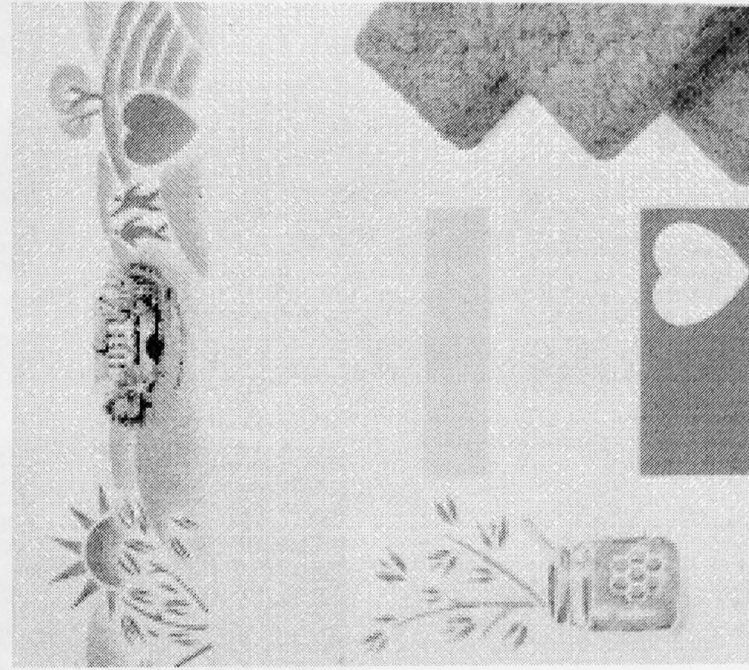
OAT BRAN BARS

ORIGINAL HONEY RECIPE

3 HIGH FIBRE OVEN BAKED OAT BRAN BARS

100g e

3 bars contain 50% of the suggested daily intake of soluble fibre



JORDANS
 OAT BRAN CAN HELP REDUCE CHOLESTEROL

OAT BRAN BARS

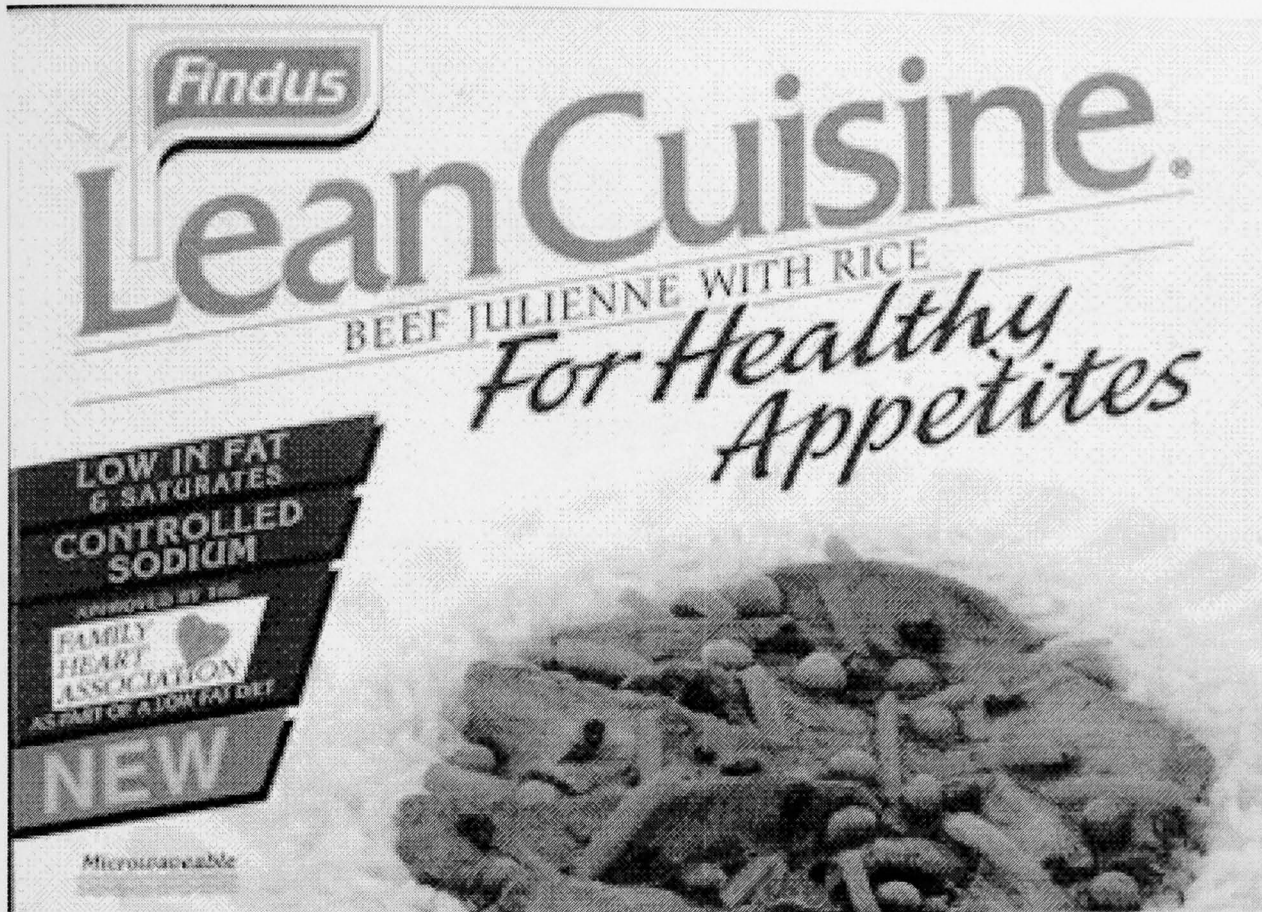
ORIGINAL HONEY RECIPE

3 HIGH FIBRE OVEN BAKED OAT BRAN BARS

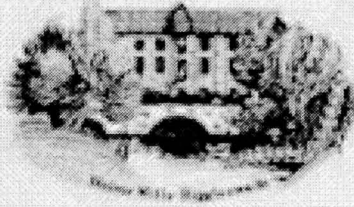
100g e

3 bars contain 50% of the suggested daily intake of soluble fibre

7.5 Attitudinal influences of health claims computer images



JORDANS



The Original
CRUNCHY BAR

TOASTED WHOLEGRAIN OAT CEREAL BAR

OATBRAN & APPLE



*Oatbran
& Apple*



The Original

CRUNCHY BAR

6 BARS

Kellogg's

BRAN BUDS

FORTIFIED
WITH
VITAMINS
AND IRON



625g

SERVING SUGGESTION
TRY FRESH FRUIT

VERY
HIGH FIBRE
CEREAL

Kellogg's

COMMON SENSE

OAT BRAN FLAKES
WITH RAISINS & APPLE

The Heart of a Good Breakfast

LOW FAT FOOD
AND ALWAYS HAS BEEN
MORE NUTRITION INFORMATION ON SIDE PANEL

375 g

Kellogg's

SULTANA BRAN

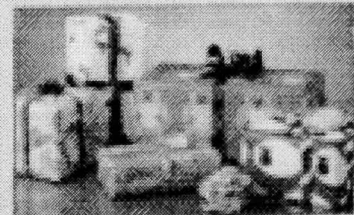
LIGHT CRISP FLAKES WITH SULTANAS

PROVIDES
ESSENTIAL
VITAMINS
AND IRON



A LOW FAT FOOD
AND ALWAYS HAS BEEN
MORE NUTRITION INFORMATION ON SIDE PANEL

FREE



**WRAPPING
PAPER**

** See back of pack for details **

500g

HEALTHY

CRACKERS

HIGH FIBRE · LOW FAT · LOW SALT

150g 5.29oz

1 1/2 CALORIES PER CRACKER

Serving suggestion

FOR BEST INFO PLEASE SEE END PANEL

viva[®]

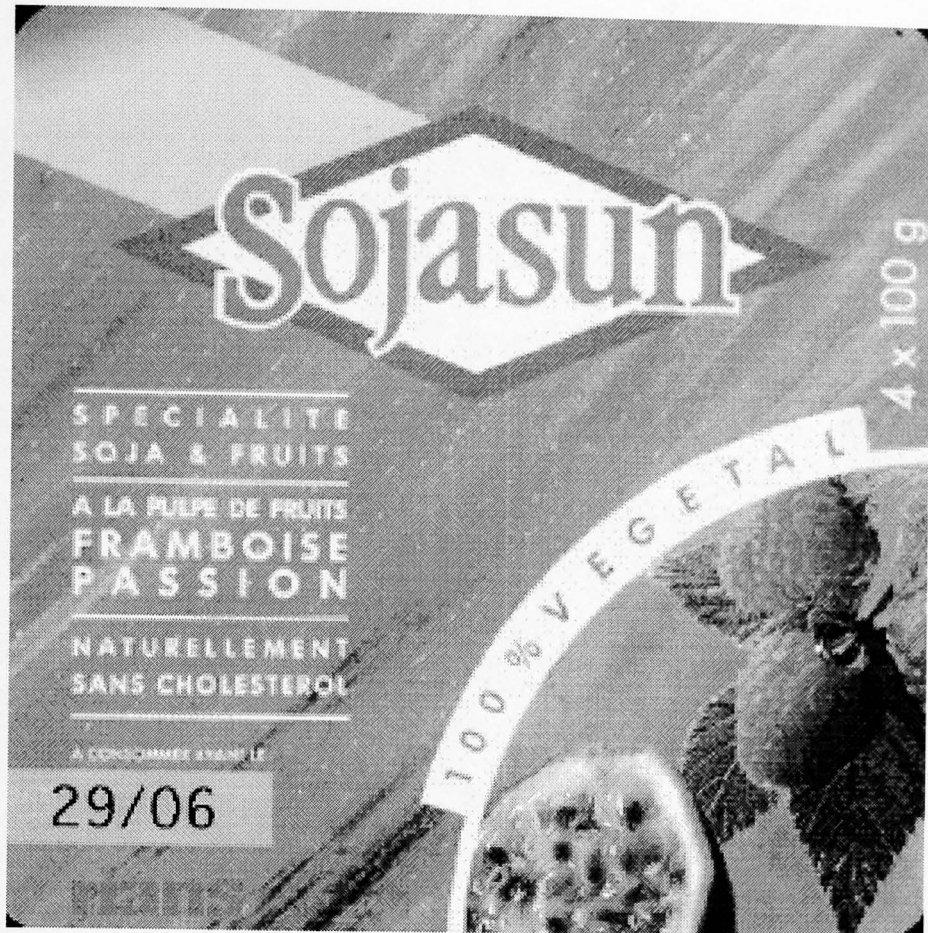
À TENEUR GARANTIE EN
VITAMINES



e 1 litre

lait stérilisé U.H.T. demi-écrémé
à teneur garantie en vitamines :
A, C, B1, B2, B5, B6, pp.

candia





Pâtes diététiques au Soja

ENRICHIES EN PROTIDES



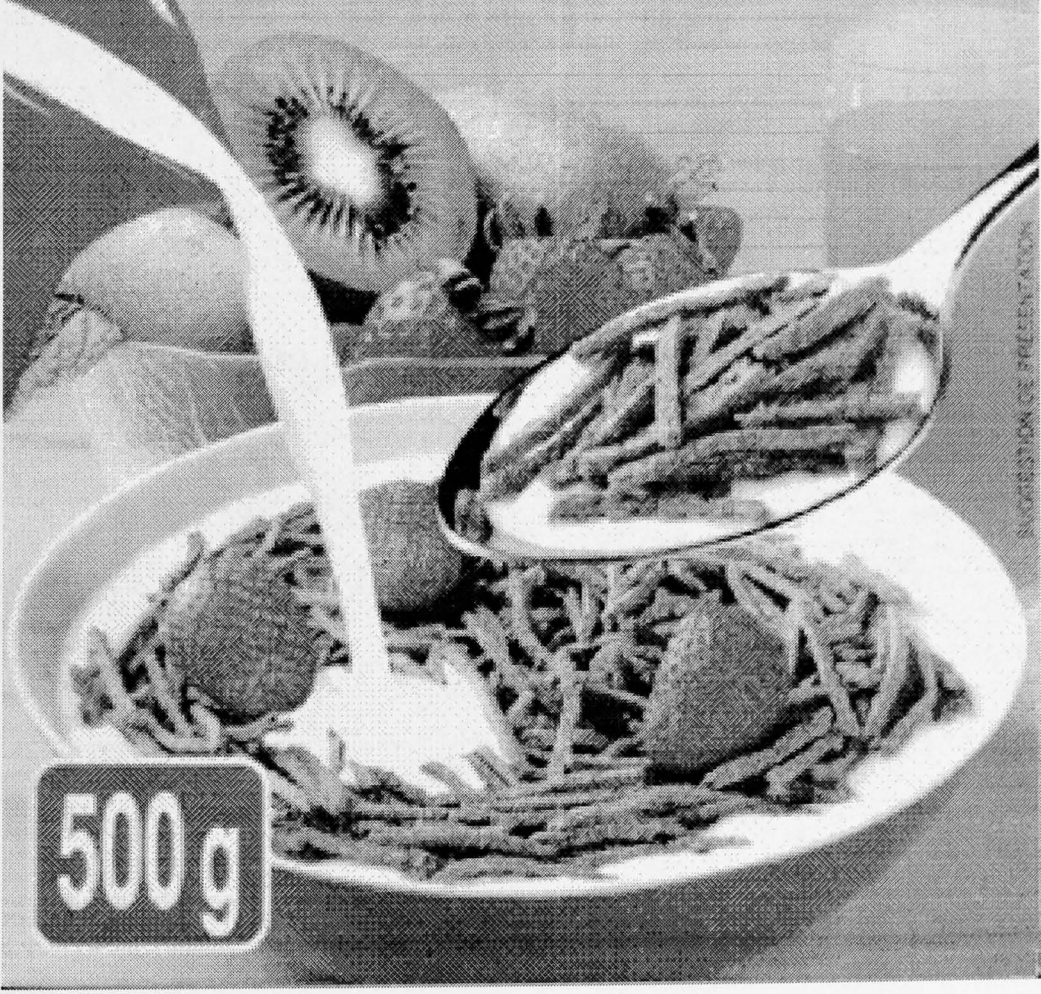
VITAMINES B1, B2, PP, B6

SANS CHOLESTEROL

100% VEGETAL

net 250g

Kellogg's
ALL-BRAN



500 g

SUGGESTION DE PRESENTATION

FLEURY MICHON

*Suprême de
Poisson*

— AU CITRON VERT ET RIZ —

PLAT COMPLET POUR UNE PERSONNE

LIGNE LÉGÈRE

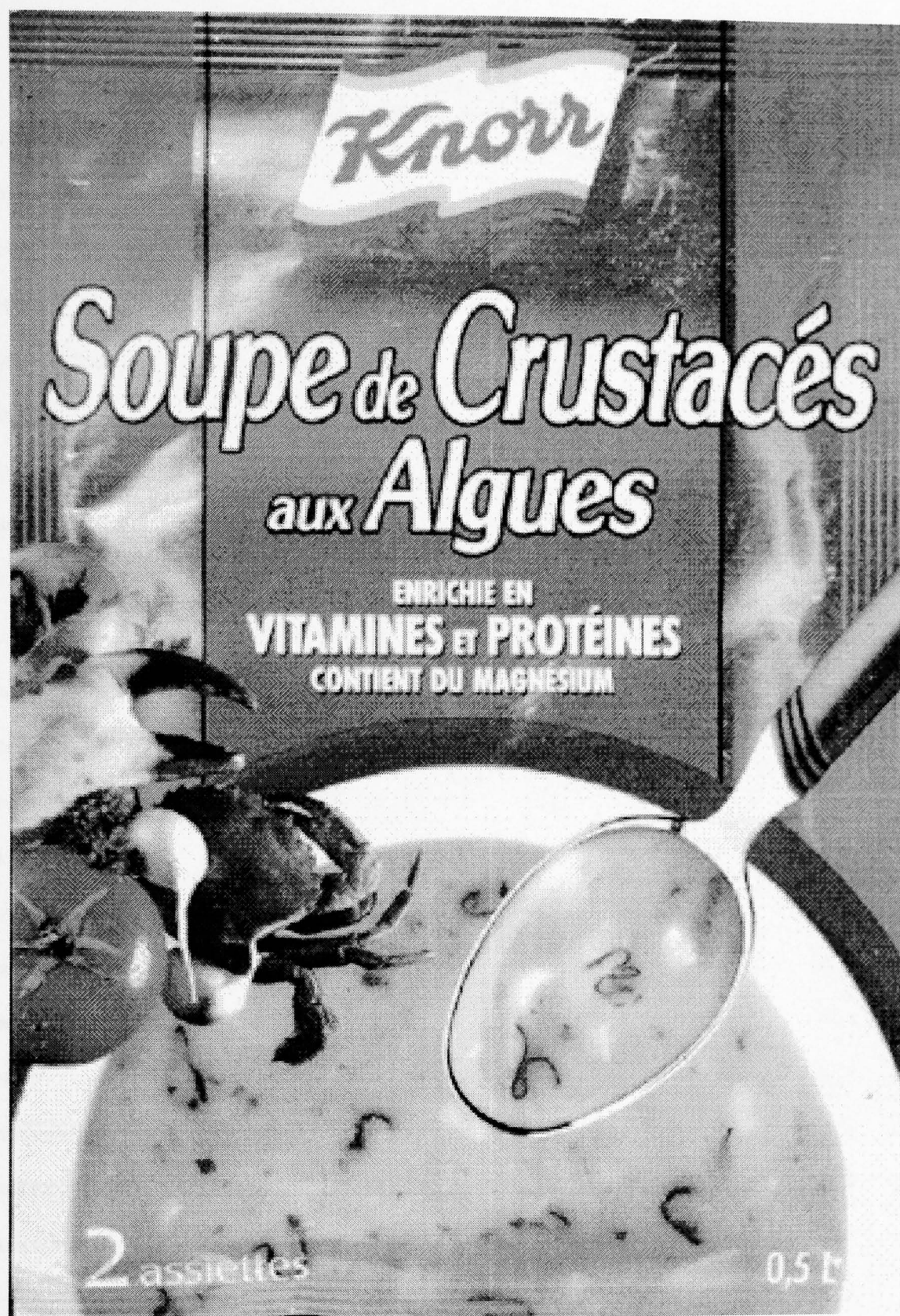


POIDS NET 270 g e

A CONSERVER AU RÉFRIGÉRATEUR ENTRE 0° ET +3°C

REGISTRATION N° 1013 414 1014

7.5 Altitudinal Insects
condition pour...



7.6 Attitudinal influence of claims, British product by condition mean scores

	Product			
	Beef lasagna		Beef julienne	
	With claims	No claims	With claims	No claims
Attractive	4.3	3.2	3.3	4.5
Interesting	3.5	2.7	4.2	3.7
Like	4.8	3.7	3.2	3.7
Happy	1.2	.9	1.7	1.3
Appetising	5.4	5.1	3.6	4.9
Sweet	-4.1	-3.3	-2.7	-3.0
Crunchy	-4.0	-4.5	-3.1	-3.3
Tasty	6.4	5.8	4.0	5.8
Bright	3.3	2.6	3.5	4.1
Colourful	3.2	3.0	5.4	4.8
Plain	-1.9	-.5	-2.7	-3.0
Fresh	-.9	.5	-.9	-.1
Healthy	5.2	3.5	4.7	3.4
Natural	.4	.2	.4	.6
Nutritious	4.2	3.6	4.1	3.0
Wholesome	4.2	1.3	3.2	2.0
Convenient	9.2	8.0	8.1	7.3
Empty	-3.0	-1.3	-2.1	-1.5
Information	3.0	.8	4.3	1.5
Quality	4.8	3.1	4.4	3.7
Familiar	6.8	5.0	3.8	3.0
Attitude to purchase	4.9	2.4	2.2	1.9
Attitude to the label	4.1	3.5	4.2	3.6
Expectation of purchase	3.1	2.3	.8	.2
Ease of purchase	8.2	4.7	7.2	3.9
Subjective norm	-.9	-.5	-3.1	-2.6
Purchase intention	2.9	1.6	.9	.2

	Product			
	Bran buds		Common sense	
	With claims	No claims	With claims	No claims
Attractive	2.7	1.4	4.0	4.9
Interesting	2.8	1.5	3.7	3.9
Like	1.3	1.0	3.6	4.3
Happy	1.9	.5	2.6	3.3
Appetising	1.9	1.0	3.8	4.4
Sweet	5.4	5.6	6.5	6.5
Crunchy	-2.0	-3.2	2.3	4.2
Tasty	1.9	.9	3.9	5.2
Bright	.1	-.1	1.7	3.2
Colourful	.3	-.2	2.9	3.2
Plain	2.0	.4	-.5	-1.0
Fresh	1.1	.5	.8	2.5
Healthy	6.4	6.5	7.0	7.0
Natural	5.0	4.9	5.0	6.1
Nutritious	5.9	5.1	6.3	6.3
Wholesome	6.6	5.8	6.6	6.5
Convenient	7.1	6.2	8.0	6.8
Empty	-1.5	-1.8	-2.3	-3.8
Information	4.6	.1	4.7	2.3
Quality	5.7	5.4	6.4	5.8
Familiar	5.3	3.8	6.1	4.3
Attitude to purchase	1.6	1.2	4.1	5.1
Attitude to the label	6.1	4.3	5.2	5.2
Expectation of purchase	.3	-.6	1.2	3.8
Ease of purchase	6.9	4.5	8.7	5.3
Subjective norm	-1.4	-.3	-.2	1.4
Purchase intention	-.3	.0	.6	3.4

	Product			
	Hi-lo Condition		Jordans bar Condition	
	With claims	No claims	With claims	No claims
Attractive	3.3	2.6	3.7	4.7
Interesting	1.7	1.5	4.2	4.7
Like	2.1	1.4	4.2	4.8
Happy	1.8	1.8	2.0	2.9
Appetising	1.4	.5	3.3	4.4
Sweet	6.1	6.6	8.0	7.8
Crunchy	-5.0	-3.3	4.5	4.3
Tasty	1.2	.5	4.5	5.2
Bright	.2	.4	.5	2.9
Colourful	.2	.7	-.7	2.7
Plain	1.2	.6	1.0	-1.2
Fresh	1.5	1.0	1.2	1.7
Healthy	5.5	4.4	6.1	5.6
Natural	2.9	2.8	4.3	6.0
Nutritious	3.0	1.7	5.3	5.2
Wholesome	3.3	3.6	6.0	5.4
Convenient	6.4	4.9	7.4	7.1
Empty	-1.6	-2.2	-2.5	-2.6
Information	2.3	-1.6	2.8	2.6
Quality	2.8	1.5	5.2	5.1
Familiar	-3.9	-1.1	5.2	3.7
Attitude to purchase	.3	.2	3.4	4.9
Attitude to the label	2.0	1.1	4.6	5.6
Expectation of purchase	-1.1	-1.0	2.4	3.8
Ease of purchase	3.3	1.8	7.8	5.4
Subjective norm	-2.2	-1.3	.5	-.4
Purchase intention	-1.2	-1.0	1.9	3.9

	Product			
	Sultana bran		Chicken masala	
	With claims	No claims	With claims	No claims
Attractive	3.9	3.5	4.4	5.1
Interesting	3.2	4.0	4.6	4.5
Like	3.1	3.3	5.0	5.3
Happy	2.1	2.0	2.8	2.3
Appetising	3.2	3.5	5.1	6.2
Sweet	6.7	6.7	-3.4	-4.0
Crunchy	3.4	3.0	-1.1	-4.1
Tasty	4.6	3.5	6.2	7.2
Bright	1.8	1.5	5.2	4.5
Colourful	1.7	1.2	5.6	4.4
Plain	.4	-.2	-3.1	-3.8
Fresh	1.5	1.0	-1.4	-.4
Healthy	7.2	6.7	3.9	3.0
Natural	4.8	5.4	-.1	.6
Nutritious	6.6	6.0	3.7	2.8
Wholesome	6.8	6.5	3.1	2.6
Convenient	7.5	6.6	8.5	8.5
Empty	-2.3	-2.0	-1.7	-2.4
Information	4.2	1.8	1.2	1.8
Quality	6.1	6.1	4.7	4.8
Familiar	5.5	5.3	6.0	4.6
Attitude to purchase	3.4	3.1	4.2	4.6
Attitude to the label	4.9	4.2	4.9	4.8
Expectation of purchase	.7	1.8	2.2	4.1
Ease of purchase	7.3	5.4	7.7	6.1
Subjective norm	-.4	.3	-2.4	-.2
Purchase intention	.8	1.6	2.3	4.2

7.7 Attitudinal influence of claims, French product by condition mean scores

	Product			
	Pates dietiques au soja		Supreme de poisson	
	Condition		Condition	
	With claims	No claims	With claims	No claims
Attractive	3.1	.8	3.8	4.1
Convenient	2.7	3.5	3.2	3.5
Bright	3.9	2.5	3.7	2.5
Healthy	4.4	4.4	2.2	2.8
Natural	3.2	3.8	.8	.2
Flavour	.2	.6	2.2	4.2
Interesting	2.6	.2	3.0	2.8
Colourful	3.7	.4	4.5	3.9
Informative	5.8	1.4	2.0	4.4
Appetising	2.1	.8	3.3	4.5
Fresh	-.7	-.3	1.3	.8
Familiar	-1.2	-2.8	-.7	.2
Nutritious	5.0	3.3	1.5	3.6
Like	3.1	.2	3.1	1.9
Empty	3.4	4.6	1.7	2.4
Happy	2.6	-.4	3.4	2.0
Texture	2.0	1.6	2.3	3.2
Wholesome	2.6	3.1	1.2	3.6
Quality	4.1	4.4	1.9	3.0
Attitude to purchase	2.8	.8	2.1	3.8
Beneficial	4.2	3.7	1.9	2.9
Attitude to the label	3.8	2.2	2.4	3.1
Purchase intention	1.3	.0	-.2	1.6
Subjective norm	.0	-2.0	-.6	-1.4

	Product			
	Framboise passion		Soupe de crustaces aux algues	
	Condition		Condition	
	With claims	No claims	With claims	No claims
Attractive	3.5	4.1	2.7	3.0
Convenient	4.1	4.7	4.1	4.7
Bright	3.6	5.0	3.7	3.3
Healthy	5.9	5.3	2.1	.0
Natural	5.3	2.5	-.1	-2.5
Flavour	3.0	4.0	.6	1.2
Interesting	2.6	3.2	2.6	3.4
Colourful	4.9	5.2	5.1	4.7
Informative	4.0	2.5	3.4	1.1
Appetising	2.6	3.3	.4	.9
Fresh	4.8	4.7	-2.8	-2.7
Familiar	-.4	-.6	-3.1	-2.6
Nutritious	5.1	4.6	2.8	.4
Like	2.7	3.2	1.7	1.5
Empty	2.1	2.5	1.2	2.0
Happy	3.4	3.6	2.6	2.4
Texture	3.1	3.6	.4	.7
Wholesome	2.1	2.8	.1	-1.7
Quality	5.3	5.4	1.7	1.2
Attitude to purchase	4.4	3.6	.5	1.6
Beneficial	5.4	5.1	1.6	1.4
Attitude to the label	3.8	3.4	2.0	2.2
Purchase intention	3.0	2.4	-.9	-.1
Subjective norm	.4	-.7	-2.2	-2.6

	Product			
	Vival lait Condition		Kellogg's All Bran Condition	
	With claims	No claims	With claims	No claims
Attractive	3.8	4.3	5.7	6.0
Convenient	3.2	3.1	2.8	4.4
Bright	2.5	3.5	5.4	5.9
Healthy	6.0	7.1	4.8	5.9
Natural	3.3	4.9	3.1	3.3
Flavour	3.2	4.3	.7	1.6
Interesting	2.9	2.5	3.8	4.3
Colourful	2.9	3.5	5.8	6.6
Informative	6.3	3.7	2.9	-1.1
Appetising	1.5	2.3	.9	1.5
Fresh	3.1	4.8	-1.0	-.2
Familiar	4.7	6.1	-.3	.1
Nutritious	6.1	6.2	3.4	5.4
Like	3.5	2.8	3.9	4.0
Empty	3.1	2.6	.0	1.2
Happy	3.6	4.4	5.1	6.1
Texture	3.4	3.7	-.2	.3
Wholesome	4.5	1.8	2.8	4.0
Quality	5.4	5.5	4.1	5.4
Attitude to purchase	4.8	5.9	2.1	2.4
Beneficial	5.8	7.2	4.1	5.4
Attitude to the label	4.8	4.7	4.2	4.1
Purchase intention	4.0	4.6	1.0	1.5
Subjective norm	2.0	2.3	-1.4	-.7

	Product			
	Barres aux cereales raisins/amandes		Bouef a la estragon	
	Condition		Condition	
	With claims	No claims	With claims	No claims
Attractive	3.9	2.8	3.7	3.1
Convenient	3.6	4.6	3.6	4.9
Bright	3.3	2.3	2.5	2.5
Healthy	5.8	5.6	.6	.6
Natural	4.9	4.2	-2.0	-1.7
Flavour	5.1	6.0	2.1	2.4
Interesting	2.8	2.2	2.5	2.3
Colourful	3.3	3.1	3.8	3.5
Informative	4.3	3.1	.6	3.4
Appetising	3.6	4.6	2.6	2.5
Fresh	-1.0	.6	-3.0	-2.2
Familiar	2.6	1.8	-.8	.7
Nutritious	6.4	6.4	.9	1.8
Like	2.2	2.6	2.8	2.4
Empty	2.6	2.5	2.0	1.7
Happy	1.4	1.3	3.0	2.9
Texture	3.4	4.6	1.5	1.2
Wholesome	4.2	5.1	1.0	1.9
Quality	5.2	5.8	1.0	1.8
Attitude to purchase	5.3	5.5	1.6	1.5
Beneficial	5.2	5.6	1.2	1.2
Attitude to the label	3.2	4.0	2.8	2.8
Purchase intention	3.8	4.1	-.4	.0
Subjective norm	2.2	1.2	-1.4	-2.9

	Product Muesli Condition	
	With claims	No claims
Attractive	4.7	3.2
Convenient	2.4	3.3
Bright	4.4	3.0
Healthy	5.1	5.7
Natural	2.8	3.9
Flavour	3.9	5.5
Interesting	2.5	2.1
Colourful	3.9	3.4
Informative	-.5	-.1
Appetising	3.6	4.3
Fresh	-1.2	1.1
Familiar	2.8	2.8
Nutritious	5.0	5.9
Like	2.4	2.7
Empty	1.9	1.7
Happy	3.1	3.2
Texture	3.2	4.0
Wholesome	3.2	5.2
Quality	3.1	4.9
Attitude to purchase	3.4	5.0
Beneficial	4.9	5.1
Attitude to the label	2.6	3.8
Purchase intention	2.6	2.7
Subjective norm	1.4	1.6

7.8 Cognitive representation of claims program code example

```
@begin<file>
```

```
@set<forceresponse= yes>
```

```
@set<datatrace= no>
```

```
@begin<text>
```

```
@title<"Intro to part 1">
```

```
@begin<screentext>
```

Introduction.

The experiment requires that you examine the information on the following screens in order that you may be able to answer a series of straightforward questions about that information.

The questions will be presented at the end of the series of presentation screens.

```
@end<screentext>
```

```
@end<text>
```

```
@begin<randomize>
```

```
@begin<block>
```

```
@set<forceresponse= yes>
```

```
@set<datatrace= yes>
```

```
@begin<text>
```

```
@title<"Croxley's">
```

```
@begin<screentext>
```

Croxley's

LEAN BEEF LASAGNE

Why choose CROXLEY'S Lean Beef Lasagne?

Only 279 Calories

CROXLEY'S recipe dishes are low in fat to help control the calories, Low fat foods can be good for your body and your figure.

Low in Fat and Saturates

Fat provides over twice as many calories per gram as protein or carbohydrate. A high fat diet increases the risk of obesity and related conditions such as diabetes and high blood pressure. Saturated fat is associated with raised blood cholesterol levels and increased coronary

risk.

@end<screentext>

@end<text>

@end<block>

Part two.

There will now follow a presentation of question screens. Each screen will contain three paraphrases. One of these is an accurate paraphrase of a portion of the original display of the advert seen in part one of the experiment. The other two are not accurate.

Please select which you remember seeing by clicking on the relevant response selection box at the bottom of the screen.

@end<screentext>

@end<text>

@begin<randomize>

@begin<block>

@set<datatrace= yes>

@begin<text>

@title<"Croxley's 1fi. 2im. 3as. /Ex. implication.">

@begin<screentext>

Croxley's Lean Beef Lasagne

1: Croxley's Lean Beef Lasagne is covered in a delicious red wine sauce for flavour.

2: Choose Croxley's Lean Beef Lasagne. Low fat foods can be good for your body and figure.

3: Croxley's Lean Beef Lasagne chosen because you care about your figure.

@end<screentext>

@set<responsemode=boxes>

@set<responses=3>

@set<response[1]="Sentence 1">

@set<response[2]="Sentence 2">

@set<response[3]="Sentence 3">

@set<responseline="Which is the accurate paraphrase?">

@end<text>

@begin<text>

@title<"Confidence Scale.">

@begin<screentext>

Please state how confident you were the paraphrase you selected was an accurate paraphrase of the relevant portion of the advert you were presented with.

1 = not confident 10 = completely confident.

@end<screentext>

@set< responsemode= scale >

@set< scaleleft= 10; scalebottom= 20; scalesize= 60;

labels= 1 1; anchormode= off >

@set< scalerange= on; scalemin= 0; scalemax= 10 >

@set< putlabel[1]= 0; label[1]="Min";

putlabel[2]= .1; label[2]="1";

putlabel[3]= .2; label[3]="2";

putlabel[4]= .3; label[4]="3";

putlabel[5]= .4; label[5]="4";

putlabel[6]= .5; label[6]="5";

putlabel[7]= .6; label[7]="6";

putlabel[8]= .7; label[8]="7";

putlabel[9]= .8; label[9]="8";

putlabel[10]= .9; label[10]="9";

putlabel[11]= 1; label[11]="Max">

@end<text>

@end<block>

@set<forceresponse= yes>

@set<datatrace= no>

@begin<text>

@title<"Thank you">

@begin<screentext>

Thank you for your participation.

The experiment is now complete.

@end<screen>

@end<text>

@end<file>

7.9 Cognitive representation of claims paraphrase versions

The first phrase is the assertion used in the probabilistic comparisons. The second phrase is the probabilistic version used in probabilistic comparisons. The fifth phrase is the filler used in the probabilistic and paraphrase, short and long term memory versions. The third phrase is the assertion paraphrase used in paraphrased comparisons. The fourth phrase is the implication paraphrase used in paraphrased comparisons.

CROXLEY'S recipe dishes are low in fat to control the calories, so they're good for your body and your figure.

CROXLEY'S recipe dishes are low in fat to help control the calories, so they can be good for your body and your figure.

Assertion form: Choose Croxley's Lean Beef Lasagne because its good for your body and figure.

Expansion implication

Implication form: Choose Croxley's Lean Beef Lasagne. Low fat foods can be good for your body and figure.

Filler: Croxley's Lean Beef Lasagne is covered in a delicious red wine sauce for flavour.

Wheat bran is a particularly valuable source of fibre. Evidence emerging shows that wheat bran fibre plays a particularly important role in maintaining a healthy digestive system.

Wheat bran is a particularly valuable source of fibre. More evidence is emerging to show that wheat bran fibre could play a particularly important role in helping to maintain a healthy digestive system.

Assertion form: Finnagan's Bran contains Wheatbran which emerging evidence shows plays an important role in maintaining a healthy digestive system.

Uniqueness implication

Implication form: Finnagan's Bran contains Wheatbran. Emerging evidence suggests Wheatbran could play an important role in helping to maintain a healthy digestive system.

Filler: Finnagan's Bran contains Wheatbran. With three packet tokens you can send for your free inflatable beach ball.

As part of a balanced diet Nutritionists recommend we eat low fat foods like Tandoori Chicken Masala.

As part of a balanced diet Nutritionists recommend we eat less fat (particularly less saturated fat). Tandoori Chicken Masala uses lean chicken breast and fromage frais keeping the fat content to a minimum

Assertion form: Nutritionists recommend we eat Natural Options Tandoori Chicken Masala and similar foods because of their low fat content.

Implication form: Nutritionists recommend low fat foods. Try Natural Options Tandoori Chicken Masala.

Filler: Nutritionists recommend we eat less fat. Natural options Tandoori Chicken Masala gives you special money saving vouchers.

Because its low fat and saturates contents avoid common dietary risks

Low in Fat and Saturates

Fat provides over twice as many calories per gram as protein or carbohydrate. A high fat diet increases the risk of obesity and related conditions such as diabetes and high blood pressure. Saturated fat is associated with raised blood cholesterol levels and increased coronary risk.

Assertion form: Choose Oragon Beef Julienne with Rice because its low fat and saturates content avoids risk of obesity and related conditions such as diabetes and high blood pressure.

Expansion implication

Implication form: Choose low fat Oragon Beef Julienne with Rice. Low fat and saturates foods may avoid risk of obesity and related conditions such as diabetes and high blood pressure.

Filler: Oragon low fat Lean Cuisine Beef Julienne with Rice will make you popular with all your health conscious friends if you serve it for dinner.

In addition, recent medical evidence shows that a diet rich in soluble fibre reduces your cholesterol level.

In addition, recent medical evidence suggests that a diet rich in soluble fibre may help reduce your cholesterol level when eaten as part of a low fat diet.

Assertion form: Appleton's Sensible Option is rich in soluble fibre which medical evidence shows reduces cholesterol levels.

Uniqueness implication

Implication form: Appleton's Sensible Option is rich in soluble fibre. Medical evidence suggests soluble fibre may reduce cholesterol levels.

Filler: Appleton's Sensible Option gives you all the taste and nutrition you need for a healthy start to the day, at a price that you can't resist.

The Wholegrain Cereals contained in Thames Oatbran & Apple bars are recommended by dieticians. They are converted slowly by the body into energy, the way nature intended, and are also high in fibre to aid digestion.

Wholegrain Cereals are recommended by dieticians. They are converted slowly by the body into energy, the way nature intended, and are also high in fibre to aid digestion.

Assertion form: Dietician's recommend Thames Toasted Wholegrain Oat Cereal Bars because the body converts the energy they contain slowly, the way nature intended.

Reasonable basis implication

Implication form: Thames Toasted Wholegrain Oat Cereal Bars contain Wholegrain. Dietician's recommend Wholegrain because the body converts the energy they contain slowly, the way nature intended.

Filler: Thames Toasted Wholegrain Oat Cereal Bars contain a galaxy of wholesome ingredients. Eat Jordan's value for money bars and you won't be disappointed.

Medical evidence shows that dietary fibre is an important element in a well-balanced diet and ALLOHA Crackers are the ideal way to increase your fibre intake.

Medical research suggests that dietary fibre is an important element in a well-balanced diet and ALLOHA Crackers contain fibre.

Assertion form: Alloha Crackers are the ideal way to increase the fibre intake medical evidence shows is necessary in a well-balanced diet.

Uniqueness implication

Implication form: Alloha Crackers contain fibre. Medical evidence shows a high fibre intake is necessary for a well-balanced diet.

Filler: Alloha Crackers are ideal for those who want to lose weight fast. Just stick to Alloha Crackers until you're ready to let your weight increase a little.

So what better way to get the fibre you need to stay healthy than enjoying a bowl of Hutchinson's SPECIAL OATS every day.

While still good for you, some foods are not as fibre rich as many people think.

Assertion version: Get the fibre you need to stay healthy by enjoying a bowl of Hutchinson's Special Oats every day.

Uniqueness implication

Implication form: Fibre can help us stay healthy. Enjoy Hutchinson's Special Oats high fibre cereal every day.

Filler: Hutchinson's the traditional good start to the day. Why don't you start the day with Hutchinson's?

7.10 Cognitive representation of claims reasons for selections

Responses from participant two.

1 sentence 2, This does not make ridiculous claims.

2 sentence 3, "Can have" the effect of reducing cholesterol is the claim I remember.

3 sentence 3, helps to keep our systems healthy and is not being too dogmatic.

4 sentence 1, My crackers have fibre to help increase fibre intake.

5 sentence 1, uses the word "May prevent" not making false claims.

6 sentence 3, This is the most sensible claim the other sentences were incorrect.

7 Sentence 1, this seems to be the most likely claim.

8 sentence 2, no additives that might upset sensitive skins.

9 sentence 3, uses the word "can" retard plaque regrowth.

10 sentence one uses the phrase "to help ensure" health for the future.

11 sentence 1, research suggests we use garlic ??? capsules.

12 sentence one, This sentence just tells you about the product and not "salon conditions."

13 this is a more likely claim, sentence 2.

14 sentence 3, more plausible reason.

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