

Pilot Study
to
Investigate the potential of eye tracking
as a technique
for
FSA food labelling behaviour research.

Report for the FSA

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Eyetracker.co.uk gratefully acknowledges the contribution of our respondents who eagerly engaged in their shopping missions and were generous with their feedback; Waitrose Supermarket in Thame, Oxfordshire who kindly and amiably hosted our field work; and finally the FSA and COI who sponsored the project and whose members gave constructive criticism throughout. The findings reported in this study are our own, however, and do not necessarily reflect the views of the FSA.

EXECUTIVE SUMMARY

Background

Eye tracking has traditionally been carried out in laboratory settings with artificially fixed visual scenes and images. Recent advances in 'mobile' versions of the technology, however, mean that it can now be used in "real world" settings. The Food Standards Agency (FSA) commissioned Eyetracker to conduct a pilot study to investigate the potential of eye tracking technology as a way of discerning what food packaging information shoppers really look at rather than relying on what they say they look at when asked, for example in surveys or focus groups. The results of the study may be used to inform the design of any future FSA research about how shoppers use food labels.

Aims of the research

The main aim of the research was to determine whether eye tracking is feasible in the natural environment of a supermarket. The study was also intended to explore the potential of eye tracking to differentiate or 'pick out' particular food labels amongst the wide range of information found on food packaging. A further consideration of the research was to understand how eye tracking can be combined with other research techniques. Eyetracker's preferred approach is to combine eye tracking with playback interviews, in which respondents talk through their eye track journey and self-completion questionnaires.

Methodology

Twelve shoppers (reflecting different demographics) were recruited to take part in the pilot study. The research took place on 7th March 2008 at Waitrose in Thame, Oxfordshire. Participants were given a shopping task or 'mission' which required them to purchase three food items. Half the group (The Specific Food Task group) were asked to look for:

- A breakfast cereal suitable for a nut allergy sufferer
- A soup/sauce that could be cooked in a microwave
- A yoghurt with real fruit pieces

The other half were simply asked to buy any breakfast cereal, soup and fruity yoghurt but to choose one that they do not usually buy. The first mission required participants to look at and use food labels whereas the second mission (the 'control' group) did not. The first mission guaranteed that labelling information would be picked up whereas the second mission was intended to reflect 'real world' shoppers who do not always look at labels unless they have a specific reason to do so.

Participants wore eyetracker glasses to record the 'visual journey' of their shopping mission. They later reviewed two play backs of the recording and were interviewed to provide a reflective commentary of their experience. Participants were also asked to complete a short questionnaire about their overall experience.

Analysis

The eye tracker recordings were analysed using frame by frame (time-sequence) coding and movement-sequence coding to generate two types of data that can be presented as statistical patterns:

- Fixation patterns – how often shoppers' attention turns to particular aspects of food products. Both eye and body behaviours can be tracked e.g. eye scanning while standing at shelves looking at a product range; eye scanning while holding up a product for inspection and eye scanning while rotating a product for closer inspection.
- Fixation timings - how long shoppers spend reading and examining particular aspects of a food product.

The reflective commentary from the play back was analysed using content analysis (a method of objectifying and quantifying what people say. Results portray the relative frequency of common themes and further group themes into higher order categories of shared meanings). The reflective commentaries were used to cross validate findings from the play backs. Answers to the self-completion questionnaires were used to add further insights on participants' experiences of taking part in the study.

Key findings

The key findings from the study are:

- Eye tracking has the potential to pick out different labelling information on food packaging, but not reliably enable very detailed information or small font text to be discerned. However, there is sufficient accuracy to plot the text respondents read if researchers have the same packaging to refer to.
- Eye tracking data showed that the Specific Food task group generally fixated more often and for longer on food labels than did the control group. This suggests that shoppers do not routinely look at and use food labels unless they have a specific reason to do so
- Participants from both groups showed a preference to select their purchase from product positioning and general packaging. That is, by standing and scanning products on shelves rather than detailed inspection through holding and rotating products.
- Participants looking for specific information, however, such as that only found on food labels, were more likely to engage in holding and rotating behaviour to find the information they needed.
- Analysis of eye tracking recordings produces a vast quantity of data that is complex to analyse particularly on any significant scale. Analysis of fixation patterns and timings produces interesting results about what shoppers look at, how they look for it and for how long.
- Eye tracking data of shoppers' visual behaviour alone is insufficient, as they are unable to tell us anything about the cognitive processes that eye tracking captures i.e. why shoppers are looking at a particular label, in a particular way and for a particular amount of time.
- Play back interviews and content analysis provided some valuable insights about the fixation patterns and timings. This has the potential to inform researchers about the optimal form of labelling design and other aspects of people's use of visual messages.
- The self-completion questionnaires revealed that the shoppers enjoyed taking part in the study and did not find the eyetracker glasses too embarrassing or obtrusive – this is

consistent with previous eyetracker research and suggests that participants are able to engage meaningfully in real world research using mobile eye tracking equipment.

Considerations for a larger study

This pilot study supports the view that eye tracking is a feasible 'real world' behaviour research technique if it is combined with other research techniques that allow the participant to help interpret the data. The pilot has confirmed the value of depth interviewing and also the benefits of collecting additional data from questionnaires. A key consideration for a larger study is how far the naturalness of the study should be compromised by expediency. The pilot suggests that eye tracking, in a food labelling context, works best when people have a specific reason to look at labels such as shopping for specific dietary needs. Another issue is that unless eye tracking is restricted to a small 'portion' of a typical shopping trip or is task focused in some way, the play backs and data analysis will be unmanageable. Eye tracking has the ability to produce statistically valid results with a larger number of participants. Smaller scale studies, similar to the one reported here, can never the less offer salient insights. Detailed analysis of exactly what respondents read on food labels can also be accurately obtained in a laboratory setting by presenting food labels in a fixed visual field (such as on a computer screen). With this constraint, the fine detail of eye tracking can be plotted. It may be, therefore, that a combined real world and laboratory study could provide both breadth and depth of data depending on the research question.

Future developments in eye tracking

Hardware developments over the coming years will undoubtedly improve the quality of the resolution of the "scene" camera and reduce the size of the recording equipment. The development of systems for these cameras should enable the researcher to see in more detail just what the shopper is reading word for word without having to refer back to the actual packaging. Future developments may also make it possible to conduct eye tracking studies in real time and there has been movement towards the development of systems that will allow this i.e. to be able to remotely watch what the shopper is fixating on while actually shopping. However, these solutions are generally very expensive and currently rely on "line of sight" (i.e. the signal must not have anything between the transmitting and receiving unit). As new technologies become available this may well become both more feasible and more economical. It is our firm belief that the findings from studies undertaken today will still have relevance over the coming decades.

Conclusions

This study has shown some of the rich insights to be obtained from eye tracking people when shopping in a real world setting. We have identified that shoppers seem to look at food labels when they have a specific reason (such as locating products for dietary needs), but only when there are such reasons. Otherwise they appear to rely on less effortful ways of finding relevant information to guide their purchasing choices. Shoppers exhibit a large amount of visual activity. In turn this reflects a vast amount of thinking and decision making showing that they actively and critically interpret the shopping environment. They do not simply respond to visual messages, but rather interpret their visual world in the light of previous knowledge and experience.

Our pilot study has also shown that the mobile eye recording technology is not regarded as particularly obtrusive and that shoppers readily adapt to it, allowing a quite naturalistic study to be conducted. Detailed word by word analysis of reading food labels requires laboratory based study, however, we recommend that eye tracking methodology be further employed to map and understand how people use food labels.

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1. Introduction

Eye tracking has been possible for over 40 years and in the last 18 months advances in technology have meant that this academic research tool can now be used in the commercial arena.

Visual imagery pervades, or perhaps dominates, the consumer retail environment. Store layouts, Point of Sale displays, advertisements, internet sites and other media all proclaim visual messages. Despite this prevalence there has been a paucity of coherent research to underpin practice, and an even greater lack of substantive theoretical models. Visual research, and particularly that based on eye tracking, however, has expanded rapidly to become a new form of market research that Pieters and Wedel (2008) champion as “Visual Marketing”.

Research methodology in eye tracking has, however, tended to polarise. The advent of computer technology has given tremendous impetus to screen based laboratory testing. This has the advantage of allowing precise plotting and measurement of eye movements against a fixed and confined scene (a computer display). Findings typically portray “heat maps” showing “hot spots” of maximum visual attention or else plot “gaze trails” (a joined up series of dots that follow the course the eyes take across the visual field). Whilst fascinating representations in their own right, these findings do not easily generalise to the actions of consumers in real world settings such as shoppers wandering around supermarkets (See for example the critique by Kingstone et al 2003).

Other research interests, including our own, have sought to understand the visual activity of consumers faced with real world decisions, involving real world products on real world shelving. In turn this has meant trying to understand the meanings consumers give to their own decision making processes. Simply mapping the behaviour of eye movements turns out not to be enough. Rather, the consumer has to be understood as an active processor of information, as someone who not only makes consumer decision, but someone who has a vested interest in understanding (and thereby optimising) their own decision making processes. In turn this means seeing eye tracking studies as part of the Cognitive rather than the Behavioural paradigm. As Janiszewski (2008) cogently argues, there is a need to change the old metaphor of visual research from passive information processing to active meaning and experience creation. The implication goes beyond academic nicety to practicable results. Those who embrace the challenge stand to benefit from the new in-sights.

The development of portable, light weight and low intrusiveness equipment has allowed eye tracking methodology in real world settings to come of age. The visual activity of real consumers can now be recorded in situ. Findings typically portray patterns and timings of fixations (the focused positioning of the eye on a visual target). Eyetracking studies by ourselves and other (e.g. Russo & Leclerc 1994) has repeatedly demonstrated that the number of times the eye attends a visual object (numbers of fixations or “visual hits”), is just as important to the consumers’ decision making processes as are sustained readings of the visual array (dwell times). This further reinforces the idea of consumers as active seekers of information rather than passive responders, as they visually switch in and switch out of the visual content. For market researchers and those concerned with visual messages on consumer products, the implication is to produce graphical design that is consistent with the consumer’s visual intelligence. It should also be literally “eye catching” (stand out against a visual field saturated with other imagery/messages) and “sticky” (this last piece of jargon amongst the eye tracking research community denotes the property of holding the eye’s attention).

The eyetracker methodology provides a unique tool to explore cognitive decision processes that previously have been regarded as unavailable. **eyetracker** uses the very latest in eye tracking technology and offers the market research industry the ability to map in detail and accurately understand what a respondent really does or does not see when shopping in the retail environment.

Our studies to date show that eye tracking methodology is most informative when combined with respondent interviews as they reflect on a video recording of their own eyetracker “journey”. Although we are accustomed to recording in memory some of our decision processes (comparing prices for example) we generally do not recall the track of our eyes when exploring visual material. The eyetracker recording provides an objective recording of our eye movements as though from the inside out. In turn, this reflects what information we are exploring as we interrogate visual images to inform our decision making (Barber, Janes & Boyland 2004).

Designed to be worn like a pair of glasses with the minimum amount of obtrusiveness to the wearer (see figure 1.1), combined with maximum level of accuracy, the system produces a video record of the respondent’s “eye journey” with a red cross hair which indicates the wearer’s direct line of vision, superimposed over the top (see figure 1.2). That is, two “hair thin” centrally crossed lines that provide a reference or “aiming” point.



figure 1.1



figure 1.2

The glasses are mounted with two very small cameras above the right eye, one records the shoppers field of vision (what is in front of them, known as the “scene camera”) the other records where the eye is looking. These two images are then married to create a video that superimposes a cross hair over the field of vision recording. The cross hair is a mathematical representation of the cornea’s position.

The optics output is recorded to a portable mini DVD, worn by the shopper in a small shoulder bag.

1.1 Aims & Objectives

Aims

This small scale exploratory project combines two principal aims:

i) Pilot Study

As an empirical pilot study: to show the potential usefulness/relevance of eyetracked data.

ii) Feasibility Exercise

As a feasibility exercise: to investigate the practical workability & acceptability of the eyetracking method in the field.

Objectives

- A. How can eyetracking be combined with other methods such as questionnaires, face to face interviews etc to unpack and build on the eye tracking results and to help understand how labelling affects purchase decision making?
- B. To what extent can eye tracking help reveal whether consumers find label information user friendly?
- C. Can eye tracking differentiate between the broad types of label information found on packaging e.g. can eyetracking pick out mandatory information from voluntary information and to what level of detail?
- D. How can eyetracking explore first time purchases versus habitual ones?
- E. Is what can be learned using an eye tracking study affected by the type of product in terms of its size, shape or materials?
- F. How eye tracking operates when used in a 'real life' supermarket setting e.g. to what extent does it distort the reality of the shopping experience, how obtrusive is it for consumers to wear?
- G. What sort of results can be obtained from eye tracking and how can the results be integrated with data from other methods used as part of the design of a behaviour study?

1.2 Research Methodology

Field work was conducted in three phases:

i) Preliminary Screening Questionnaire, Eyetracking Calibration and Task Briefing

Respondents were recruited outside the store using The Screening Questionnaire (Appendix I) and upon successful completion, were brought to the interview facility for calibration of the equipment and task briefing. Respondents also completed an informed consent form which can be found in Appendix II.

ii) Eyetracking Shopping Activity In Store

Our shopper respondents were tasked with making a small number of shopping selections within a predefined range and were given a £10.00 budget.

The sample was divided into two, with half of the sample being set three “specific food tasks” and half being set three “new food tasks”. The three tasks were selected to ensure respondents looked at a range of different food categories, packaging types (different shapes and surfaces) and at a range of label information to see how the eye tracking technology could work across these parameters.

The “*specific food task group*” were given tasks constructed to stimulate visual searching and interrogation of labels: They were asked to purchase three products which met the following specific criteria, and this could have been something they had purchased before.

- A breakfast cereal suitable for a nut allergy sufferer
- A soup/sauce that could be cooked in a microwave
- A yoghurt with real fruit pieces

The “*new food task group*” (i.e. the control group) were tasked to purchase any items from the following, but which they had never purchased before:

- A breakfast cereal
- A soup/sauce
- A fruity yoghurt

The specific food tasks were designed to ensure that participants were required to look at and use food labels whereas the new food tasks did not necessarily require participants to use the label information, so therefore acted as a control to the specific tasks.

Additionally, the two groups contained a possible contrast between consumers’ eye tracking of first time versus habitual purchases (See Objective D). The New Food Task group was meant to show the former, and the Specific Food Task Group the opportunity to show the latter.

The respondents were given individual shopping lists, dependant on their group (Appendix III)

iii) Play Back Interview & Questionnaires

On completion of the shopping task, respondents were taken back to the interview facility. Once the eye tracking glasses were removed, respondents were given an anonymous questionnaire to complete. This contained a number of rating scales which aimed to measure critical aspects of their experience plus some open ended items (See Appendix IV)

Respondents viewed two full playbacks of their eyetracker journey. On first viewing of the eyetracker recording of their shopping journey, respondents are typically surprised and

sometimes awe struck by the amount and rapidity of their eye movements. The first playback is therefore intended to familiarize and normalise the experience. It may also function to allow respondents the opportunity to gather their thoughts about their visual journey.

The second playback was used for a more focused discussion. The interview follows a well established depth interview method of “funnelling” (see Oppenheim 1992) beginning with open ended questions and gradually channelling respondents’ comments to discuss their visual processes and their choices of products. The interview sought respondents’ reflections on their immediate shopping experience, how they arrived at their purchase decision and how they viewed the labelling. They were funnelled to review critical features of their eye tracking tape and to provide a first hand account of their visual cognitive processes. Special care was taken to not put words into their mouths, but rather to elicit their own verbatim reflections of their cognitive processes. In this way, and in line with the previously described model of the consumer as an active processor of information, the interviews are considered to yield rich data for subsequent content analysis, revealing the “inside track” of their visual cognitions. Interview questions were kept deliberately simple such as “what are you looking at here?”, “what does it say [on the label]?” and “what were you thinking at this point?” Directive and closed-ended probing was considered to be counter productive at this stage of research enquiry.

Finally, respondents were given a second anonymous questionnaire to complete. The questionnaire aimed to evaluate the acceptability or obtrusiveness of wearing the eye tracking equipment during the study. (See Appendix V)

1.3 The Fieldwork Setting

The study took place at Waitrose Supermarket in Thame, Oxfordshire. The whole study took just over 10 hours and was completed in one day on the 7th March 2008.

As with many of our studies we used a mobile research facility parked in the store’s car park to calibrate the eyetracking equipment for each shopper and to conduct the playback interviews and questionnaire completion.

By using such a facility we ensure that the store has to provide the minimum of amount of resource, while at the same time ensuring that the shopper interviews can be conducted in a relaxed and friendly atmosphere.

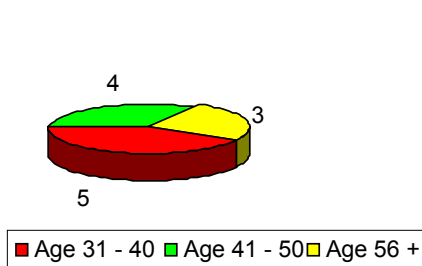


1.4 Sampling Frame

The sample of 12 respondents incorporated a mixture of men (3) and women (9) from a range of age groups. There was also a mixture of those shopping alone or with someone else.

We unintentionally under-sampled the younger age brackets. This may reflect the local population shopping in Thame at the time. Obviously, a larger controlled study would employ a Stratified and Proportionate Quota basis to ensure accurate demographic representation.

Shopper Ages



Shopper Profile



(*Children's ages: 18 months and 4 years)

The recruitment screener (Appendix I) was designed to exclude those who required glasses for reading, as the eye tracking equipment at the time could not be worn over glasses; those who never purchased products from the three food categories, to help create a more natural task for them; and those who normally shop for someone with a nut or dairy allergy as it was felt they may use labels in a very specific and practised way and so not be representative of the mainstream shopper.

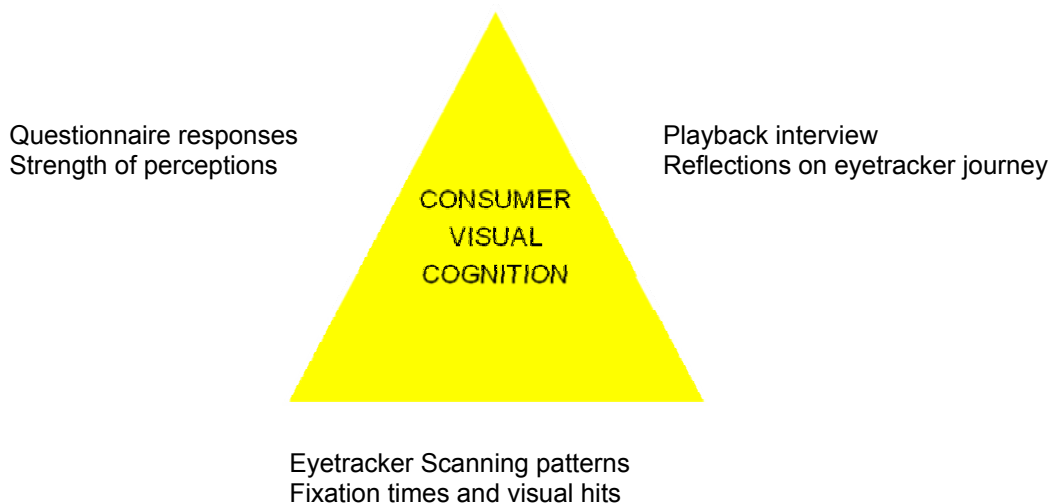
2. FINDINGS

2.1 Research Objective A:

How can eye tracking be combined with other methods such as questionnaires, face to face interviews etc, to unpack and build on the eye tracking results, and to help understand how labelling affects purchase decision making?

Triangulation of Data

Eyetracker research collects three different data sources to provide convergent validity of findings. Each data source helps illuminate and substantiate the other, as indicated in the schematic diagram below:



Eyetracker Scanning Patterns

The eyetracking data captured is saved to an audio visual interleave (AVI) file. This video recording shows exactly where each person looks and can be analysed on a frame by frame basis if necessary.

Differentiating Packaging and Food Labels

During the course of this research study we have come to understand from respondents' reflective comments in the playback interviews, that the distinction between food packaging and food labelling is not necessarily obvious. Some mandatory information requirements are food labels by definition. Other aspects blur with promotional packing. We believe the difference is also of concern to our shopper respondents. As they clearly express;

- *"They say all this stuff is marvellous, but it's such a load of rubbish"*
- *"What it says in the label doesn't always follow"*

For operational purposes in the analysis of eye tracking data in this pilot study, we defined food labels as writing on packaging that included: ingredients, nutritional information, allergy advice, product promise (eg "sugar free"), and health icons. Packaging was determined to be anything else that fell outside this working definition. In a wider study it would be possible to group the

information according to whether it is mandatory or voluntary. Content analysis of playback interviews provided information of what respondents regarded as food labelling. Respondents' descriptive language is revealing, suggesting that food labels are both like the small print of a contract (perhaps important but seldom read through) and also containing superfluous information (other "stuff"). As they describe it labels are:

- *"small print"*
- *"guidelines and all that stuff"*
- *"little ingredients"*

Eyetracker recordings were analysed using frame by frame (time-sequence) coding and movement-sequence coding to generate two kinds of complementary data: Fixation Patterns and the Fixation Timings:

a. FIXATION PATTERNS

Numbers of fixations (That is discrete focused looking at a product or product feature, such as a food label.)

This data describes changes in visual attention and represents in effect the number of visual "hits" or the number of times the eye is drawn to the visual target. As Pieters & Wedel (2008) convincingly argue, visual attention per se is informative. That is, regardless of how long the perceiver looks at an object (in this case food labels) there is intrinsic informational value in the act of attending to food labels at all.

Fixations patterns are calculated for three distinct Visual Orientations that describe the major elements of point of purchase decision making:

- Standing scanning: Eye scanning whilst standing at shelves looking at product range.
- Holding scanning: Eye scanning whilst holding up product for inspection.
- Rotation scanning: Eye scanning whilst rotating product for closer inspection.

The different sets of visual orientations describe shoppers visual scanning as a part of their larger behavioural repertoire, including body movement. It represents a macro level of behavioural navigation, of locating the area to be scanned. It is important to recognise eyetracking recordings as part of the larger sequence of shopping activity. The three visual orientations identified here are similar to the distinction made by Russo & Leclerc (1994). They differentiate stages of eye fixations during the process of in-store decision making: orienting, evaluating and verification processes. Orientation concerns obtaining a general overview of the products available. In the Evaluation stage, direct comparisons are made between brands. Finally, Verification refers to further visual checking (or double checking) of the chosen brand.

b. FIXATION TIMINGS

Fixation times (dwell times, or how long the gaze is sustained on a visual target).

Fixation times are calculated for:

- Reading food labels on product purchased
- Examining packaging (excluding food labels) on product purchased
- Total fixation time on product purchased

Overall Fixation Times for All respondents (seconds)

	Mean	Standard deviation
Soups/sauces	29.46	23.63
Yoghurts	25.36	15.37
Cereals	57.09	78.87

This data set shows that overall respondents spend around half a minute in total examining the products they eventually purchase, with cereals occupying the longest time. The wide standard deviations also show there is considerable individual variation.

The table below shows that there is no difference between the two groups in total amount of time spent on visually inspecting soups. The Specific Food Task group spend somewhat more time on Yoghurt selection, but substantially more time on Cereals¹.

Overall Fixation Times per Group (seconds)

	Soup	Yoghurts	Cereals
Specific Food Task	29.46	28.88	40.55
New Food Task	29.46	21.91	25.59

Reflections from Playback Interviews

Respondents were asked to describe their visual journey during two playbacks of their eyetracking recording. Care was taken to elicit as much as possible their own description and explanation of their visual thinking. Respondents' reflective commentaries were recorded, later transcribed and subjected to Content Analysis. This discloses the relative frequency of common themes.

Content Analysis

Content Analysis is a widely used method to convert unstructured or open ended data, such as reflective commentary, into a systematic, objective and quantitative form (see for example Neuendorf 2002). Content statements (verbatim words or phrases) from all the respondents were coded into similar groups or categories of shared meaning (e.g. all the comments associated with how easy or difficult it was to read food packaging were grouped under the category of "readability"). Subsequent analysis regrouped the categories into higher order (or more abstract) categories to provide a taxonomy of meanings (e.g. "readability" as part of "visual effort").

Content Analysis of playback interview comments yielded a total of 284 separate content statements. These were sorted into 17 first order categories such that all statements were mutually exclusive and collectively exhaustive. That is, all the relevant content statements were located into one category or another (no items were excluded). The 17 categories were resorted into 11 higher order themes, and finally subsumed under 3 Domains of Cognition:

¹ One respondent's timings for looking at cereals in the Specific Food Task group might justifiably be regarded as an outlier. He spends over 5 minutes looking at the cereal packet he eventually purchases. 46 seconds of this time is spent on reading the food labels. The distorting effect of outliers is, of course, an intrinsic risk with very small samples.

- Visual Search Content (45%), N=127 statements
- Purchasing Hierarchy (30%), N=85 statements
- Visual Search Pattern (25%), N=72 statements

In order to make comparisons across the various content themes, some of this data is presented in subsequent sections of this report as percentages in addition to actual frequencies. Whilst 284 content statements provide sufficient data to make this statistically valid, it should be remembered that this is a pilot study based on only 12 respondents. The results should not, therefore, be generalised to the wider population.

Domain 1: Visual Search Content

In this domain, our respondents describe what information they look for when making a purchasing decision. The findings of this from both task groups are referred to fully in Section 3.4; Objective D.

- Task Search
 - Positive search
 - confirming phrases/symbols
 - appealing flavours
 - Negative search
 - double checking
 - luxury/treat
- Reading additional labels/sections

Domain 2: Visual Search Pattern

In this domain, respondents describe how they go about acquiring information through visually interrogating their shopping environment. The findings from this domain are explored more fully below.

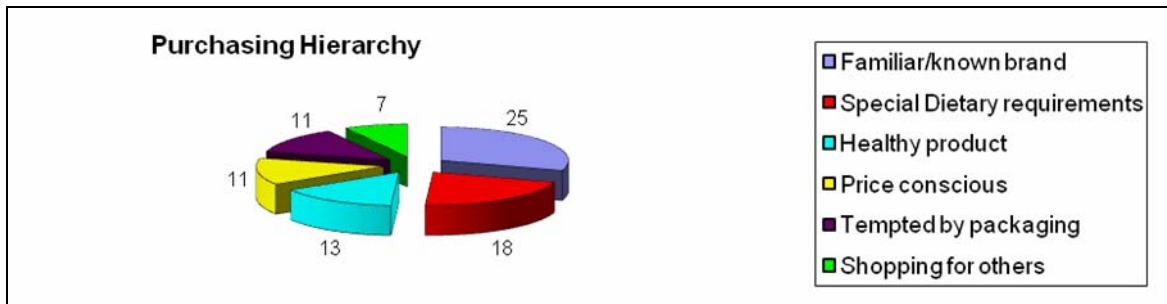
- Visual effort
 - readability
 - huge choice array
 - level of information
 - difficulty discriminating
- Known locations
- Time Limitation

Domain 3: Purchasing Hierarchy

In this domain our shopper respondents describe their pre-existing knowledge and motivations when reaching a purchasing decision.

- Familiar/known brand
- Special Dietary requirements
- Healthy product
- Price conscious
- Tempted by packaging
- Shopping for others

Purchasing Hierarchy (both groups) motivations/ preferences for product selection:



The following example quotations illustrate the emergent themes:

- Familiar/known brand: *“Activia peach – we have this brand at home. I knew what to buy in advance” (Specific Food Task)*
- Special Dietary requirements: *“I’m a bit of a health freak and I like to make sure I don’t get anything with sugar” (Specific Food Task)*

This purchasing hierarchy shows that our shoppers respond as normal. Our experimental tasks are completed as instructed (e.g. buying cereals suitable for someone with a nut allergy), but the tasks are also interpreted in the light of the prevailing hierarchy of motivations. Again, this reinforces the significance of understanding that consumers actively process information according to their own agenda. They do not simply respond passively to stimuli. Note, for example, that even though the shopping on this mission is for free, the shoppers still behave with normal prudence. That is, they reveal their usual price consciousness and shop for bargains even though this is unnecessary. This also demonstrates the ecological validity² of the real world shopping mission in this study.

c) Visual Search Pattern (how information is visually acquired)

In order to make comparisons across the various content themes, the data is presented as percentages. Whilst the themes in this domain provide sufficient data to make interesting comparisons, it should be remembered that this is a pilot study, and in this specific analysis, a total of only 40 content statements have been used. The results should not, therefore, be generalised to the wider population.

i) Specific Food Task Group (total of 40 content statements)		
	Percentage	Frequency
• Visual effort	72	29
○ Readability		
○ difficulty discriminating		
○ huge choice array		
○ level of information		
• Known locations	18	7
• Time Limitations	10	4

Total	100	40

² Ecological Validity refers to Brunswik’s (1956) celebrated dictum for credible research design that the research environment as well as the research respondents should realistically represent (in a sampling sense) the wider situation to which the results will be generalized.

Nearly three quarters of visual search pattern for the Specific Food group is taken up with visual effort (72%). That is, the difficulty and amount of visual information to be processed. Respondents describe a major concern with the strain (effectively time and energy) they expend on visually interrogating the food items in their shopping mission. Out of this, the single largest concern is with the readability of packaging and labels. There is also concern with the difficulty telling packaging from food labels, being overwhelmed by the vast choice available and the level of information available. Taken together, this suggests that detailed reading of food labels (and other detailed packaging information) is a major concern for consumers when shopping for specific food requirements of the sort tasked here.

The following quotations from the content analysis clearly show the poignancy of these themes:

Visual effort:

- *"it is difficult. The writing [on the yoghurt pot] is just so small"*
- *"Considering it [shredded wheat] has only got one ingredient in it there's quite a lot of information on there"*

Known locations:

- *"The reason I went to end [of aisles] is because they tend to section off products there. I was wondering if products for intolerances might be at the end. But its all mixed up"*

Time limitations:

- *"When you're normally shopping – in a hurry - you just grab the first thing. You don't really stand and read it. You just don't stand and read these things".*

ii) **New Food Task Group** (total of 32 content statements)

In order to make comparisons across the various content themes, the data is presented as percentages. Whilst the themes in this domain provide sufficient data to make interesting comparisons, it should be remembered that this is a pilot study, and in this specific analysis, a total of only 32 content statements have been used. The results should not, therefore, be generalised to the wider population.

	Percentage	Frequency
• Visual effort	50	16
○ Readability		
○ difficulty discriminating		
○ huge choice array		
○ level of information		
• Known locations	30	10
• Time Limitations	20	6
	<hr/>	
Total	100	32

Visual effort for the New Food Task group is reduced to 50% of their concern. Knowing where products are located and time constraints in contrast to the Specific Food Task group, each now show as a major concern. This suggests that consumers for new foods obtain most of their purchasing information from general positioning and packaging, and not from detailed reading of food labels. It also suggests that the prospect of stopping to read detailed food information is weighed against other shopping considerations.

The following quotations from the content analysis clearly reveal the shift in concerns:

Visual effort:

- *"There was some smaller print I could read clearly enough [Carbonara sauce]"*
- *"I think it was one of the fruit ones [yoghurt] that caught my eye. I sort of scanned down so I didn't bother to go any further"*

Known locations:

- *"I know my way around."*

Time Limitations:

- *"When you've got children with you, you go 'come on, come on, you're not stopping there'"*

Questionnaire Responses

For the purpose of cross validating the eyetracking data and the playback reflections, the Shopper's Questionnaire items are treated as 5 point scales representing strength of reactions. With this small sample results are expressed only as descriptive statistics (means and standard deviations), to indicate the pattern of responses between the two groups in the sample. Used in this way, the statistics retain validity. Illustrations of using the questionnaire data for this purpose can be found in Section 3.2 below.

For completeness, we have included the frequency of responses to the questionnaire scale items. It is important to understand that the results should not be generalised beyond the small pilot sample of 12 respondents.

We were asked to include two open ended items in the questionnaire, but these yielded a poor response rate. Asked which, if any, products were difficult to find, the 6 respondents replies show a mixed reaction:

Specific Food Task Group:

- *It was easy to find m/wave soup than sauces*
- *Fruit yoghurt with real fruit pieces couldn't really tell which were flavours, puree or pieces*
- *I know the shop so I could find the products*
- *The yoghurts didn't specify whether they contained real fruit*

New Food Task Group:

- *I shop regularly at Waitrose so it was easy to find the products I was looking for*
- *The soup took longest to choose – couldn't decide between the flavours!*

The second open ended item asked if packaging information was difficult to read and resulted in only 3 replies that said:

Specific Food Task Group:

- *Non really, although all should state if produced in factory which also processes nut product*
- *Yoghurts – far too small writing!*

New Food Task Group:

- *I didn't really read the information, just the main labels on the front*

2.2 Research Objective B:

To what extent can eye tracking help reveal whether consumers find label information user friendly?

This objective can be answered by looking at the fixation data, questionnaire responses and the playback analysis, comparing the two task groups and across products.

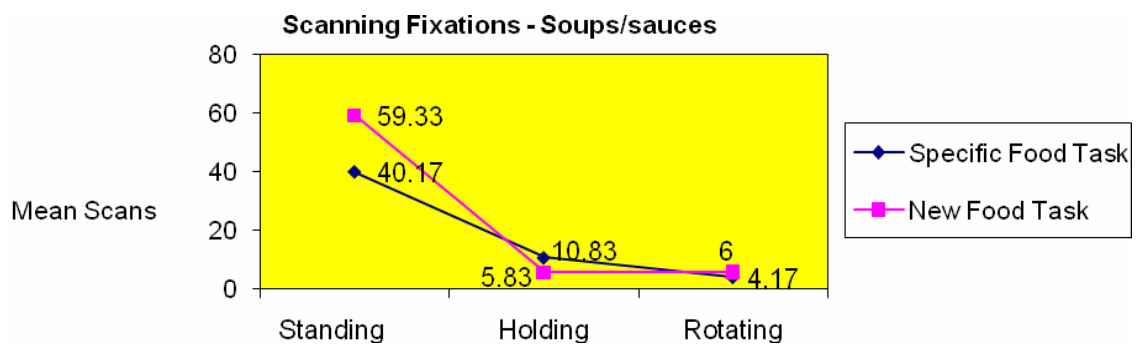
Important: The data generated throughout this study was based on a small pilot sample of 12 respondents. Whilst eyetracking generated a rich data field, the results should be taken only as indicative for future research designs and should not be generalised to the wider population.

a) Shopping for Soups/sauces

Both groups generate similar numbers of scanning sets. That is, they stand, hold and rotate about an equal amount in their efforts to shop for soups/sauces. The New Foods group, however, engage in somewhat more visual interrogation of the shelves, as the following data shows:

Scanning Fixations: Soups/Sauces

Mean fixations: the average number of visual hits made during each of the three visual orientations.



	Standing	Holding	Rotating
Specific Food Task	40.17	10.83	4.17
New Food Task	59.33	5.83	6.00

Questionnaire responses: Perceived choice of soup / sauces purchased
(5= too much choice, 1= hardly any choice)

	Mean	Standard deviation
Specific Food Task	3.5	0.55
New Food Task	4.4	0.89

Frequency of responses to question: “How much choice of soup/sauce was there?”

	Specific Food Task	New Food Task
Too much choice	-	3
Quite a good choice	3	1
Satisfactory	3	1

The questionnaire data reveals a substantial difference between the two groups, with the New Food group finding much more choice within their shopping mission. Whilst they are also looking at flavours, the Specific Food Task group are primarily focused on looking for “microwavable” products (of which there is a smaller range and therefore easier choice).

Shopping for soups/sauces appears to be the easiest task of the three for both groups. That is, most of the visual information could be acquired whilst standing at the shelves. The Specific Food Task Group appears to find the task easiest of all in locating a symbol or phrase to confirm the product was microwavable. The New Food task group, however, appear to expend more visual energy to identify new flavours, as the following quotes indicate:

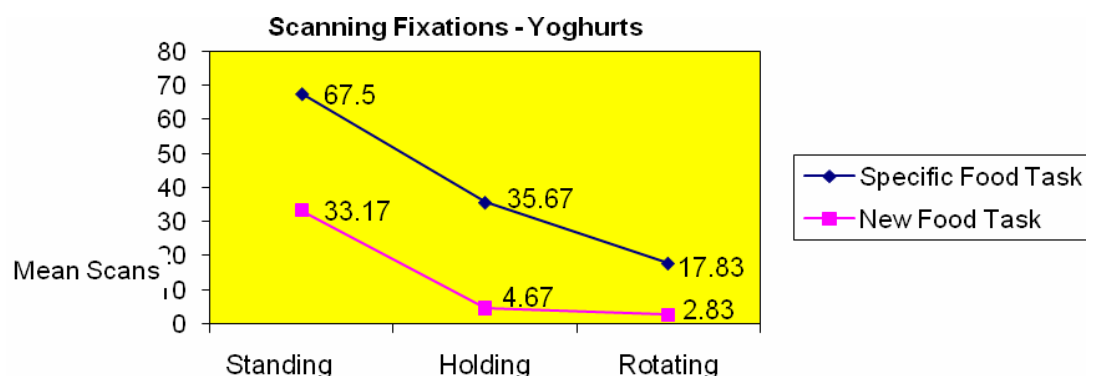
- *“The one I went for in the end because it was more exotic was asparagus but with crab” (New Food Task)*
- *“What made me pick it up it says ‘ready in minutes” (Specific Food Task)*

b) Shopping for Yoghurts

Scanning Fixations: Yoghurts

Mean fixations

	Standing	Holding	Rotating
Specific Food task	67.50	35.67	17.83
New food task	33.17	4.67	2.83



This data shows the number of fixations respondents invest in yoghurt searching. The Specific Food Task group appear to be significantly more visually active than the New Food group. This

difference is marked throughout all 3 visual orientations of standing, holding and rotations scanning. Most importantly, fixations for holding and rotating are proportionately much higher. This indicates the Specific Task Group are reading much more packaging and label information to complete their shopping mission.

Questionnaire responses: Ease/difficulty of finding yoghurts purchased.

(5= very easy, 1= very difficult)

	Mean	Standard deviation
Specific Food Task	3.33	1.51
New Food Task	4.83	0.41

Frequency of responses to question: "How easy or difficult was it to find yoghurts?"

	Specific Food Task	New Food Task
Very easy	3	5
Quite easy	1	1
Quite difficult	3	

In contrast to the mission to find soups/sauces a clear difference emerges between the 2 groups. The New Food Group find it much easier to locate their relevant product, as the following quotes suggest:

- *"Looking and thinking, does that count as real fruit pieces" (Specific Food Task)*
- *"I was reading the flavours more than the detailed ingredients to be honest" (New Food Task)*

The New Food Task group solve their problem almost entirely at the level of standing scanning. That is, they find the information they need to make a purchasing decision through a combination of shelf positioning and packaging that can be read whilst the product remains on the shelf. This typically does not include food labelling. The Specific Task Group, however, have to engage in more effort in all three visual orientations, but particularly in holding and rotating (reading the detail of packaging and labels).

c) Shopping for Cereals

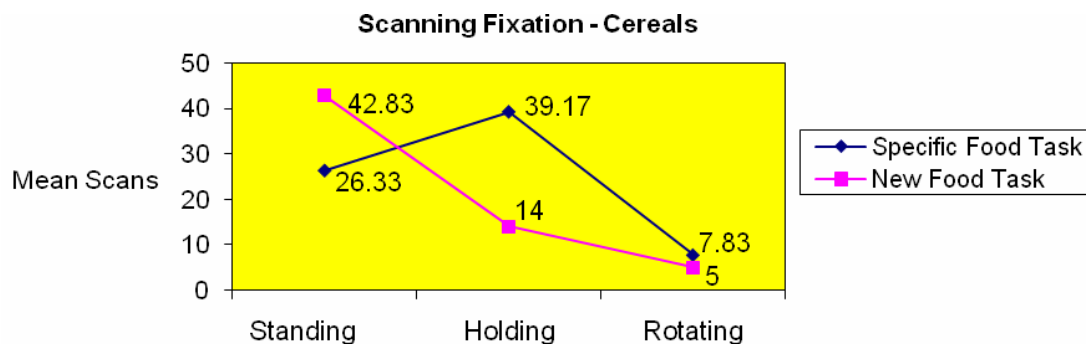
There is an interesting contrast or interaction effect with the number of fixations when looking at cereals. The New Food Task group invest about twice as many visual hits whilst standing (that is they invest most of their visual effort in finding the relevant product). The Specific Food Task group in contrast, invest most of their visual effort in closer examination of the product by holding the packet. This probably reflects the difference in their shopping missions and the different packaging information they attend to. It is notable that they make around 7 or 8 visual fixations on average whilst rotating the product, compared to 17 or 18 fixations whilst rotating yoghurt cartons. Again, this signifies the variation in density and readability of food labels. Lots of information can be comfortably printed on a large cereal packet. The same level of information on a much smaller yoghurt carton makes it a vastly more difficult problem to solve.

Scanning Fixations: Cereals

- “Just a case of reading the stuff on the side. It said ;may contain nuts’. Special K didn’t say that. I’m happy with that. (Specific Food Task Group)
- “Reading packaging. I think there’s a choice of 3 different mixtures. I went for cranberries. I like cranberries.” (New Food task).

Mean Fixations

	Standing	Holding	Rotating
Specific Food task	26.33	39.17	7.83
New food task	42.83	14.00	5.00



Questionnaire responses: Ease/difficulty of reading cereal packaging

(5 = very easy, 1 = very difficult)

	Mean	standard deviation
Specific Food Task	4.33	0.82
New Food Task	3.5	0.84

Frequency of responses to question:

“How easy or difficult was it to read the packaging information on the cereal packet?”

	Specific Food Task	New Food Task
Very easy	3	1
Quite easy	2	1
Neither easy nor difficult	1	4

The preceding data shows the Specific Food Task group found it much easier to read the relevant information on cereal packets. This is perhaps surprising given their task demanded more detailed reading of food labels.

Do consumers find label information user friendly? Although it is not possible to make wider inferences from the data of this pilot study we have shown that it is possible to distinguish how

shoppers seek information, firstly from shelf position, then general packaging and finally from food labels. The data suggests that food labels are seen as requiring greater time and effort to access than information derived from general packaging or the information inferred from shelf positioning. Shoppers, however, do appear to be persistent. When they need relevant information, they exert considerable visual effort to find it.

2.3 Research Objective C:

Can eye tracking differentiate between broad types of label information found on packaging e.g. can eye tracking pick out mandatory information from voluntary information and to what level?

This eye tracking study shows that the technology can show generally what shopper respondents look at, but not the fine detail of what they specifically read in a real world setting. Parallax errors³ in the calibration of the eye tracking equipment make this too unreliable. It is, however, perfectly able to show a good enough image to pin point the areas of packaging that respondents visually interrogate. That is, there is sufficient accuracy to plot the text respondents read if the researchers have the same packaging to refer to. Further studies in this area might, therefore, restrict the choice of goods to a limited and previously selected range (e.g. a choice of 6 cereal packets). Eyetracker recordings could then be mapped against the known location of labels on the packaging. We also advocate continued cross validation of findings through the use of play back interviews.



Fig 2.1 Reading just how fruity the yoghurt is.



Fig 2.2 Reading instructions on a soup packet.

³ Image clarity depends upon the focus of the lens. The eyetracker equipment is primarily an optical device to plot eye movement and only secondly a kind of telescope. The human eye, of course, can radically alter focus from short to long distance, literally in the blink of an eye. The eye tracking equipment, however, is optimally set at a distance for the task in hand. Inevitably therefore, some long and short distance fixations can appear inaccurate.

When calibrating, there are two optical paths; the eye and the scene camera which coincide only on the calibration plane, as the scene camera is not embedded in the eye. If the paths are not parallel, such as if the subject moves forward or backward, there is a misalignment referred to as a parallax error. This can be both horizontal and vertical.

Eyetracking technology can provide accurate recordings of reading small print, but only in a laboratory setting. The last quarter Century has generated a wealth of research literature devoted to just this issue. Typically research has focused on describing the minutiae of saccades (short ballistic eye movements characteristic of reading patterns). See for example Pollatsek et al's (2006) EZ Reader Model.

Further eyetracking research on the utilisation of food labels could perhaps combine data from real world settings with laboratory based findings. Such a mixed method approach would provide both breadth and depth of data about consumer's reading of food labels.

2.4 Research Objective D;

How can eye tracking explore first time purchases versus habitual ones?

We can make a number telling comparisons between the two groups. The Specific Food Task Group was under no restriction to purchase new products. As we saw earlier, familiar/known brands heads the purchasing hierarchy. One respondent from the Specific Food Task group, for example, relied entirely on prior knowledge to select a product suitable for a nut allergy sufferer. She had already decided to buy Shredded Wheat. As she explained, quoting from the advertising:

- *"Shredded Wheat – its whole grain- there's nothing in it, no salt"*

Visual Search Content obtained during the playback interviews reveals further interesting decision making processes when new products are chosen. In order to make comparisons across the various content themes, the data is presented as percentages. Whilst the themes in this domain provide sufficient data to make interesting comparisons , it should be remembered that this is a pilot study, and in this specific analysis, a total of 70 content statements have been used. The results should not, therefore, be generalised to the wider population.

Visual Search Content (what information respondents looked for)

Specific Task Group (total of 70 content statements)

	Percentage	Frequency
• Task Search	81	58
○ Positive search (confirming phrases/symbols)		
○ Negative search (double checking)		
• Reading additional labels/sections	19	13
Total	100	70

As the data above shows, our shopper respondents approached their task mostly as a search for label information that would confirm whether the package contents matched their shopping mission. For the task of finding a cereal suitable for a nut allergy sufferer, this became paradoxical, or at least an attempt to prove a negative. Our respondents show they spent a lot of visual effort double checking, when no confirming phrases could be found:

Positive search (Confirming phrases/symbols)

- *"Little icon of microwave oven gives your eye something to home in on, or if it was freezable to have snowflakes."*

Negative search (Double checking)

- *“Just checking it [Special K] doesn’t say something else. They don’t always say ‘nut free, glucose free’ or whatever”*

Reading additional labels/sections:

- *“Just basically telling you about what gluten is in it, where the cows milk comes from, that sort of thing”*

Visual Search Content (what information respondents looked for)

In order to make comparisons across the various content themes, the data is presented as percentages. Whilst the themes provide sufficient data to make interesting comparisons, it should be remembered that this is a pilot study, and in this specific analysis, a total of 57 content statements have been used. The results should not, therefore, be generalised to the wider population.

New Food Task Group (total of 57 content statements)

	Percentage	frequency
• Task Search	76	43
○ Positive search (appealing flavours)		
○ Negative search (luxury/treat)		
• Reading additional labels/sections	24	14
Total	100	57

As with the Specific Food Task group, the task search dominates. The New Food Task group, however, defined their task mostly as finding new flavours. They too had a negative search trying to prove the negative of what they had not previously had:

Positive search (appealing flavours):

- *“Special K with purple berries - which I thought sounded it would be nice”*

Negative search (luxury/treat):

- *“I was trying to keep away from soups I normally eat”*

Reading additional labels/sections:

- *“Looking for a date to see how long it would last”*

The difference between first time and habitual purchases is demonstrated by the broad picture of differences between the two groups. That is, consumers appear on the basis of our pilot study findings, at least, to read labels when and only when required (for a specific purpose such as purchasing for special dietary needs). New Food consumers, however, appear to prefer to rely on shelf positioning and general packaging information to inform their purchasing decisions. Additional (or general) reading of food labels accounts for a much smaller proportion of visual activity in both groups (at best around a quarter of our shoppers concerns).

2.5 Research Objective E

Is what can be learned using an eye tracking study affected by the type of product in terms of its size, shape or materials?

The shopping tasks were designed to reflect differences in product materials. During the construction of the pilot, a wide range of potential products were explored and discussed with the

FSA to agree the best products to cover a wide range of packaging for the pilot. Consequently, a selection of small (yoghurts) and comparatively large items such as cereal packets were agreed upon. Comparison of fixation times across the product types indicates the relative amount of visual processing required.

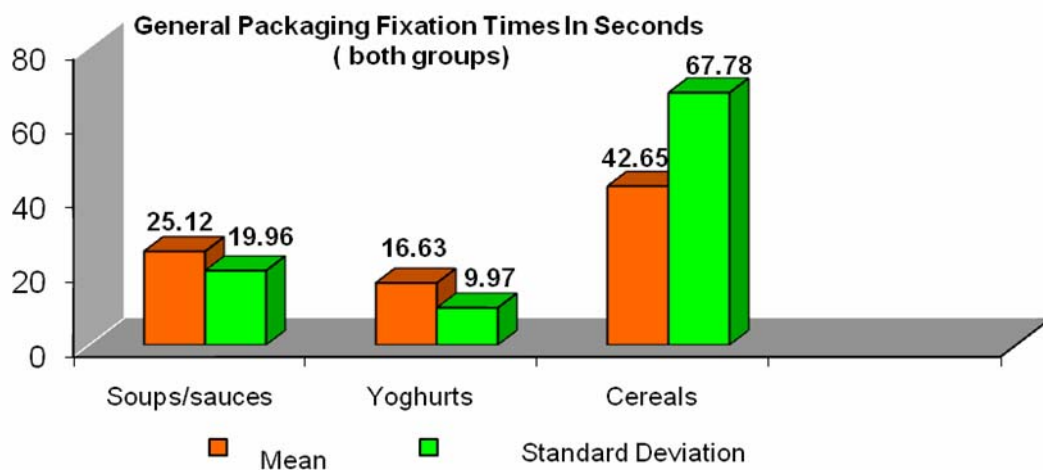
Microwavable soups and sauces are mostly contained in either "floppy" soft plastic cartons or square section waxed cardboard boxes. Yoghurts are typically contained in semi rigid round plastic pots and are sometimes surrounded by cardboard packaging. Cereals are almost always contained in rectangular cardboard boxes. Graphics and text printed on the packaging of these three product types varies in size, print density, print contrast and other factors likely to affect readability. Our study, however, was not set up to compare the readability of the wide variety of different packaging surfaces. Our respondents were given a free choice of product purchase and so examined and retrieved items with widely varying size and shape of materials.

Comparison of fixation times across the 3 product types, never the less gives some indication of the relative amount of visual processing required.

Important: The data generated throughout this study was based on a small pilot sample of 12 respondents. Whilst eyetracking generated a rich data field, the results should be taken only as indicative for future research designs, and should not be generalised to the wider population.

General Packaging Fixation Times (seconds) both groups

	Mean	Standard deviation
Soups/sauces	25.12	19.96
Yoghurts	16.63	9.97
Cereals	23.33	11.37



As can be seen, yoghurt packaging attracts the least amount of time. Yoghurt labels, however, do command more attention than soup/sauce labels:

Label Scanning Fixation Times (seconds)

	Mean	Standard deviation
Soups/sauces	4.35	5.49
Yoghurts	8.64	14.54
Cereals	15.19	19.67

Food labels as a whole are scanned for relatively short periods of time. As can be seen, there is a doubling of time from looking at food labels on Soups & Sauces to Yoghurts and then doubled again for looking at food labels on cereal packets.

Fixation times for general packaging are clearly substantially higher than for reading food labels. This suggests that either shoppers are more beguiled by the food packaging, or else they find it more informative than the food labels for the purposes of their shopping mission. As can be seen, there is little overall difference in the groups when visually fixating on the general packaging.

Fixation Times for Packaging (per group)

	Mean	Standard deviation
Specific Food Task		
Soups/sauces	23.47	22.52
Yoghurts	15.07	11.63
Cereals (no outlier)	20.63	15.03
New Food Task		
Soups/sauces	26.69	19.11
Yoghurts	19.05	7.09
Cereals	24.83	10.67

Further Visual Reflections:

Content statements from the playback interviews reveal just how shoppers visually acquired information is utilised in product decision making. The following quotes indicate the differences in visual activity required by different shopping missions (and thereby different printing and packaging types). Information on cereal packets was regarded as readable, but not always obvious:

- *“There’s a section [on the cereal packet] that contains all the allergy info. I was just wondering if there’s some information somewhere else. Then I thought there can’t be.” (Specific Food Task)*
- *“I was worried there’s so much writing on that packet [of cereal] that I might have missed ‘may have some nut traces’.” (Specific Food Task)*

It is clear that some forms of packaging and food labelling are readily accessible (e.g. the icon or phrase for microwavable soups/sauces). As our respondents describe:

- *“I saw picture of microwave straight away, so picked it up”*
- *“The little icon of microwave gives your eye something to home in on.”*

Other messages are effectively hidden in a plethora of small print within food labels (e.g. “real fruit pieces” in yoghurts). The data presented here suggests larger printing on flat packaging (such as cereal boxes) is easier to read. If this allows a higher saturation of additional information, smaller print on less regular shapes, such as yoghurt pots, appears to compound the problem further. As our respondents make abundantly clear:

- *“Writing sideways [on yoghurt pot] is stupid, you have to turn it around”*
- *“I had to turn the yoghurt pack upside down to read”*

In total, the preceding data suggests that further research is required to understand the impact of packaging with different sizes, shapes and types of material. Our respondents spend considerable amounts of time and energy to complete their shopping mission. Undoubtedly, smaller items are more difficult to track; both in terms of the ability of the eye tracking camera to provide a higher enough resolution to be able to read small print (see eye tracking developments section 3) and depending upon just how the shopper holds the products. However, the pilot proves that even the small detail can be seen, and when read alongside the actual product, enables specific sections of data to be tracked.

Fig 2.3



Fig 2.3: Reading the ingredients section of a cereal packet.

Fig 2.4



Fig 2.4: Reading the storage instructions on a soup carton.

For future studies, eye tracking of textual detail such as that encountered on a food label can be obtained through a combination of methods. Viz:

1. Mapping detailed eye movements in laboratory settings
2. Cross referencing fixations recorded in real world settings against known packaging
3. Respondent validation through playback interviews.

2.6 Research Objective F:

How does eyetracking operate when used in a “real life” supermarket setting e.g to what extent does it distort the reality of the shopping experience, how obtrusive is it for consumers to wear?

a) Recruiting Refusals

We were asked to include on our recruitment and screening questionnaire an item to ask why people did not wish to take part. This yielded no data. All shoppers who agreed to stop for the

recruitment screener were willing to take part in the study. Shoppers who did not wish to stop at the recruitment stage did not, by definition, show willingness to answer this item.

b) Respondents Feedback

The Respondents Questionnaire was designed to evaluate the acceptability and obtrusiveness of the eyetracker method. As the following questionnaire responses indicate, there was a generally positive reaction to the study and to wearing the eyetracker equipment. This sample positively rates their experience and indeed adds unsolicited expressions of interest and enjoyment.

9 out of 12 found taking part in the study to be *very enjoyable*. The remaining 3 found it to be *quite enjoyable*.

4 thought wearing the eyetracking equipment to be *very comfortable*. Most (8) thought it quite *comfortable* to wear.

When asked the crucial question how concerned they felt about wearing the glasses in public 6 were *not concerned at all*. 3 said they *hardly noticed* and the remaining 3 expressed being *somewhat concerned*.

The anonymous questionnaire also provided a number of unsolicited positive statements from the respondents, such as:

- *"It was interesting to see the play-back and to see where your eyes scan whilst shopping"*
- *I was somewhat concerned about the glasses before. Afterwards I realised only 1 person had noticed. Very interesting. Good experiences"*

(See Appendix V for the full list of comments)

The potential embarrassment factor from wearing the eyetracker glasses turns out to be less than people anticipate. This is consistent with our previous research experience. We believe the method is sufficiently unobtrusive to allow respondents to engage meaningfully in real world research tasks. In turn, this allows the design of studies having good ecological validity.

2.7 Research Objective G:

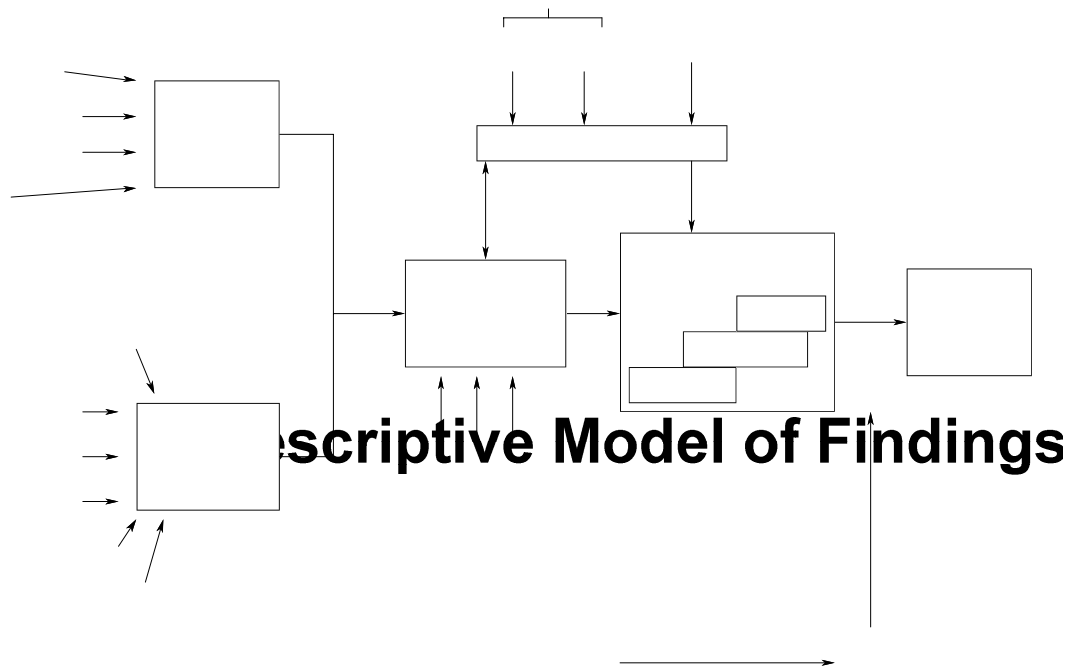
What sort of results can be obtained from eyetracking and how can the results be used as part of the design of a behavioural study?

We believe this pilot study has shown the feasibility of eyetracking methodology for food label studies. In particular, this small scale exercise has generated a rich seam of data revealing the how and why of visual cognition employed by consumers. Eye tracking patterns (fixation patterns and fixation timings) show consumers are prepared to invest considerable visual energy into obtaining information for their food purchases. When given a specific mission that demands particular detail (such as can only be discovered on a food label) consumers show remarkable acuity and tenacity in locating the relevant information. Eyetracking behaviour, however, is only half the story. Playback interviews provide a unique insight into consumers' thinking about *what* they look at and about *how* they go about looking. Both sets of information are an invaluable resource for understanding and designing food messages.

The questionnaires employed in this study were designed only for internal purposes, to cross check the findings. In this regard they have yielded clear data backing up the themes extracted from content analysis of playback interviews and the behavioural descriptions of eye tracking

patterns. The triangulated methodology forms a useful, and we believe credible means of using eye tracking data.

Eye tracking could also be extended as part of a wider survey or field experiment. Eyetracking data could be set against findings from qualitative interviews, attitude survey, patterns of purchases or many other forms of data. Future researchers might profitably develop a wider conceptual model to integrate the social and psychological variables relevant to food labelling.



This diagram illustrates a possible means of integrating the diverse findings. We believe that consumers are willing and able to access food labels to aid their purchasing decisions when they have to, but only when they have to. In turn, this is likely to depend upon some relative judgment regarding their current shopping mission and their pre-existing shopping schema (such as their purchasing hierarchy).

Visual cognitive processes are further mediated by considerations of visual search patterns and visual search content. In this pilot study, we have seen that food labels appear to be read only after other avenues of food information are exhausted. Shelf positioning and product packaging appear to offer the consumer less effortful information (even if less definitive). Our descriptive model suggest food labels represent a further step up in visual effort and require a further commitment of time to reach a purchasing decision. We recommend that this preliminary model or other conceptual device be developed into a more systematic and testable account of how consumers utilise food labels.

Nut Allergy

Real Fruit

Microwavable

New

Shopping Mission

Familiar/Known Brand

Special Dietary Requirements

Healthy Product

Purchasing Hierarchy

Visual Pattern

In addition to the stated research objectives, the FSA brief included a more fundamental research question that asked:

“What information do consumers really look at, as opposed to what they say they look at?”

In each group in our study there were 6 respondents with 3 shopping tasks. This totals 18 shopping events, or 18 opportunities to read food labels in each group. The following table shows the relative frequencies of respondents looking at labels. Unfortunately, the expected frequencies are too low to warrant a Chi Square analysis

Numbers of Respondents Reading Food Labels

	Soups/sauces	Yoghurts	Cereals
Specific Food Task	4	5	5
New Food Task	2	5	2

It is apparent that the Specific Food Task group do much more reading of food labels. This becomes clearer when the figures are aggregated overall:

Percentage of Respondents Reading Food Labels:

Specific Food Group:	78% (14 out of 18)
New Food Group	50% (9 out of 18)
Both Groups	64% (23 out of 36)

Curiously, these figures generally accord with the results of the FSA's Consumer Attitudes Survey (2008) that found:

- 50% of consumers refer to food labels with first time purchases.

However, as previously stated the sample size in this pilot study does not allow us to make wider inferences to the general population.

3. Advances in eyetracking technology

Eye tracking as a technology has been available for over four decades. It is only really in the last five years, however, that it has become viable as a commercial research tool. It is now more cost effective, accurate and easily used in the public domain without making a respondent feel conspicuous. The mobile eye provides a relatively unobtrusive platform for eye tracking studies in public settings.

Much of the research undertaken in the last three years has been conducted using systems that are designed to track eye movements on a computer screen. While this technique is ideally suited to tracking web sites and other fixed/contained visual fields, applying it to packaging and labelling research is misleading as the shopper is not interacting in a natural shopping environment, cannot touch the object or really see its total dimensions. It is more suited to 2d than 3d.

The only true way of obtaining valid eye tracking data about how shoppers engage with such items is by conducting studies with consumers in “real world” settings carrying out “real world tasks” such as in-store shopping.

At present there are a number of systems on the market suitable for this type of research technique, the one used in this study was supplied by ASL, Boston, USA.

Hardware developments over the coming years will undoubtedly improve the quality of the resolution of the “scene” camera and reduce the size of the recording equipment. The development of systems for these cameras should enable the researcher to see in more detail just what the shopper is reading word for word without having to refer back to the actual packaging. This is especially relevant when reading very small text.

In this study the system used was only suitable for people who either did not wear glasses or who used contact lenses. However, recent developments have meant that we can now track somewhere in the region of 85% of glasses wearers.

There has been some movement towards the development of systems that will allow the viewing of the shoppers’ eye tracking data in real time i.e. to be able to actually watch what the shopper is fixating on while actually shopping. However, these solutions are generally very expensive and not only rely on “line of sight” (i.e. the signal must not have anything between the transmitting and receiving unit) but also provide a very poor signal when there are large amounts of metal in the area such as display shelving. Moreover, we are unclear what research advantages there would be from real time recording.

As new technologies become available this may well become both more feasible and more economical but at this stage it is very difficult to say just what they are. It is our opinion that while over the coming years mobile eye tracking systems may well become smaller with better recording functionality they will still require the shopper to wear some sort of glasses as seen today.

We are seeing an increase in the use of eye tracking methodology in commercial research and it is now becoming part of many research briefs being produced for market research companies to tender on. It is our firm belief that the findings from studies undertaken today will still have relevance over the coming decades.

4. Conclusions and Recommendations

More naturalistic studies with eye tracking methodology could be developed, such as recording the whole of a consumer's normal weekly shop. As a kind of "shopper cam" this would have undoubtedly have convincing ecological validity. It would also have considerable time and cost implications. Eye tracking methodology yields 25 frames of data per second. In a typical 45 minute shopping trip in a supermarket, there would be around 67000 frames of data to analyse per respondent. In addition, each shopper respondent could potentially visually interrogate 300-400 separate food package items. Given that shoppers rely heavily on prior knowledge and motivations there is also a real possibility that no food labels at all are accessed during any one shopping trip. If a naturalistic style study is required we suggest that whilst the whole shopping journey is recorded, detailed data analysis is restricted to a predefined 15 minute segment. This could be sampled on the basis of time (e.g the middle 15 minutes) or content (e.g. shopping for cereals).

Eyetracking methodology can be deployed with minimal obtrusiveness in real world settings, such as shopping in a supermarket. The recording is accurate enough to establish what shoppers look at, but not with sufficient resolution to read the exact text that they read. It should be possible, however, to devise studies that map the recording against known target packaging or validate what text participants were looking at during the playback interviews and using the actual packaging for the products purchased for reference.

Detailed analysis of exactly what respondents read on food labels (at the level of word by word reading) can also be accurately obtained in a laboratory. It may be, therefore, that a combined real world and laboratory study could provide both breadth and depth of data. One way to do this would be to pre-select a short range of products of interest (as in the present study). A relatively wide range of consumers could then be followed through their shopping journeys using eyetracker methodology (say 100+ to allow multivariate statistical analysis plus a wider demographic representation). A smaller sub sample (perhaps 30+, to ensure sufficient statistical power) could be asked to participate in a supplementary laboratory study. This might present on computer screen various food labels and packing information of interest, including the items chosen by the consumer in real life. More detailed eyetracking recordings of their visual interrogation of food labels etc could then be ascertained and compared with the broader patterns seen in the real world setting.

We do not believe there are any major obstacles to recruiting shopper respondents in real world settings. Consistent with our research experience, this pilot study has also shown that respondents shopping with friends or with children are equally comfortable with wearing the eye tracking equipment. Sample size and physical setting are mostly a function of the research brief and limited only by logistical and cost considerations.

Visual imagery such as food packaging predominates in the consumer retail environment. As part of the cognitive paradigm eye tracking research literally offers in-sight, a means to describe and understand how visual processes inform consumer decision making. To this end, we hope this pilot study has demonstrated the research advantage of combining eye tracking data with the playback interview procedure and questionnaire methods.

References

- Barber, H, Janes, I. & Boyland, M. (2004). The Full Picture: using eye tracking to make website design more effective. *World Association of Research Professionals*. ESOMAR, 1-15.
- Brunswik, E. (1956). *Perception and the Representative Design of Psychological Experiments*. Berkeley, CA.: University of California Press.
- FSA (2008) *Consumer Attitudes to food Standards, Wave 8*.
- Janiszewski, C (2008) Rethinking Visual Communication Research. In: M. Wedel & R. Pieters (Eds). *Visual Marketing: From Attention to Action*. New York: Lawrence Erlbaum Associates.
- Kingstone, A., Smilek, D., Ritsic, J., Kelland-Friesen, C. & Eastwood, J.D. (2003). Attention Researchers! It is time to take a look at the real world. *Current Directions in Psychological Science*, 12 (5). 1276-184.
- Neuendorf, K.A. (2002). *The Content Analysis Guidebook*. London: Sage
- Oppenheim, A.N. (1992). *Questionnaire Design and Attitude Measurement*. London: Pinter Publications.
- Pieters, R. & Wedel, M. (2008) Informativeness of eye movements for visual marketing. In: M. Wedel & R. Pieters (Eds). *Visual Marketing: From Attention to Action*. New York. Lawrence Erlbaum Associates.
- Pollatsek, A., Reichle, E.D. & Rayner, K. (2006). Tests of the E-Z Reader model: Exploring the interface between cognition and eye-movement control. *Cognitive Psychology*, 52. 1-52
- Russo, J.E. & Leclerc, F. (1994). An eye-fixation analysis of choice processes for consumer nondurables. *Journal of Consumer Research*, 21(2),. 274-290

Appendix I: Screening Questionnaire

Note to recruiters:

Please aim to recruit an even spread of shoppers in the 20 – 55 categories (i.e. 4 people in their 20s, 4 in their 30s, 4 from 40 -55, and an even spread of men and women if possible).

1) How old are you?

16 – 19

20 – 30

31 – 40 5

41 – 55 4

56+ 3

2. Are you? Male 3 Female 9

3. Are you the main person in your family that does the weekly shop?

Yes No (Exclude if N)

4. Do you usually wear glasses for reading?

No Yes (Exclude if Y)

5. Could you tell us which of the following foods you usually buy?

Fresh Fish

Bread

Yoghurt

Cooked meats

Raw meats

Breakfast cereals

Prepared soups or sauces

Raw vegetables

Please only recruit people who usually buy cereals, yoghurts and soups/sauces,

6. Do you have or do you normally shop for someone with either a dairy or nut allergy or intolerance?

No Yes (Exclude if Y)

7. We are conducting some market research here today and we were wondering if you would like to take part?

If so, would you be willing to wear these special glasses (which show us what you are looking at) while completing a few shopping tasks? There will also be a short interview afterwards and you will be able to watch a playback of the recording showing what you look at. The whole process takes about one hour.

For this we would like to give you £50 for your time.

Yes No (if N proceed to question 8)

Please stress that in the unlikely event that the glasses do not work, they will NOT get paid.

8. Are you shopping alone or with anyone else today?

Alone
With children
With friend
Record age(s) of children

(Please recruit 2 people each day who are with children)

9. Finally would you please tell me the main reason you do not wish to take part?

Haven't got the time

Not really interested

Don't fancy wearing the spectacles

Don't want to have information about me recorded

Other reason (please say what)

.....

Thank you for your co operation.

Name *(if recruited)*

Shopper Number

Appendix II



Eyetracker Market Research

Informed Consent Form for Shopper Respondents

Dear Respondent,

Please carefully read through the following conditions for participating in this market research study. Do ask the researcher to explain anything you are not entirely clear about. Please then sign if you agree to these conditions;

The Respondents Rights

- I understand that the study is being carried out solely for the purposes of market research
- In return for taking part, I will receive a fee of £50.00
- My participation is entirely voluntary, and I have the right to withdraw at any point
- I understand the study will take approximately 60 minutes and consist of my answering some brief questionnaires, wearing an eyetracker device to complete a shopping mission and having an interview about my experience.
- I understand that all data collected will be kept strictly confidential and that any published findings will retain my anonymity. Any personal information (such as my age or occupation) will be used only for creating general statistics.
- I understand that the study will involve audio recordings of the interview and that these will be deleted after analysis.
- I understand that the study will involve video recording of what I will be looking at (but not showing pictures of me). I agree to this footage being used to demonstrate the research findings (e.g. at open meetings etc)

Signed (respondent)

Dated

The Research Company's Pledge

Eyetracker Research is committed to maintaining the highest standards of professional and ethical research. We abide by the Code of Conduct of Market Research Society (2005) and the Data Protection Act (1998).

All Eyetracker research studies are undertaken purely for the purposes of Market Research. That is, to help understand how consumers behave and make their shopping decisions. All data is kept strictly confidential and all findings retain respondents anonymity.

All Eyetracker research studies employ research methods that are not harmful and not unpleasant. All recruitment and sampling procedures are based on principles of equal opportunity, and of ensuring maximum safety for our respondents.

Signed (on behalf of the Research Company)

Dated

Appendix III : Shopping lists

1. New Food Task Group Shopping List:

Please purchase:

- Packet of breakfast cereals that is new to you
- A packet of fruity yoghurts that is new to you
- A ready made soup or cooking sauce that is new to you

2. Specific Food Task Group Shopping List

Please purchase:

- A ready made soup or cooking sauce that is microwavable
- A packet of fruity yoghurts with real fruit pieces
- A packet of breakfast cereals for someone with a nut allergy

Appendix IV: Shoppers Questionnaire

Disclaimer: These results are based on a maximum sample size of N=12. The percentages quoted are for reference only and should not be used as statistical references.

ABOUT YOUR SHOPPING FOR YOGHURT

1. How easy or difficult was it to find the yoghurt that you purchased today?
N

very easy	7
quite easy	2
neither easy nor difficult	-
quite difficult	3
very difficult	-

2. How much choice of yoghurt was there?
N

too much choice	5
quite a good choice	6
satisfactory	1
quite a poor choice	-
hardly any choice	-

3. How much information was there on the packaging of yoghurt (such as food labels etc) to help you make the right choice?
N

far too much information	-
too much information	-
about the right level	8
too little information	4
far too little information	-

4. How easy or difficult was it to read the packaging information (food labels etc) on the yoghurt that you purchased today?

	N
very easy	3
quite easy	6
neither easy nor difficult	2
quite difficult	-
very difficult	-

ABOUT YOUR SHOPPING FOR A BREAKFAST CEREAL

5. How easy or difficult was it to find the breakfast cereal that you purchased today?

	N
very easy	5
↑	
quite easy	6
↑	
neither easy nor difficult	-
quite difficult	-
very difficult	-

6. How much choice of breakfast cereal was there?

	N
too much choice	3
↑	
quite a good choice	8
satisfactory	-
quite a poor choice	-
hardly any choice	-

7. How much information was there on the packaging of breakfast cereal (such as food labels etc) to help you make the right choice?

	N
far too much information	-
too much information	1
about the right level	9
too little information	2
far too little information	-

8. How easy or difficult was it to read the packaging information (food labels etc) on the breakfast cereal that you purchased today?

	N
very easy	4
quite easy	4
neither easy nor difficult	5
quite difficult	-
very difficult	-

ABOUT YOUR SHOPPING FOR SOUP/SAUCE

9. How easy or difficult was it to find the microwavable soup/sauce that you purchased today?

	N
very easy	6
quite easy	5
neither easy nor difficult	1
quite difficult	-
very difficult	-

10. How much choice of microwavable soup/sauce was there?

N

too much choice	3
quite a good choice	4
satisfactory	4
quite a poor choice	-
hardly any choice	-

11. How much information was there on the packaging of microwavable soup/sauce (such as food labels etc) to help you make the right choice?

N

far too much information	1
too much information	-
about the right level	9
too little information	1
far too little information	-

12. How easy or difficult was it to read the packaging information (food labels etc) on the microwavable soup/sauce that you purchased today?

N

very easy	4
quite easy	5
neither easy nor difficult	2
quite difficult	-
very difficult	-

13. If you found any of the problems difficult to find, which products were these and why did you find them difficult to find?

Specific Food Task Group:

- *It was easy to find m/wave soup than sauces*
- *Fruit yoghurt with real fruit pieces couldn't really tell which were flavours, puree or pieces*
- *I know the shop so I could find the products*
- *The yoghurts didn't specify whether they contained real fruit*

New Food Task Group:

- *I shop regularly at Waitrose so it was easy to find the products I was looking for*
- *The soup took longest to choose – couldn't decide between the flavours!*

16. If you found any of the information on the packaging was difficult to read, why was this?

Specific Food Task Group

- *Non really, although all should state if produced in factory which also processes nut product*
- *Yoghurts – far too small writing!*

New Food Task Group

- *I didn't really read the information, just the main labels on the front*

Appendix V

Respondents Questionnaire

The following anonymous questionnaire responses show a generally positive reaction to the study and to wearing the eyetracker equipment.

1. On the whole, how enjoyable or tedious was it for you to take part in this study today?

	N
very enjoyable	9
quite enjoyable	3
neither enjoyable nor tedious	
quite tedious	
very tedious	

2. How physically comfortable was it for you to wear the **eyetracker** equipment?

very comfortable	4
quite comfortable	8
didn't really notice / can't say	
quite uncomfortable	
very uncomfortable	

3. How concerned did you feel about wearing the glasses in public?

not at all concerned	6
hardly noticed	3
somewhat	3
quite a bit	
very much concerned	

4. Please use this space below to add anything further about your shopping and research experience today. We are grateful for all your comments:

New Products Group:

- *It was interesting to see the play-back and to see where your eyes scan whilst shopping.*
- *The response above [Q3] reflects my extravert nature; others may feel differently. The research team were very friendly and pleasant. An interesting exercise.*
- *I think its revealed I'm a bit of a sucker for colour packaging!*
- *I was somewhat concerned about the glasses before. Afterwards I realised only 1 person had noticed. Very interesting. Good experiences.*

Specific Products Group:

- *It was good to learn + to see where and what you look at.*
- *Interesting!!*
- *I enjoyed it! Thank you for asking me.*
- *Watching the play back was very interesting. Wearing the glasses was slightly embarrassing – may have affected the speed with which I shopped*
- *Really enjoyed the experience. I thought the interviewers were very professional and friendly. Thanks.*