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Back to Basics: The Sequencing of Inductive and Deductive. Research Methodologies in Fresh Fruit and Vegetable Research

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Abstract: A review of the literature in the field of fresh fruit and vegetable preferences in Australia reveals very little systematic study, with most investigations having been conducted by various public and private industry groups. Given the embryonic stage of research into fresh fruit and vegetable perceptions and choice, a particular program of research is warranted, with an emphasis on inductive processes progressing to deductive methods. This type of research is facilitated by relatively unstructured research methods. The data thus yielded can be subjected to deductive methods, which require a more experimental, structured research method, involving testing hypotheses that suggest themselves from the inductively-derived data. In this paper, these issues are discussed at length, and a word association study conducted by the author is described in order to illustrate the utility of combining a word association questionnaire with a demographics survey to produce a wealth of well ordered, easy to interpret inductive data.

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1. Introduction

Given

a. the significant growth of diet-related chronic diseases in Australia and other Western countries (National Health and Medical Research Council, 1996; Australian Bureau of Statistics—Causes of Death, 1995; WARDLE, 1993; NSW Department of Health, 1985; THOMPSON, 1995),
b. the crucial role that fresh fruits and vegetables play in maintaining a healthy diet (Australian United Fresh Fruit and Vegetable Association [AUF], Australian Horticultural Yearbook, 1995; KENYON, 1997; FRY, 1995; CARPENTER, 1988; DUTHIE, WAHLE & JAMES, 1989; World Health Organisation [WHO], 1990), and
c. the large sums of money that are presently being spent on promotion of these products (BACKLUND, 1994; CSIRO, 1995; KNIGHTS, 1996; AUF, 1996a, 1996b),

there is a pressing need to conduct studies that will provide fundamental, descriptive data on the nature of consumer fresh fruit and vegetable preferences. [1]

A comprehensive literature search by the author indicates that research into fresh fruit and vegetable decision making in Australia has not been conducted in a systematic and comprehensive manner to date. Several industry-based studies exist, however the methodologies employed have not often been appropriate to this early stage of research. In this paper, existing marketing methodologies are explored and it is concluded that they too do not provide fruitful results given the infancy of research in this area. A research tool, the Word Association Method (JUNG, 1919), is posited as an appropriate methodology to use when a particular area of research is at an embryonic stage. [2]

In this article, the word association method has been used to illustrate its utility in generating preliminary, descriptive information relating to consumer perceptions of fresh fruits and vegetables. The results are instructive not only in providing lists of attributes, or characteristics of fresh fruits and vegetables, but also in providing information on demographic trends in consumer fresh fruit and vegetable usage and perception. [3]

2. Knowledge Acquisition

Given that academic research can be viewed as a formal mode of knowledge acquisition, in order to comprehensively critique marketing methodologies we must pause to reflect on the learning phenomenon, that is, how does learning occur? Acquisition of knowledge has occupied the minds of researchers since the time of Aristotle, and the theory of human reasoning first postulated by thinkers of this era has retained its validity to the present day. [4]

Most contemporary theories posit stages of information acquisition that follow the steps set out by Aristotle. These stages equate to Inductive and Deductive Reasoning, respectively (JOHNSON-LAIRD & BYRNE, 1991). Induction is defined as:

> "a process whereby from sensible singulars, perceived by the senses, one arrives at universal concepts and principles held by the intellect. Thus, from the sense experience of even a single yellow tulip, the intellect grasps that it is a special kind, a kind found in every single tulip. The person proves not only that he sees the tulip but also that he knows what kind of thing the tulip is by the following. He is able to point out all the others of the same kind. If the individual did not know the essence or whatness existing in each tulip, he could not group them together." (JOHNSON-LAIRD & BYRNE, 1991, p.16) [5]

Deduction, by contrast, is defined as:

> "the human process of going from one thing to another, i.e., of moving from the known to the unknown ... Utilising what he knows, the human being is able to move to what he doesn't see directly. In other words, the rational person by means of what he already knows, is able to go beyond his immediate perception and solve very obscure problems. This is the nature of the reasoning process: to go from the known to the unknown." (SPANGLER, 1986, p.101) [6]

Human reasoning proceeds sequentially through three distinct steps, namely Simple Apprehension, Judgement and Reasoning (SPANGLER, 1986). When seeking to solve a problem, which includes finding explanations for phenomena of interest, we must make our way through these three stages. Stage One, Simple Apprehension, comprises an attempt to discover the "whatness", or fundamental nature of an object. Stage Two, Judgement, combines and divides concepts inherent in the description of the nature of the object. It establishes general principles common to all instances of a given class of object, and these will enable us to combine information derived from Stage One to establish certain facts. Stage Three, Reason, moves us beyond what is known to the unknown. That is to say, we infer the existence of the unknown from what we do know about the object (SPANGLER, 1986). [7]

Stage One (Simple Apprehension), therefore, is a crucial part of the problem-solving process, since we cannot hope to propose the combination of various concepts (Stage Two—Judgement), and to draw conclusions from these (Stage Three—Reasoning) unless these concepts, which comprise the nature of the object, have been previously identified in Stage One (Simple Apprehension). [8]

As stated by GHAURI, GRONHAUG and KRISTIANSLUND (1995, p.9):

> "... facts acquired through observations lead us to theories and hypotheses, while with deduction (logical reasoning) we accept or reject the hypotheses. This acceptance and rejection then helps us to explain or predict .....When we utilise observed facts in generating a theory which is consistent with these facts, we are

> doing induction. In other words, induction is the process of observing facts to generate a theory and is perhaps the first step in scientific methods ... Most researchers in business studies go through this method, observing facts which lead them to propositions and later to theories." [9]

This process of Reasoning, or acquiring knowledge, is called the Aristotelian Method, or Ampliative Inference (TRUSTED, 1979) and is widely accepted as a legitimate description of the human learning process (SPANGLER, 1986). [10]

It is argued that research into a given area of interest, such as fresh fruit and vegetable preferences, is a form of knowledge acquisition, albeit formal, and that as such, it should proceed systematically through the stages of learning, as described above. It follows that, within the context of scientific investigation, and during the initial stages of research, when there has not been an attempt to systematically research an area, it is crucial to gather descriptive information which is relatively free of the researcher's preconceived ideas, and which will provide a fundamental description of the area of interest. This parallels Stages One and Two, Simple Apprehension and Judgement, wherein we seek to become familiar with the fundamental nature, or "whatness", of a phenomenon (SPANGLER, 1986, p.16). In these processes, we seek to identify concepts inherent to an object (Stage One—Simple Apprehension) and to connect, or link these to gradually form a coherent image (Stage Two—Judgement). [11]

After a relatively comprehensive body of information has been thus gathered, qualitative data analysis can be used to establish the presence of trends and consistencies of behaviour, that is, an identification of concepts comprising consumers' knowledge structures of particular products (in this case, fresh fruit and vegetables), which will direct subsequent hypothesis generation (Stage Three—Reasoning). Researchers can thus begin to move from the known to the unknown, using inductive followed by deductive research methods. That is to say, once we become aware of additional conceptual connections (via research) we can integrate these into our existing information, and thereby know more about a particular phenomenon. We work from this to hypothesise yet more relationships. In summary, it is imperative to gather fundamental Stage One (Simple Apprehension) and Two (Judgement) (descriptive) information at the outset of research, so that subsequent hypotheses can be generated in subsequent research attempts. [12]

As stated above, within the context of fresh fruit and vegetable research, there have been few attempts to undertake research that would provide fundamental, purely descriptive data which can inform subsequent hypothesis generation. Existing research in this area does provide some useful descriptive data, such as favourability, relative amounts consumed, and themes associated with a particular product, the pineapple (MILGATE, 1994). Information such as this can usefully be built into a developing framework of fresh fruit and vegetable knowledge structures, which is provided in the present research. [13]

However, generally speaking, it is the case that in many of the studies reviewed below, a methodology has been utilised that is problematic in at least two ways. Firstly, assumptions of causal factors have not been proposed on the basis of existing (Stage One—Simple Apprehension) data but, rather, have been suggested a *priori*. That is, researchers have investigated the effects of particular factors that they believe, intuitively, might be salient however these factors have not been identified in previous studies. [14]

The second difficulty relates to the design of particular methodologies, such as surveys, highly structured interviews, and so on. These methods are relatively directed as respondents are not asked to write down their answers in a free-response format, but are asked whether any of the listed, predetermined factors are relevant to them. Respondents are also directed toward a particular context such as the *purchase* decision, which can constrain responses that are relevant to fresh fruit and vegetable selection but that do not relate directly to the purchase context, such as personally meaningful, experiential knowledge (EPSTEIN, 1994). In essence, the more structured, or directed research methodologies that have been used in fruit and vegetable studies are unlikely to provide the comprehensive descriptive data that is warranted in initial research efforts. [15]

It is concluded that many fruit and vegetable studies contain methodological difficulties and that, because fresh fruit and vegetable selection research is in its infancy (i.e., there is a paucity of descriptive [Stage One—Simple Apprehension] data), deductively-oriented methods are inappropriate. A strong argument is mounted in favour of unstructured studies that provide basic, descriptive data as being most appropriate and relevant in the initial stages of research of a particular phenomenon. [16]

3. Consumer Marketing Methodologies

The next section of this paper contains a review of methodologies that have been applied in the area of consumer behaviour, and that comprise less directed forms of gathering information regarding consumer knowledge of particular products. It must be noted that these methods have not been used to undertake fresh fruit and vegetable research (to the author's knowledge), with the exception of a verbal protocol conducted by OWEN (1996). The objective of this section is to further argue that many existing research methods, while less-directed than the survey and telephone interview (methodologies that are used in many existing fruit and vegetable studies)[1], are inappropriate *in the initial stages of investigation* as they:

a. are developed in such a way as to direct the subject to concentrate on particular areas of knowledge, to the detriment of others;
b. assume the importance of particular attributes that have not been shown by previous research to be salient; and

1 A comprehensive literature review of these studies is available on request from the author.

c. are based on questionable assumptions regarding the nature of human knowledge acquisition and the manner in which this information is cognitively structured. [17]

Generally speaking, the (above-mentioned) methods of eliciting factors important in the consumer decision process relate to *asking individuals more specifically about their knowledge base* of a particular object. This, in turn, can be obtained using a verbal protocol method (MURTAUGH, 1984), focus groups, and other projective methodologies, such as sentence completion tasks. A word association variant, such as perceptual mapping (GREEN, WIND & JAIN, 1973; STEENKAMP, VAN TRIJP, & TEN BERGE, 1994), in which the task is relatively unstructured, can also be used. These latter comprise research methodologies of attempting to record thoughts and ideas at a fundamental, descriptive level. [18]

3.1 The verbal protocol

In the verbal protocol, the consumer delivers a running commentary of their thoughts and feelings as they actually make a purchase decision. This is interspersed with conversation with the researcher relevant to the purchase, and sometimes recording of the subject's overt movements (MAURTAUGH, 1984). It provides relatively comprehensive information that is "less susceptible to problems of rationalisation and retention" (COUNTISS & TILLEY 1995, p.88). In addition, the verbal protocol method allows explanations of consumer behaviour at several levels and perspectives: psychological, sociological, anthropological and economic (COUNTISS & TILLEY 1995). [19]

A limitation of the method is that, due to the time-consuming nature of recording and analysing data, small samples are typically obtained (COUNTISS & TILLEY, 1995, MURTAUGH, 1984). In addition, the consumer is led, to a certain extent, as they are aware that the researcher is interested in thoughts and ideas related to purchase behaviour, which might limit information to that deemed to be relevant to a purchase context. In this respect, the verbal protocol is a structured (as opposed to an unstructured) methodology (GREEN, TULL & ALBAUM 1988). Finally, respondents may "edit" their responses in order to deliver socially acceptable responses to the researcher. [20]

3.2 Focus groups

Focus groups are a projective method in which a group of individuals is interviewed regarding an area of research interest. Projective methods are said to work because they provide information that is "gut-level", or intuitive in nature. They also provide information unique to particular consumers, including needs, motivations, and self-perceptions which are relevant to everything they do (GREEN et al., 1988). However, as is the case with verbal protocols, the focus group methodology suffers from contextual limitations. That is, it is partially structured, in that the interviewer asks particular questions, and the consumer is aware *of the purchase context of the interview*. [21]

It is also the case that particular group dynamics, such as groupthink and groupshift (ROBBINS, MILLETT, CACIPOPPE & WATERS-MARSH, 1994) can influence contributions made by individuals to the discussion, and can affect the group decision process in several ways. When discussing fresh fruit and vegetable preferences, these tendencies towards groupthink and groupshift can distort the information obtained so that a representative and accurate dialogue is not achieved. For example, groupthink is a phenomenon wherein the pressure for group conformity causes individuals to provide responses that will not deviate from the group consensus and, in a focus group discussion, individuals might not provide information of a critical nature, if this appears to go against information provided by other group members. Groupshift occurs when the tendency of the overall group to be more or less conservative or risk-taking causes the group to take a position on an issue that is actually more extreme (either conservative or risk-taking) than any one individual in the group would be individually. This might affect focus groups in moving the discussion to extreme positions or viewpoints that might not accurately reflect the views of particular individuals in the group, and should be borne in mind when interpreting the findings of this type of study. [22]

3.3 Other projective methodologies

It is also the case that marketing researchers utilise projective tests in order to elicit consumer views of various products (GREEN et al., 1988). This style of technique includes the third-person technique, sentence completion and thematic apperception tests. In the third-person technique, a subject is asked to state the views of another person, such as a neighbour, an associate, or a friend. In sentence completion tasks, a subject is given the beginning of a sentence, such as "good housewives use ...", and is asked to complete the sentence. In thematic apperception tests, a subject is shown a picture of an ambiguous situation, typically with one or more persons depicted in the picture, and is asked to assume the role of one of the persons. They are then asked to describe what is happening in the picture. In each of these methods, it is assumed that the subject will feel comfortable in projecting their own views into their answers. [23]

These methods differ in terms of degree of structure in that the researcher is able to choose how "freely" the consumer is to respond, by introducing levels of context. That is, the researcher can design the study in a manner that is context free, by not anchoring the discussion to a particular context. On the other hand, the researcher can introduce varying levels of structure, thus limiting the "freeness" of the consumer's response. Given the embryonic stages of research into fresh fruit and vegetable selection, any research conducted would benefit from a relative lack of contextual limitations, thereby providing fundamental, descriptive data from consumers' knowledge structures. [24]

A possible limitation of projective methods relates to the validity of data analysis. It has been suggested that projective methods can suffer from experimenter bias in data interpretation, because of the qualitative nature of responses. However,

rigorous methods do exist for the analysis of free-response data, including tests of significance (NUDIST[2], BLISS, MONK & OGBORN 1983; MONK, 1983a). [25]

It is concluded that projective methodologies such as sentence completion tasks and thematic apperception tasks might prove useful in obtaining descriptive, relatively context-free data, provided that data analysis is methodologically sound. [26]

There are other free-response techniques, in which subjects are presented with a stimulus word or object, and asked about particular attributes or characteristics, including perceptual mapping and means-end chain analyses (GREEN et al., 1973). A variant of this method is termed "perceptual mapping," and this comprises an attempt "to derive attributes of a product" that are significant to a sample of consumers (STEENKAMP et al., 1994, p.17). In this context, variants of the so-called attribute-elicitation method are commonly used (STEENKAMP et al., 1994). Depending upon the research question, particular procedures are used to tap attributes of products that are salient to the consumer. In this respect, subjects are provided with varying levels of direction from the researcher, as was the case for the above-mentioned projective methods. [27]

Predetermined attributes can be supplied by the researcher, and are subsequently rated by subjects (GREEN et al., 1973). Difficulties of using predetermined attributes regarding fruit and vegetable preferences have been discussed previously. Alternatively, subjects are asked to record words associated with particular brands of product (STEENKAMP et al., 1994). A methodological difficulty that exists in this respect is that these methods typically focus on particular brands and the respondent's attention is drawn to the notion of *attributes*. That is, the respondent is directed to responses dealing with attributes or brands and in this respect, the attribute-elicitation method is researcher- or hypothesis-directed. For example, a consumer might be asked to consider which attributes are important when purchasing a product, or in which way(s), i.e., attributes, do particular products differ. [28]

3.4 Means-end chains and laddering techniques

Recognising that more traditional consumer marketing research has focussed primarily on product attributes, and that this emphasis limits our understanding of the decision making criteria that are *personally relevant to each consumer*, some marketing researchers use means-end chain analyses and laddering techniques in an attempt to model cognitive representations of knowledge of particular phenomena, that is, "encoded representations of information in memory" (KANWAR, OLSON & SIMS, 1975, p.122; see also GENGLER & REYNOLDS, 1995). [29]

Means-end chains involve an attempt to elicit consumers' product knowledge and value-related self-knowledge, and to determine the degree of congruency between these (GENGLER & REYNOLDS, 1995). If the consumer links the

2 QSR NUDIST (1997).

product with important end goals or values, they are said to be highly involved in the purchase decision (PETER & OLSON, 1996). In-depth interviews are typically used to elicit consumer self- and product-knowledge, and the laddering technique is used to order and model the data. The laddering technique was developed to gain knowledge about how product attributes are linked to values important to each consumer (GENGLER & REYNOLDS, 1995). [30]

Initially, attributes salient to consumers are derived in one of three ways: direct elicitation, free-sort task, or triad task (the latter involves comparing three brands of a given product in terms of attribute similarities and differences). Following this, and using the laddering technique, an interview is conducted in which the investigator attempts to link "product attributes to more abstract consequences and values" (PETER & OLSON, 1996, p.99). Proponents suggest that, in this way, it is possible to determine the knowledge structure of a sample of respondents, by identifying links, or associations between levels of meanings (from the product level to the benefit level to the more abstract value level). [31]

It is argued, however, that this research method introduces context effects. To elaborate, marketing researchers are interested in understanding consumer behaviour, and the focus of in-depth interviews and attribute-elicitation tasks is on purchase behaviour. Respondents are typically asked to think about what attributes are important *when purchasing certain products*, and this might constrain them in the sense of activating knowledge schemas relevant to a purchase context (WALKER & OLSON, 1991, MULVEY, OLSON, CELSI & WALKER, 1994). That is to say, this research format directs the consumer to concentrate upon certain categories of information, such as salient attributes, which might, in turn, lead the consumer to pay relatively less attention to other characteristics of possible importance, such as personal experiences (EPSTEIN, 1994; LOEWENSTEIN, 1996; FAZIO & ZANNA, 1978; BECHARA, DAMASIO, TRANEL & DAMASIO 1997; VOGEL, 1997). [32]

It is generally accepted that many cognitive processes are unconscious, and are not available to the conscious mind for the purposes of explaining to researchers what type of impact these processes might have on conscious reasoning (EP-STEIN, 1994, 1997; JAYNES, 1990). COOK (1994, p.7), for example, states that

> "it is increasingly clear that the contents of our consciousness are determined by processes which are open neither to inspection nor control by us. Cognitive psychologists now tend to see consciousness as a kind of aide memoir—a blackboard onto which the results of intrinsically non-conscious computations are projected for inspection and action. Additionally, it is clear that much of our behaviour is driven directly by 'cognitions' which are not conscious, and which are not capable of being made conscious." [33]

Contemporary researchers of decision making have posited the existence of various types of knowledge contained by individuals, and the above-mentioned research methods are unlikely to elicit information from each of these knowledge areas, due to their directed nature. [34]

To elaborate, contemporary decision theorists stress the need to view the decision process in a holistic manner. The work of these researchers points to the importance of a wide range of information that impacts on decisions, including a complex array of sensory stimuli as well as information from memory. Many cognitive psychologists discuss the notion of the interaction of rational and intuitive cognitive processes in a decision mode (see HAMMOND, 1996, for a review of research in this area). They posit that information relevant to a decision is likely to include, on the one hand, knowledge that is semantic/analytic/factual in nature and, on the other hand, knowledge that is episodic/experiential or personally meaningful to the individual decision maker. That is, it is the case that consumers' fruit and vegetable knowledge structures include factual knowledge regarding the healthiness of fruits and vegetables, cooking methods, and so forth, as well as personally meaningful information, for example, relating to a family tradition of eating creamed turnips at Christmas. There is a need to embrace decision models that are cognisant of the complex array of "information gathered using their five major senses as well as upon information reconstructed from their memory systems" (COOKSEY, 1996, p.xi). [35]

It is therefore unlikely that means-end chains and laddering techniques, which rely solely on the articulation of consumers' thoughts relating to a product, can tap all of the information that is likely to influence the purchase decision. It is also the case that respondents might edit their responses to give the researcher a logical and coherent response which might not accurately reflect cognitive processes that underlie their purchase decisions. Moreover, some researchers present consumers with predetermined concepts, derived from focus groups, and the difficulties associated with a *priori* assumptions have been discussed above. Finally, the possibility of actually "leading" the respondent through the depth interview is arguably the most problematic (BENNINGTON & CUMMANE, 1996). [36]

Therefore, although means-end chains are instructive in extending the research focus to an inclusion of information regarding consumer values, the focus remains on the object as a "product," and the values that relate to this "product" (thereby constraining the breadth of information obtained). [37]

4. The Word Association Method

It can be argued that the word association technique is a methodologically "purer" research technique than is the verbal protocol, focus groups, or the various attribute-elicitation methods, as its relatively unstructured format allows access to a wide range of cognitively stored knowledge. That is, consumers are not asked to record thoughts *relating to a purchase decision*, or to pay attention to *particular product attributes*, but merely to record all thoughts and ideas that come to mind when viewing a particular object. Furthermore, the design of word association research methods is not dependent upon a set of a priori assumptions regarding possibly salient factors, such as "price" or "healthiness." The only assumptions underlying use of the word association methods are that this is a useful way of tapping into knowledge structures, and that it is vital to use a context-free and undirected methodology to elicit basic human knowledge of any phenomenon.

That is, consumers respond to a stimulus object without specific direction from the researcher regarding what types of thoughts and ideas are being sought. It is believed that the traditional word association method presents us with one of the least directed research methods available. [38]

From the time of Aristotle, the associative connection of ideas has been the subject of intense research interest. BLEULER emphasises the fundamental importance by stating that "[e]very psychical activity rests upon the interchange of the material derived from sensation and from memory traces, upon *associations*; ... any psychical activity without association is unthinkable" (BLEULER, 1919, p.1). [39]

The importance of associations linking ideas is exemplified in Semantic Network Models (COLLINS & LOFTUS, 1975), which posit that knowledge structures are represented cognitively in a network-type system in which concepts that are related are linked. The degree of relatedness determines how closely two concepts are linked. Presumably, when an individual wishes to retrieve stored knowledge, a concept is activated, activation spreads down associated paths, and those concepts with a high degree of relatedness are activated more quickly than those with less relatedness. As concepts are located further away from the activated concept, their chances of being activated as a result of activation of the primary concept are reduced (COLLINS & LOFTUS, 1975; ANDERSON, 1976; cited in REED, 1988). [40]

The word association technique is useful in this context as the presentation of a cue (a word, or picture of an object) can act as the initial cue, thus starting the process of spreading activation. The responses given by the subject are representations of this knowledge structure. It has also been suggested (and discussed above) that the temporal ordering of responses is instructive in the sense of providing information regarding the "layout" or "cognitive representation" of the particular knowledge structure. [41]

According to SZALAY and DEESE (DE GROOT, 1989, p.824), "word associations comprise a method of retrieving information regarding the stimulus object via links in the memory network *and are relatively pure indicators of the way human knowledge is mentally represented*" (my italics). Responses obtained during a continuous (where respondents give more than one word association response to each stimulus object) word association study therefore reflect the cognitive representation of related concepts for a particular stimulus object. [42]

The word association technique has been used in a variety of contexts since the latter part of the nineteenth century. It is thought that word association tests originated with Francis GALTON in 1879, and have since been utilised in a wide variety of research settings, including interests and attitudes (TERMIN & MILES, 1936), language acquisition and verbal behaviour (BASTIAN, 1961; ENTWISLE, 1966; CRAMER, 1970; FLEKKOY, 1987; SELL, 1992; ERVIN-TRIPP, 1970), memory (THOMSON, MEREDITH & BROWNING, 1976), demographic factors (such as age and sex) on response repetition (PONS, 1989), lexical ambiguity

(FRENCH & RICHARDS, 1992), post traumatic stress disorders (SINNETT, 1990), the hierarchical positioning of responses (BILODEAU & HOWELL, 1965; KEPPEL & STRAND, 1970), grammar (MARSHAL & COFER, 1970), efficiency in problem solving, cognitive processing and, not surprisingly, market research. This research emphasis has led to the compilation of word association norms for use in a variety of experimental contexts (see POSTMAN & KEPPEL, 1970). [43]

If the data are analysed appropriately, and interpreted carefully, they provide valuable information regarding *unconscious thoughts and feelings* (FESHBACK & WEINER, 1986), as well as *preconscious thoughts and ideas which have been shown to influence the decision process* (EPSTEIN, 1994; FAZIO, 1993b; BARGH, CHAIKEN, GOVERNER, & PRATTO, 1992). It must be stated that a limitation of all research methods that rely on respondents' verbal representations of their thoughts and feelings (which includes all of the above-mentioned methodologies including the word association format) is that respondents may censor their responses before providing these to the researcher. Answers that are considered to be socially unacceptable or inappropriate might be withheld by the respondent, thus providing an incomplete record of the information contained in an individual's knowledge structure for a particular object. This particular methodological limitation has not been successfully overcome by social scientists, and must be borne in mind when interpreting the responses obtained in the present research. [44]

In summary, the word association method is useful for eliciting cognitively-stored knowledge, including information from each of the knowledge areas posited by EPSTEIN (1991, 1994), LOEWENSTEIN (1990), JAYNES (1990), and DAMASIO (1994), which were discussed above. [45]

5. Fruit and Vegetable Word Association Study

As stated above, a word association study was conducted by the author for two purposes: (1) to provide descriptive data relating to consumer fresh fruit and vegetable preferences, and (2) to illustrate the utility of the word association method in obtaining this information. The findings of this study are also instructive in the sense of eliciting context free information from each of the knowledge areas discussed by EPSTEIN (1997) and others, above. [46]

A relatively comprehensive body of information dealing with knowledge structures of ten fruits and ten vegetables has been obtained using the word association methodology, and these data have been ordered in a manner that allows researchers to quickly and easily isolate salient concepts related to each of these products. In the present study, consumers were also asked to fill out a demographics questionnaire, and to anticipate the results briefly, analysis indicated demographic differences in word association responses; these are further discussed in the results section. It is relatively easy to ask consumers to fill out a demographic questionnaire and the data provided are useful in helping to unearth trends in knowledge acquisition relative to particular groups. These findings, taken together, will be of assistance in future research of fresh fruit and

vegetable decision making, since the data clearly comprise empirical evidence of factors that combine to make up consumers' knowledge structures of these products. That is, information relating to Stages One and Two of knowledge acquisition—the "whatness" of an object of interest—has been obtained in this way. The relative importance of these concepts and the manner in which they feature in the decision making process can be usefully investigated in future fruit and vegetable studies. [47]

The remainder of this paper is spent describing the methodology used for the above-mentioned research, and the data analysis methods that were undertaken. A summary of findings for one product, broccoli, is discussed, as are some of the more interesting demographic trends found. The full Systemic Network for broccoli is appended for illustrative purposes (Appendix 2), as is the specific coding scheme used to order the large amount of qualitative data obtained during the study (Appendix 1). [48]

5.1 Methodological issues

A preliminary study was undertaken to identify the ten fruits and ten vegetables that are most commonly consumed by the majority of Australians. This provided a feasible number of fruits and vegetables to study, and also allowed for a test of the accuracy of consumer perceptions. [49]

The methodology used for the word association study involved several tasks. Briefly, respondents freely associated to pictures (and/or words) of ten fruits and ten vegetables. Up to ten responses for each stimulus object were allowed. The respondents then rated each of the fruits and vegetables on a favourability scale. This provided an index of the relative likeability of each product. This was followed by a nine-item demographic questionnaire, which asked for information relating to sex, age, marital status, and so on. Finally, respondents filled in the 18-item Self-monitoring Scale[3] developed by SNYDER (1987). [50]

The word association study was piloted using a pencil and paper format. The ten fruits and ten vegetables identified in the preliminary study as being the most commonly consumed in Australia were used as stimulus objects. Unnamed and named colour photographs, line drawings, black and white photographs, and pieces of paper with the name of a particular fruit or vegetable were used as stimuli[4]. In all, seven modes of stimulus presentation were used. A particular respondent saw fruits and vegetables in only one modality; that is, Respondent Number One saw all named colour photographs, Respondent Number Two saw all black and white photos, Respondent Number Three saw all named colour photos, and so on. The format of the pilot study was exactly the same as that

3 The doctoral thesis of which the research discussed in this paper is a part was undertaken with several objectives in mind, one of which was an investigation of the role of Self-monitoring (SNYDER, 1987) in consumer perceptions. This part of the thesis is not discussed in this paper.

4 The doctoral thesis of which the research discussed in this paper is a part was undertaken with several objectives in mind, one of which was an investigation of the effect of different modes of stimulus presentation on access to cognitive representations of information. This part of the thesis is not discussed in this paper.

used in the main study; that is, respondents completed the word association study, provided favourability ratings for each fruit and vegetable, filled out the demographic survey and finally, filled out the Self-monitoring Questionnaire. Ordering of stimulus objects was counterbalanced across respondents. [51]

After the pilot study was completed, a computer version[5] of the same study was designed. Respondents sat in front of a computer screen with a keyboard, and were guided through each of the tasks by instructions on the screen. The experimenter was in the same room to assist with any difficulties that arose. As well as informing the respondents that instructions would appear on the screen, the experimenter explained the procedure to respondents verbally. They were told that five practice trials (for the word association part of the study) would precede the actual study, so that they could familiarise themselves with the computer. Respondents were urged to ask the experimenter for assistance if in doubt about any part of the procedure. [52]

5.2 Data analysis

Qualitative data of the volume produced in the present study can appear to be unwieldy in the sense that a huge amount of information (in the form of words, phrases and sentences) is obtained. Moreover, because of its qualitative nature, the number of tests of statistical significance that can be used is limited. Statistical analyses are typically limited to frequency breakdowns and trends evident in pictorial representations of the data. However, BLISS et al. (1983) have developed a way of codifying the data which makes the data amenable to statistical testing. This methodology is called Systemic Network Analysis (BLISS et al. 1983), and MONK (1983a, b) has used this process to investigate children's attitudes towards their peers in a classroom setting. He used a free-response method to gather fundamental data, and sorted and analysed these data using the network analysis method. From this, he was able to provide detailed explanations regarding the factors that influence children's attitudes toward their peers, and was also able to perform statistical (quantitative) analyses to test the strength of these findings. A similar methodology was utilised in the present study, in order to elicit subjects' knowledge structures of fresh fruits and vegetables. [53]

A critical component of MONK'S method (1983a) is in the establishment of categories into which the free-response data can be inserted. In the present study, a categorisation scheme was developed which achieved high levels of inter-rater consistency. The categories suggested themselves from the data, however some categories were identified from previous theory, namely, the work

5 The notion of creating a computer–driven word association study was described by ISAACS and CHEN (1990), who used this type of methodology to determine the relative effects of the absence–presence of an observer on the nature of word association responses obtained. These authors used a computer program to obtain word association responses and basic demographic information from respondents. The author of the present research used a modified version of this idea in the present study. Dr ISAACS kindly sent (the author) a copy of his word association program which was used for comparative purposes.

on the psychological construct of Self-Monitoring (SNYDER, 1987). The categories used in the present research are discussed in some detail in Appendix 1. [54]

It is important to note that Monk utilised a system of categorising responses, first, in global categories (these "naturally" appear in the data). The global categories provide information that only discriminates among responses according to membership in a particular global category. He then broke these global categories down into further categories, continuing this procedure until he reached a set of terminal, or end categories for each global category. Data from the present study were analysed at a preliminary, descriptive level and from this, frequency breakdowns were developed. Inspection of these showed that the data tended naturally to fall into particular categories (a full description of the categories used in the present study, and the manner in which they were ordered into a Systemic Network, is included in Appendix 1). [55]

What follows is a brief summary of general findings, followed by a summary of findings related to demographic effects on the types of word association responses produced. [56]

5.3 Summary of findings

5.3.1 Descriptive findings

The descriptive summaries of each of the ten fruits and ten vegetables are instructive in demonstrating that each fruit and vegetable is different, with particular attributes linking together to form a descriptive pattern unique to that particular product. [57]

It is the case that primary categories of ideas relating to fresh fruits and vegetables are *sense* and *function*. Notions relevant to visual, olfactory and tactile attributes, and also the various uses, or functions, of fresh fruits and vegetables assume a significant place in consumers' knowledge structures of fresh fruits and vegetables. This appears to be the case with all of the fresh fruits and vegetables studied herein. That is, regardless of the type of fruit or vegetable studied, appearance and function factors are important. However, the systemic networks clearly show that, once these primary characteristics have been accounted for, individual fruits and vegetables can be distinguished on the basis of other characteristics, such as horticulture, idiosyncratic matters and evaluation. Attention to terminal categories, rather than the five global categories identified, provides a rich tapestry of detail regarding knowledge structures of particular fruits and vegetables. [58]

Word associations obtained in the present study have reflected the relative importance of particular product characteristics, such as function, appearance, horticulture, idiosyncratic matters and evaluations. It can be concluded that each of these categories of attributes are important to consumers. [59]

To elaborate, it is possible to identify particular concepts that form part of the knowledge structure for each product. For example, when looking at the systemic network analysis for broccoli (see Appendix 2), it is relatively straightforward to discern which concepts are most relevant to broccoli by examining the relative frequencies of responses in the various categories. Again using the example of broccoli, the systemic network illustrates the salience of function, taste, appearance, health, and the notion that broccoli is similar in appearance to other objects, such as clouds and trees. The taste responses indicated that consumers have polar views of the taste of broccoli (you either love it or hate it), and the number of health responses indicate that, while broccoli might not be seen by many to taste nice, it is nevertheless considered to be very healthy. In summary, the concepts *health, looks like, function, appearance* and *taste* are salient in the knowledge structure for broccoli. [60]

In summary, the results of the present study provide information regarding the attributes, or product characteristics that are implicated in the decision process for different fruits and vegetables, and can be used to begin building consumer decision models that relate specifically to particular fresh fruits and vegetables. [61]

As an example, the fruit and vegetable industry can use the information provided in the descriptive networks (from the present research) to enhance product attractiveness by minimising the perceived negative characteristics of particular fruits and vegetables, and maximising their perceived benefits and positive attributes. Measures such as these may prove to be beneficial in increasing the consumption of fresh fruits and vegetables among the Australian population. [62]

5.3.2 Demographic findings

In the present study, demographic information was also collected. Chi-square analyses on numbers of word association responses in each of the age, sex and category cells showed substantial differences in expected versus observed numbers of responses, in several cases. These findings highlight the notion that demographic factors such as sex and age influence the ideas or thoughts that comprise consumer knowledge structures. Depending upon whether an individual is male or female, and the age group to which s/he belongs, it is expected that they will focus on particular product characteristics rather than others. Limited word space precludes the author from presenting a detailed summary of these findings. Briefly, the findings of the present study show:

> a propensity for women aged between 25-54 to produce more "function" words (for both fruits and vegetables-although there were more "functional" words provided for vegetables than for fruit) than would typically be expected, and for males in this age group to show the reverse trend. [63]

Given the division of labour traditionally found for males and females (that is, women participating in more domestic activities than men), it is not unexpected to

find that women think more about the function of vegetables (different ways of preparing them, and so on) than men. DEMPSEY (1988) and BAXTER (1990) provide evidence suggesting that women continue to complete more indoor household chores (including cooking) than males, and that women in the workforce continue to have the major responsibility for household chores.

> Women aged 55+ produced fewer evaluative words than expected, whereas males of this age group showed the reverse trend. Interestingly, women aged 40-54 showed a tendency to produce more evaluative words than expected, again with males showing the reverse. [64]

This finding was quite robust, and might again reflect the fact that women continue to be the primary food shoppers (GLEZER, 1991; BAXTER, 1990). If women are responsible for purchasing fresh fruits and vegetables for the usage of the family, it would be expected that they would use evaluative terms in describing these products. There is little point in purchasing a wide range of fresh fruits and vegetables if they will not be consumed by the family because they are not liked, and women would be expected to have sound knowledge of the fruit and vegetable preferences of individual members of the family.

> Women aged 18-54 produced fewer idiosyncratic responses than expected for vegetables, and males showed the reverse trend. Interestingly, younger women showed fewest, with women producing more responses (but still fewer than expected) as they become older. The same was true for males, that is, younger males produced fewer idiosyncratic words than their older counterparts. For vegetable responses, both males and females in the 55+ age groups showed an effect that is the reverse of their younger counterparts. That is, older women produced slightly more idiosyncratic responses than expected, whereas males aged 55+ produced more idiosyncratic responses than expected. However, it must be remembered that these latter findings show only a weak trend, rather than a substantial phenomenon.

> Women in the 18-54 age group produced fewer horticultural responses than expected (for both vegetables and fruits) whereas males showed the reverse trend. Both males and females in the 40-54 age groups contributed most to this finding. Older women (55+) showed a slight tendency to produce more responses than predicted, whereas again males showed the reverse. [65]

The finding that older women produce more horticultural responses, whereas younger women produce less might indicate a cohort effect. That is, older women would be expected to have more horticultural knowledge, as, firstly, the number of home vegetable gardens has decreased over the years, due to our increased urban density, which decreases yard size; and, secondly, the increased presence

of women in the work force, gives them less time to tend home gardens. In this case, it would be expected that older women would have an increased likelihood of having tended home gardens, and would thus possess more horticultural knowledge than their younger counterparts. [66]

Alternatively, the trend for younger women to provide fewer horticultural responses might be explicable in terms of BERNARD'S (1972, cited in HAAS, 1979) assertion that males are stereotyped as providers of information and fact, whereas women "tend to be handicapped in fact-anchored talk. ... They are ... less likely to have a hard, factual background, less in contact with the world of knowledge" (p.153). This latter suggestion actually supports the finding that women aged 55+ provided more horticultural words than expected, as these women compared to younger women, would be more likely to possess horticultural information, for the reasons given above. [67]

To elaborate, at first glance, the finding that women aged 55+ possess much horticultural knowledge would appear to belie the suggestion that women typically lack hard, factual backgrounds. However, as stated above, women in this older age group would be expected to have acquired factual data relating to horticultural issues due to their past domestic experiences. It might be suggested that while this older age group of women might "tend to be handicapped in fact-anchored talk" relating to the world of business and careers, that they would be expected to have some expertise in areas related to their careers as primary care-givers and housekeepers. This trend would not be expected to continue in younger women, many of whom attempt to combine the dual careers of family and professional life, and would therefore have less time for gardening and other activities in which older women participate. [68]

This same cohort effect also explains the tendency for older males (55+) to produce fewer horticultural responses than expected. When many males aged 55+ were in the workforce, they were typically the primary breadwinner, and women were primary caregivers (GILDING, 1997). Their focus on career would leave very little time for home gardens, hence their relatively few horticultural responses. The fact that men aged between 40–54 produce more horticultural words might illustrate the tendency for contemporary western values to reflect an equal division between work and leisure than was the case in earlier times. In fact, the results of a recent study by BAXTER clearly show that younger Australians are more likely to hold feminist values than older Australians, and women are more likely to hold feminist views than males. In addition, DEMPSEY (1988) shows that 78–80% of males are likely to cite gardening as a regular household chore (as opposed to just under half the women in the sample); however, only 61% of elderly men, as opposed to 56% of elderly women garden at least once weekly. These findings can be interpreted as providing support for the notion that older women garden more frequently than younger women (and are thus more likely to possess horticultural information) whereas the reverse is true for males. BAXTER (1990) conducted a study of 220 households in Brisbane, Australia, and concluded that a sexual division of labour is still evident in Australian homes. She noted that the participation of males in household chores is confined

primarily to *outdoor tasks* and leisure activities with children, while women undertake the bulk of household chores. These findings are echoed by GLEZER (1991) and BITTMANN (1991). [69]

The results of the present study also demonstrate sex and age differences in favourability evaluations of various fruits and vegetables. It was found that males consistently rated vegetables much lower than did females, and that both males and females rated fruits at a similar level. [70]

6. Conclusion

To conclude, the findings of the present study have illustrated the utility of the word association method in obtaining fundamental, descriptive data relating to consumer knowledge structures of fresh fruits and vegetables. This knowledge conforms to Stages One and Two of knowledge acquisition (Simple Apprehension and Judgement). [71]

The nature of the descriptive data provides insight into the type of knowledge consumers possess in relation to fresh fruits and vegetables. In line with the ideas of EPSTEIN (1997), DAMASIO (1994), HAMMOND (1996), and others, the data demonstrates that consumers possess rational, factual information as well as intuitive, experiential knowledge of a highly personal nature. The information obtained using a word association methodology and represented graphically as a Systemic Network provides a wealth of information that, it is argued, could not have been obtained using a research methodology that is more structured in nature. This data can be used in future research in an effort to move from Stages 1 and 2 of knowledge acquisition to Stage 3, that is, to go from what is known about fresh fruits and vegetables to what is presently unknown, such as how the characteristics identified in the present study are actually used in the decision process. [72]

The demographic findings can also be used in future research to further investigate the extent to which females and males of varying ages differ in their decision making processes in relation to fresh fruit and vegetable preferences. Interestingly, it will be useful to investigate whether there are demographic and perhaps personality differences in the way in which individuals access and utilise factual and experiential knowledge when making decisions in this area. [73]

Appendix 1

The word association responses were subjected to an intensive iterative analysis, a process which illuminated a set of categories that could encompass most of the data. A "miscellaneous" category, which contained all responses not fitting into any of the other categories contained less than 1% of the data, illustrating that the categorisation system was almost completely inclusive. An inter-rater consistency level of 95% was reached among the four coders. That is, 95% of the categorisations of word association responses were agreed upon by all raters.

Figure 1 shows the categories that were developed to describe the word association responses obtained in the present study.

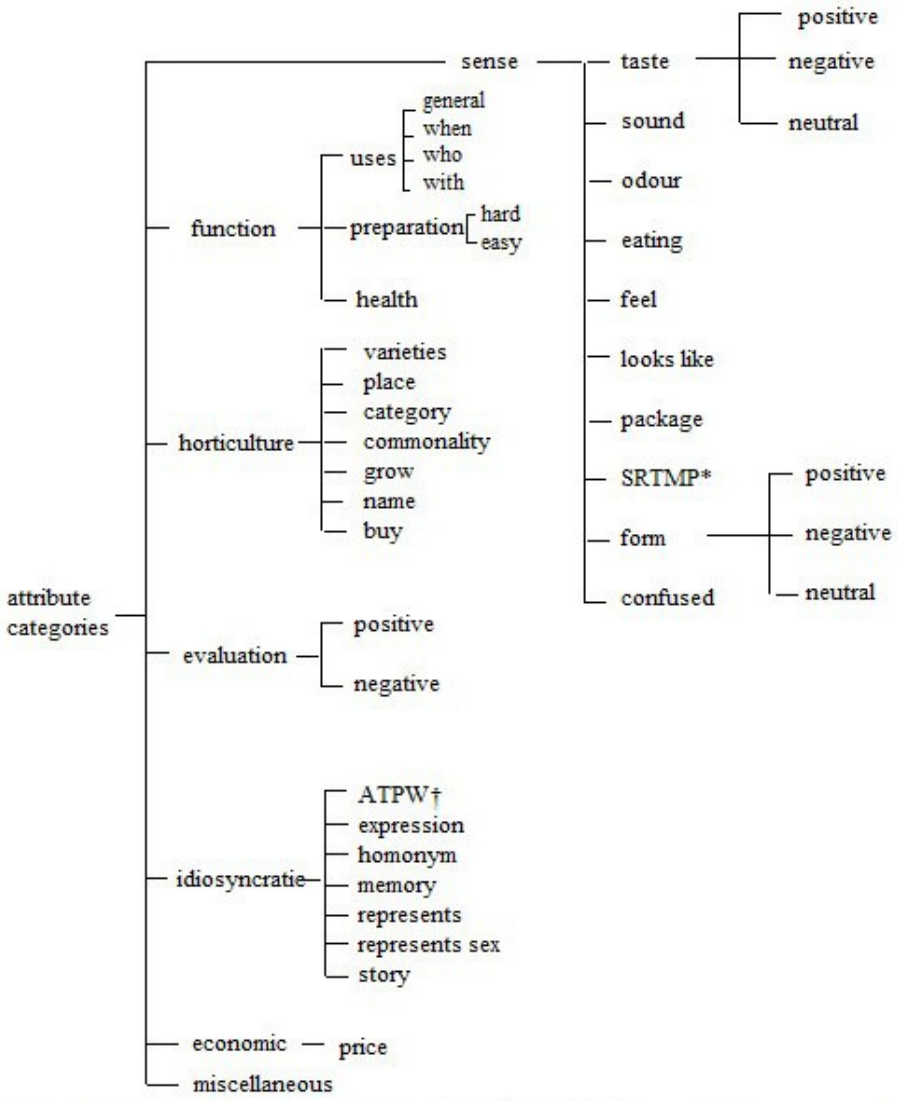

Figure 1: *Systemic network structure* (* = specific reference to mode of presentation; + = association to previous word)

Network categories

Before discussing the meaning of the five global categories that were developed, a word on specificity of responses is warranted. As one moves from the global to the terminal categories in the network, the description of responses becomes more specific. So, for example, the global category sense indicates that the response referred to something consumers physically sense about an object: its taste, or odour, or colour, and so on. However, following the tree to a particular terminal category, say form—positive, discriminates between responses at a finer level; this indicates that the response deals with the physical form of the object, and that it was positive in nature. For example, a response such as "good

colouring" would be categorised as a positive form response, as the respondent was making a positive comment about the appearance of the object.

Data were analysed at the level of terminal categories for the purposes of providing individual network summaries for each of the ten fruits and ten vegetables. This enabled the author to provide a richly detailed knowledge structure for each item. This is in contrast to all other analyses conducted on the data, including the analysis of demographic trends, the stimulus modality, and self-monitoring analyses, wherein global categories were focussed upon, and terminal categories were used as an adjunct to provide a detailed picture of individual effects. That is, when investigating specific effects, numbers of responses in each global category were tabulated, whereas, when presenting the data in the form of systemic networks, numbers of responses in each terminal category were tabulated.

Category 1: Sense (or appearance)

Reading through the responses, words relating to the appearance of the object were extremely common. Given the discussion by KJELDAL (1988) relating to the uniqueness of fruits and vegetables, and the corresponding attention that should be paid to appearances when evaluating these products, this finding was not unexpected. However, due to the various sensory modalities used in evaluating the quality of fresh fruits and vegetables (such as feel and smell), it was decided to extend the category from one dealing with appearance to one dealing with all information impinging on the various senses when a respondent viewed the product. Consequently, the global category *sense* was adopted, which was then subdivided into responses dealing with specific sensory modes. A visual representation of this portion of the network is illustrated in Figure 2.

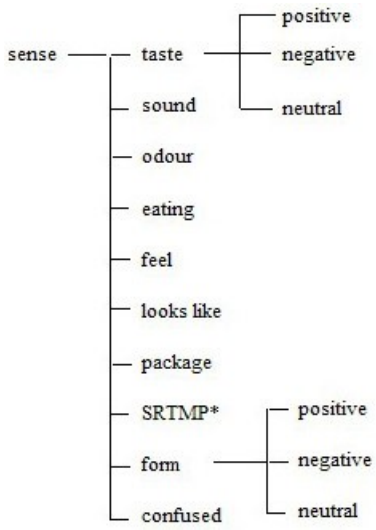

Figure 2: *Sub-component of network analysis—sense* (* = specific reference to mode of presentation)

As can be seen, the global category sense was subdivided into those responses dealing with specific sensory stimuli, such as "taste", "sound", "odour", "eating", "feel", "form", "specific reference to mode of presentation", "confused", "looks like", and "confused". Perusal of the data in these categories illustrated the need for still further sub-categories. For example, when describing the taste of a product, respondents' comments were either positive, negative or neutral. To this end, several of these categories were subsequently subdivided into categories dealing with positive, negative or neutral responses. What follows is a specific description of each of the terminal categories within the global category sense (bolded words in brackets are the shorthand, or abbreviation of the terminal categories adopted by coders—see Table 1).

SENSE—VISUAL—FORM—looks like **(looks like)**. Responses indicating that the product looks like something else. [For example, actual responses categorised here include (to the apple stimuli) "balls" and "smooth river rocks"].

—positive **(form +ve)**. A response that evaluates the form or appearance of the product in a positive manner. [For example, actual responses categorised here include (to the apple stimuli) "good colouring" and "nice pair"].

—negative **(form -ve)**. Same as above, except that the words describing the appearance of the product are negative. [For example, actual responses categorised here include (to the apple stimuli) "black spots" and "bruises"].

—neutral **(form)**. Words that refer to the appearance of the product, but cannot be viewed as being either positive or negative. [For example, actual responses categorised here include (to the apple stimuli) "red" and "shiny"].

—ODOUR **(odour)**. Responses that refer to the odour of the product. [For example, actual responses categorised here include (to the apple stimuli) "fragrance" and "rotting fruit smell"].

—TASTE—positive **(taste +ve).** Responses that refer to the taste of the product in a positive manner. [For example, actual responses categorised here include (to the apple stimuli) "yummy" and "tasty"].

—negative **(taste -ve)**. Negative taste responses. [For example, actual responses categorised here include (to the apple stimuli) "Granny Smith today lacks flavour" and "bitter skin from too many chemicals"].

—neutral **(taste).** Taste responses that are neither positive or negative. [For example, actual responses categorised here include (to the apple stimuli) "sweet" and "taste"].

—SOUND **(sound)**. The sound that is made when eating the product. [For example, actual responses categorised here include (to the apple stimuli) "crunch" and "snap"].

—TEXTURE—feel **(feel)**. Words that describe how the product feels when it is touched, or handled. [For example, actual responses categorised here include (to the pineapple stimuli) "spiky" and "prickly"].

—TEXTURE—eating **(eating).** Words that describe how the product feels when it is being eaten. That is, the sensation of the product in the mouth. [For example, actual responses categorised here include (to the strawberry stimuli) "mushy" and "saliva"].

—CONFUSED **(confused)**. The individual cannot properly identify the product. That is, individual is not sure which fruit it is. [For example, actual responses categorised here include (to the lemon stimuli) "orange" or "grapefruit"].

SPECIFIC REFERENCE TO MODE OF PRESENTATION (SRTMP). A reference to the way that the product has been presented. [For example, actual responses categorised here include (to the lemon stimuli) "light effect" or "grey"].

PACKAGE (package). References to the manner in which the product is packaged. [For example, actual responses categorised here include (to the strawberry stimuli) "punnet(s)"].

Table 1: *Descriptors of "sense" terminal categories*

Category 2: Function (or uses)

Many responses related to uses of fresh fruits and vegetables. To this end, a function category was developed. Analysis of the responses within this global category suggested the existence of several sub-categories. Figure 3 visually represents this portion of the network. As illustrated in Figure 3, responses

indicated that fresh fruits and vegetables were functional in several senses. Sub-categories dealing with potential uses, ease of preparation and health were consequently identified. When inspecting the responses in the "use" category, which all reflected ways of actually using the product, it was found that several sub-categories were emerging. To this end, the "use" category was subdivided into four sub-categories: "uses-general", "uses-when", "uses-who", and "uses-with". Responses in the preparation category dealt with the relative ease of preparation, and were therefore subdivided into "preparation—hard", and "preparation-easy". Specific definitions of the various function categories follows in Table 2.

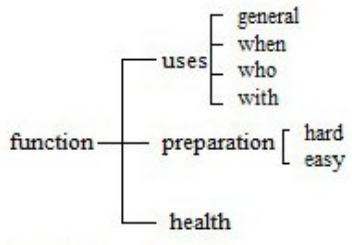

Figure 3: Sub-component of network analysis—function

FUNCTION—USES—general **(uses-gen)**. Responses that refer to the way in which the product can be used. [For example, actual responses categorised here include (to the lemon stimuli) "lemonade" "salad dressing" and "taste enhancer"].

—who **(uses-who)**. Responses indicating that certain groups of people use this product. [For example, actual responses categorised here include (to the watermelon stimuli) "kids" and "children"].

—when **(uses-when)**. Responses indicating that the product is used, or consumed at a specific time (time of year, time of day, etc.). [For example, actual responses categorised here include (to the watermelon stimuli) "summer" or "Christmas"].

—with **(uses-with)**. Responses indicating that the product can be eaten with some other product. [For example, actual responses categorised here include (to the strawberry stimuli) "cream" and "champagne"].

—HEALTH **(health)**. Responses that associate the product with physical health (either positive or negative). [For example, actual responses categorised here include (to the carrot stimuli) "eyes" and "vitamin A"].

—PREPARATION—hard **(prep-hard).** Responses indicating that the product is considered to be difficult to prepare. [For example, actual responses categorised here include (to the pumpkin stimuli) "have cut hard pumpkins with an axe" and "accidents with knives"].

—easy **(prep-easy)**. Responses indicating that the product is considered to be easy to prepare. [For example, actual responses categorised here include (to the carrot stimuli) "easy to peel" and "quick"].

Table 2: *Descriptors for "uses" terminal categories*

Category 3: Horticulture

Another global category which emerged contained responses dealing with *horticultural* information. For example, some comments referred to the varieties of fruit or vegetables, and others related to the place or manner in which various

fresh fruits and vegetables are grown (termed "variety", "place", and "grow", respectively). Other horticultural categories that emerged were as follows: "category", "commonality", "name", and "buy". Responses in the horticultural categories clearly related to factual, or semantic information. Figure 4 visually represents this portion of the network. A description of *horticultural* categories follows, in Table 3. Note that the categories entitled "identify" and "origin" were not included in the category network (Figure 4), as they were considered superfluous (subsequent to categorising the word association responses) as descriptive categories.

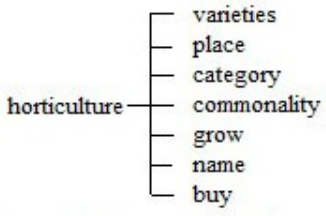

Figure 4: *Sub-component of network analysis—horticulture*

IDENTIFY—name **(name)**. The product is named. [For example, actual responses categorised here include (to the apple stimuli) "apple"].

—category **(category)**. The product is placed in a category. [For example, actual responses categorised here include (to the carrot stimuli) "vegetable"].

ORIGIN—place **(place)**. Where grown. [For example, actual responses categorised here include (to the banana stimuli) "Coffs Harbour" or "Queensland"].

—grow **(grow)**. How grown. [For example, actual responses categorised here include (to the banana stimuli) "plantation" or "bunch" or "injection to ripen quickly"].

—varieties **(varieties)**. Identifying the product in terms of a specific variety (Batlow, Delicious, etc.) or brand. [For example, actual responses categorised here include (to the apple stimuli) "Granny Smith" or "Delicious"].

BUYING VENUE (buy). References to where the product is purchased. [For example, actual responses categorised here include (to the banana stimuli) "Big Banana" or "locally bought", or "Safeway"].

COMMONALITY (commonality). References made regarding the commonness, or familiarity of the product. [For example, actual responses categorised here include (to the strawberry stimuli) "rare dessert", "too few", or "familiar"].

Table 3: *Descriptors for "horticulture" terminal categories*

Category 4: Idiosyncratic (or experiential)

Yet another global category was identified from the iterative analysis process. This category was labelled *idiosyncratic*, and contained responses dealing with memories and responses which tended to be personally meaningful to respondents. Figure 5 visually represents this portion of the network. For example, one sub-category which suggested itself from the data was labelled "represents", and dealt with responses relating to what the product represents to the respondent. Another sub-category in this vein was termed "represents—sex", and dealt with responses of a sexual nature. Other sub-categories within the

global category of "idiosyncratic" responses were as follows: "association to previous word", "story", "expression", "homonym", and "memory". A description of *idiosyncratic* categories follows, in Table 4.

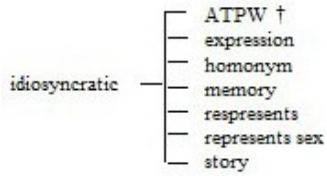

Figure 5: *Sub-component of network analysis—idiosyncratic* (+ = association to previous word)

STORY (story). A response that places the product in the context of a story, fairy tale, myth, etc. [For example, actual responses categorised here include (to the apple stimuli) "Adam and Eve", "Snow White" or "Newton"].
EXPRESSION (expression). An expression, or saying that is associated with the product. [For example, actual responses categorised here include (to the banana stimuli) "banana lounge" or "mellow yellow"].
MEMORY (memory). A response indicating that the individual has a memory of the product in a specific context. [For example, actual responses categorised here include (to the broccoli stimuli) "President Bush", or "Dad" or "childhood memory of overboiled broccoli"].
HOMONYM (homonym). Words that sound the same (but are not necessarily spelt the same) but mean different things. [For example, actual responses categorised here include (to the pear stimuli) "pair"].
REPRESENTS—general **(represents)**. A response that suggests that the product in question represents something. [For example, actual responses categorised here include (to the strawberry stimuli) "decadent" or "fragile" or "romance"].
—sex **(sex)**. Responses indicating that the product is viewed in an erotic, or sexual manner. [For example, actual responses categorised here include (to the banana stimuli) "condom", "penis" or "phallic symbol"].

Table 4: *Descriptors for "idiosyncratic" terminal categories*

Category 5: Evaluation

The next global category that suggested itself from the data related to *evaluations* of the products. This category was subdivided into "positive" and "negative" evaluations. Descriptions of these categories follows, in Table 5.

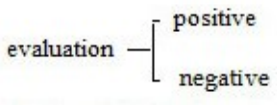

Figure 6: *Sub-component of network analysis—evaluation*

EVALUATION—positive **(eval-+ve)**. The product is evaluated in a positive way. [For example, actual responses categorised here include (to the strawberry stimuli) "favourite fruit" or "the best"].
—negative **(eval--ve)**. Same as for a positive evaluation, except that the responses are a negative evaluation of the product. [For example, actual responses categorised here include (to the broccoli stimuli) "boring", or "not so versatile"].

Table 5: *Descriptors for "evaluation" terminal categories*

A *price* (called evaluation) category was introduced, largely because of the focus in marketing literature on the role of price in the purchase decision. Any responses that relate to the price of the fruit or vegetable were placed into this category. (For example, actual responses categorised here include [to the strawberry stimuli] "can be expensive" and don't buy often—expensive").

A miscellaneous category was also introduced to deal with responses that were uncategorisable. This category was used for any words that could not be placed in any of the other categories. (For example, actual responses categorised here include [to the broccoli stimuli] "gold nugget", "flake" and "lost").

Appendix 2

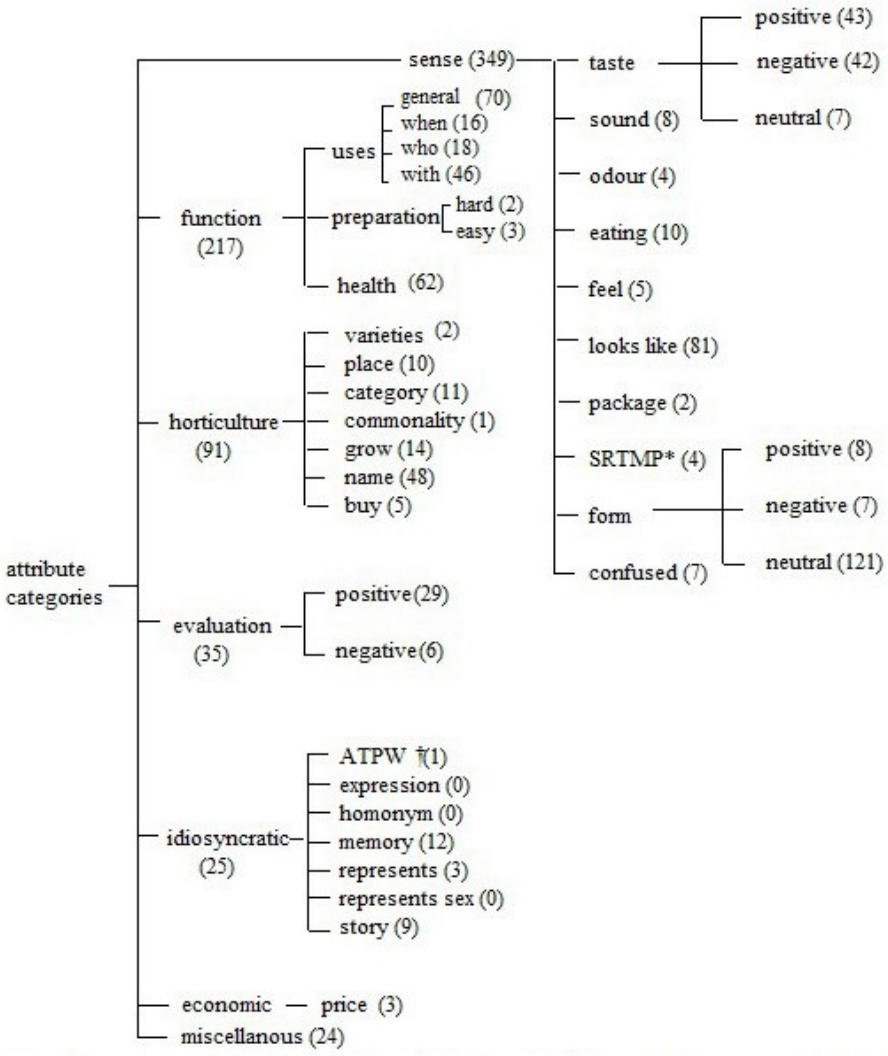

Figure 7: *Network analysis—broccoli* (* = specific reference to mode of presentation, + = association to previous word)

Network description

The salient features of the categorisation network for broccoli responses can best be seen by an inspection of Figure 7: Network Analysis—Broccoli. Words describing some aspect of the function of broccoli comprised the most frequent response (20%). Of the function words, general function words comprised the most frequent response (47%), followed by uses-with (30.7%), uses-who (12%) and uses-when (10.7%). Regarding general usage words, no particular response predominated. Rather, there was an assortment of relatively evenly distributed responses (steam(ed), stir fry, boil(ed), etc.). Words describing some aspect of the form, or appearance of broccoli comprised the next most frequent response (18.3% of total broccoli words). Of the total form words, neutral words predominated (89%), with considerably less positively-toned words (5.9%), and approximately the same number of negative words (5.1%). Of the neutral words,

words relating to the colour of broccoli predominated, accounting for 72.7% of the total. The "looks like" category, which was comprised of words noting the similarities between the shape of the picture and some other object, such as "trees", "flower", "a martian needing a haircut and viewed from above" and "looks like a dog's body", accounted for 10.9%. of overall broccoli words. This is the only fruit or vegetable in which this category accounted for more than 5% of overall responses, indicating that the appearance of broccoli is capable of capturing high imagery responses. Some examples of responses in this category include "tree(s)", "forest", "bush", "flower", "jungle", "hair", "rain forest" and "volcano". Words describing some aspect of the healthiness of broccoli comprised the fourth most frequent set of responses (8.3%). Some examples of words in this category include "health(y)", "vitamins", "iron" and "good for you". The fifth most frequent category was the one in which consumers simply named the product (6.5%). Finally, responses dealing with the taste of broccoli comprised 12.4% of overall responses. Of these, positively- and negatively-toned responses both accounted for approximately the same percentage of responses (46.7 and 45.7%, respectively). Neutrally-toned taste words accounted for only 7.6 of the overall taste responses. Some examples of positive words include "tasty", "yum(my)", "delicious" and "nice". Some negative taste words were "yuck", "tasteless", "disgusting" and "don't like". These strongly-worded mixed responses highlight the fact that consumers either love or hate broccoli. Other response categories each made up 5% or less of the overall responses, signifying that words in these categories were not generally associated with the product.

Overall view of broccoli

Broccoli received an overall favourability rating of 62.8%, placing it at the bottom end of this scale along with cauliflower (which received a favourability rating of 62.2%). In summary, it can be stated that, while approximately half of the taste words were positive and half negative, indicating that consumers are divided in their ideas regarding this aspect of the product, the high number of health-related words lends support to the claim that broccoli is eaten for reasons other than the taste. Consumers consider broccoli to be an extremely healthy product, and its interesting shape may also be partially responsible for the positive responses received for this vegetable. Words relating to the form, or appearance of the product accounted for 29.2% of overall responses (if the "appearance" and "looks like" categories are merged). Finally, overall uses of the product were frequently mentioned, indicating that, along with the healthiness and peculiar shape of broccoli, its extreme versatility may contribute to consumers' positive view of this product.

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