The attributes of leftovers and higher-order personal values

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Received 14 August 2017
Revised 12 April 2018
Accepted 13 April 2018

Abstract

Purpose – The purpose of this paper is to investigate the inter-relationships between peoples' perceptions of the attributes of leftover food and how they lead to higher-order values in relation to food waste.
Design/methodology/approach – The method involved an online, text-based, qualitative survey of 112 panel members from a market research firm. The data were examined using thematic analysis and framed using a means-end approach.
Findings – Findings show that leftover foods take on both positive and negative attributes and benefits, as shown in four themes—tasty foods, dangerous foods, images of spoiling and used or second-hand—leading to consequences, identified as creating time, Time to binning and repurposing. Additionally, how individuals in a household speak of themselves based on their higher-order values, termed as states of being, can determine whether such foods are repurposed or consigned to the bin. These states of being are reflected in the three themes: the responsible ones, the virtuous ones and the blameless ones.
Originality/value – This study provides more focussed insights on the interplay between the attributes and benefits of leftovers and how household members position themselves towards these foods, particularly in their transition to waste.

Keywords Thematic analysis, Personal values, Leftovers, Household food waste, Means-end approach, States of being

Paper type Research paper

Introduction

Recent global estimates suggest that between 30 and 50 per cent (or up to 2bn tonnes) of all food produced for human consumption is either lost or wasted, highlighting a contemporary problem in modern society (FAO, 2011; Institute of Mechanical Engineers, 2013). Although food loss happens at a number of points in the food supply chain an avoidable portion occurs through consumer behaviours in domestic households (Lanfranchi *et al.*, 2016; Tucker and Farrelly, 2015). Household food waste emerges as the many dynamics of daily life intersect with food provisioning, preparation and consumption (Evans, 2012a, b; Pearson *et al.*, 2013; Porpino *et al.*, 2015). As such, there are multiple points of interaction between household members, the food and resultant leftovers, where waste reduction opportunities are possible or have passed (Evans, 2012a, b; Quested *et al.*, 2013). Therefore leftovers, as one aspect of household food waste, become an important focus of investigation in their own right (Cappellini, 2009; Cappellini and Parsons, 2012).

The literature identifies two sources of leftovers. First, they are the remnants of a previously prepared meal (e.g. Cappellini, 2009; Evans, 2012a, b; Porpino *et al.*, 2015). Hence, it may be prepared food that is "left unused or only partially used and then disposed of"

British Food Journal
Vol. 120 No. 9, 2018
pp. 1965-1979

0007-070X
DOI 10.1108/BFJ-08-2017-0442

(Tucker and Farrelly, 2015, p. 3). Second, leftovers are remnants of foods that were purchased as part of the ingredients for a meal, but were not totally used up in making that meal (Evans, 2011, 2012a, b). Taking these two sources into account, for the purpose of this study, a leftover is defined broadly as food that was provided for one purpose and is now surplus to, or left over from that purpose in some way. Relating this definition to household food waste, this includes: food purchased for intended meals that is not used or only partially used in meal preparation; plate waste, which is uneaten food left on a person's plate; and extra food made at the time of the family meal that is intended for later consumption but ultimately not eaten. "Avoidable" or "edible" food waste and "unavoidable" or "inedible" food waste are often used interchangeably in the literature. Emerging definitions are beginning to favour the classification of food waste as edible and inedible, rather than avoidable and unavoidable (European Union Fusions, 2016). According to Reisinger *et al.* (2011), edible food waste is food waste which was, at some point prior to disposal, fit for human consumption; includes both avoidable food waste (e.g. slices of bread, apples, meat) and possibly avoidable food waste (e.g. bread crust, potato skins). Inedible food waste is food waste arising from food preparation that was not at any point edible (e.g. bones, eggshells, pineapple skins); inedible food waste is considered unavoidable food waste. In the context of leftovers, a banana skin, for example, is usually deemed by most people "inedible" (though it can be eaten if prepared in certain ways), so is not considered a leftover if the banana is eaten as part of a meal but not the skin.

There is limited research that focusses specifically on household leftovers (Cappellini, 2009), yet it makes up a significant amount of domestic food waste (Porpino *et al.*, 2015; Stancu *et al.*, 2016). Instead, studies focus more broadly on aspects of provisioning, storage and meal preparation, with leftovers simply being part of this overall picture (e.g. Farr-Wharton *et al.*, 2014; Marx-Piennar and Erasmus, 2014; Porpino *et al.*, 2015; Stancu *et al.*, 2016). It is argued here that there is an imperative for more research into this aspect of food waste since little is known about how individuals perceive and experience food that is signified as left over in a household, and how such understanding could reduce this form of waste.

The current study is based in Australia, a country where it is estimated that household food waste may be as much as one in every five bags of groceries, with a monetary value of over AUS $1,000 per year, per household (Dee, 2015). Such statistics further highlight the problem of domestic food waste and the importance of research in this area. The current study uses qualitative questions in an online survey instrument to investigate leftover food in Australia extending research on domestic food waste by exploring the relationship between how people perceive leftovers and their beliefs and actions that result in behaviours towards leftovers in their complex, everyday lives (e.g. Evans, 2011; Porpino *et al.*, 2015). Moreover, the findings enhance work by Cappellini (2009) through focussing on leftovers specifically, which is an under-researched area. Managerially, the findings can benefit social marketing practitioners by further informing approaches to food waste behaviour change initiatives or marketing communication campaigns. The next section reviews the relevant literature on leftovers in households.

Leftovers in the literature

As previous researchers have noted, edible food items seem to be moved along a multi-step consumption process and eventually some are wasted (Blichfeldt *et al.,* 2015). Evans (2012a, b, p. 53) speaks of the passage of "food" into "waste", where edible food, including food that could be seen as leftovers, is disposed of as a casualty of the complex rhythms of everyday life. This notion of leftovers emerging from dynamic interactions in a household is also evident in Cappellini (2009) and is used to describe practices that permit leftovers to be re-admitted for use in another meal or excluded, hence becoming waste. Thus, there is an argument in the literature (e.g. Cappellini, 2009; Porpino *et al.*, 2015) that, to more closely understand leftovers, it is important to understand the contextual situations relating to food in a household.

For example, there are concerns with handling leftovers correctly leading to possible anxiety about food-borne illnesses (Watson and Meah, 2013; Meysenburg *et al.*, 2014). Expiration dates and consumers' perceptions of risk about the impact of these expiry dates are evident in the literature (e.g. Tsiros and Heilman, 2005; Kendall *et al.*, 2013). Less formal perceptions around storage and food-borne illnesses from leftovers stored in the fridge also contribute to waste. Some individuals make decisions about food edibility by relying on smell, touch, taste or length of time in the fridge (e.g. Evans, 2011; Farr-Wharton *et al.*, 2014). While others intend to eat cooked leftovers within a period of days, the complexities of modern life lead to lost opportunities to consume them as they rapidly cross the line to being food waste (Cappellini, 2009; Evans, 2011; Farr-Wharton *et al.*, 2014).

In summary, leftovers account for a significant amount of domestic food waste that is actually under the control of household members, meaning their loss could be controlled (Stancu *et al.*, 2016). Hence, studies seeking a better understanding of how household members perceive and deal with leftovers are imperative. In a related area on food products, research shows that negative or positive perceptions of the attributes and the benefits accruing are important determinants of how people engage with such foods (Zagata, 2014). Taking this important chain of linkages towards food into account, the following discussion identifies the attributes and benefits of leftovers that are evident in the literature.

Perceptual attributes and benefits of leftovers

Leftovers have perceptual attributes that household members perceive negatively and as a consequence are less appealing to eat (Cappellini, 2009, p. 370). As concern for the freshness of food increases, so does the amount of food wasted (Principato *et al.*, 2015), which is perhaps unsurprising, as values of hedonism ("pleasure or sensuous gratification for oneself", Schwartz, 1992, p. 8) and self-direction ("independent thought and action—choosing, creating and exploring", Schwartz, 1992, p. 5) have been linked to food waste behavaiors (Mirosa, Mainvil, Horne and Mangan-Walker, 2016; Mirosa, Munro, Mangan-Walker and Pearson, 2016). Still, leftovers can be imbued with moral attributes that suggest benefits of thrift and sacrifice, but this connection is not shared by all household members (Cappellini, 2009; Cappellini and Parsons, 2012). Leftovers are perceived as having functional attributes, leading to perceptual benefits of being a quick and easy meal preparation, therefore saving time and labour. They may have money and energy saving benefits through only having to reheat them. But they can also be perceived as boring, particularly if served again the next day (Cappellini, 2009). Leftovers may simply be seen as undesirable by family members shown through some household members' unwillingness to eat them (e.g. Cappellini, 2009; Porpino *et al.*, 2015).

Household members' roles in relation to food waste

The notion of positioning in this current study is used to understand how household members' perceptions of their roles or actions towards leftovers can reflect what Jervis and Drake (2014) identify as the fulfilment of personal values or desired states of being. Food waste studies provide insights into actions or roles that position certain household members in respect to higher-order values when engaging with leftovers.

Porpino *et al.* (2015) speak of women being good providers, over-providing to be good mothers or not to appear poor—all roles that speak of higher-order values both within the home and broader society. A wife's position as household provisioner and food provider may somehow be diminished by her actions that create food waste, for example, a husband criticising his wife over her actions (Evans, 2011). Cappellini (2009) identifies that the mother (wife) is the one who adopts the sacrificial action of eating the leftovers, rather than the children or husband. Such positioning through household members' roles and actions in

relation to leftovers not only impacts on the perceptual value of the attributes or benefits of the leftovers, but also on their fate (Cappellini, 2009; Evans, 2012a, b; Porpino *et al.*, 2015).

In summary, the literature demonstrates evidence of both the attribute–benefit links regarding leftovers and also the roles or actions household members take to achieve higher-order values in how they deal with this food. However, given the limited research in this area, there is an opportunity to provide more focussed insights on the interplay between the attributes and benefits of leftovers and how household members position themselves towards these foods, particularly in their transition to waste. In this endeavour, the study is guided by the following research questions:

RQ1. What are the links between a household member's perceptions of the attributes and benefits of leftovers and their consequences?

RQ2. How do these aspects influence an individual's states of being towards this type of household food waste?

RQ3. What are the inter-relationships between the leftovers' attributes and the perceived states of being?

Methodology

Theoretical framing

This study is broadly based on research that examines the links between attributes, benefits and consumer values (e.g. Vriens and Ter Hofstede, 2000). This means-end approach assumes people will consume or use a product based on its attributes (means) that provide forms of benefits that may be both physical and psychological in nature. In turn, these benefits become important as they help a person to achieve higher-order personal values, considered to be ends (Vriens and Ter Hofstede, 2000). Attributes and benefits are often elicited through qualitative research, with the end-states identified through laddering techniques that identify the links (or ladders) between the participant's perceptions of the focal product and their own motivations or values (Zagata, 2014). This approach has been used in relation to a range of new and existing food products (e.g. Zagata, 2014), but not to leftover foods. Therefore, the links between attributes, benefits and higher-order values are used as a guiding framework in the current study.

Procedures

The study was conducted in Australia in late 2015 using a consumer panel accessed through a research firm. An online questionnaire was developed with a combination of point-and-click responses for the categorical questions, and textboxes for responses to the open-ended questions. The panel participants were recruited by the market research firm using an e-mail-based call for participation, with an embedded URL to the interview protocol which was hosted on the lead author's university server. They were incentivised through a payment of AUS$10 which was facilitated by the research firm.

Sampling

The researchers purchased a non-random sample of 112 participants, based on available funds, specifying that participants needed to be over 18 years of age, and that there needed to be approximately 20 participants in each of the five age groups ranging from 18–24 to 65–75. This is a relatively large number of participants in a qualitative research project (e.g. as a general rule of thumb for interviews, it has been suggested that a minimum of 20 respondents should be included in any single subgroup, Saaka *et al.*, 2004) and is sufficient for the purposes of the study. However, this sample is not intended to be representative of the Australian population.

Measures

In the first section questions focussed on the participants' perceptions of: how often they had leftovers in the identified food categories over a month, and how often over the month they were likely to put these particular leftovers in the rubbish bin.

In the main section participants were asked three questions: one to identify specific leftovers they had in the relevant categories and two laddering-style questions. An example of these three questions for a leftover food category is shown below. As can be seen in this example, question (1) identifies the actual foods that commonly become waste in the household in a category, question (2) elicits attributes or benefits relating to these leftover foods that determine whether they become waste, while question (3) gains the insights into their actions towards leftovers. It is the findings in question (3) that position household members through their personal values or states of being (as suggested in the literature, e.g. Vriens and Ter Hofstede, 2000) and which determines the ultimate outcome for the leftovers.

Food prepared at home for a household meal (e.g. cooked food and/or uncooked food, such as salads):

(1) Thinking about your own household situation, list up to three (3) cooked or uncooked foods in this category (food prepared at home for a meal) that commonly become leftovers in your house.

(2) Please describe as fully as you can what it is about of these leftover foods that explains why you would eat them at a later opportunity—or would not eat them at a later opportunity.

(3) If applicable in Q2 above, in what ways do your descriptions of these leftover foods (food prepared at home for a meal) lead you to think about putting them in the rubbish bin?

For example, what are your concerns with the leftovers, or thoughts about how these leftovers may affect others in your household?

Benefits/limitations to the research method

There were four key benefits to using this type of data collection that were relevant to the study. First it was possible to achieve a higher number of responses in a shorter space of time as the text-based surveys could be accessed by any number of participants at any time of the day. Additionally, the researchers were able to get opinions from a wider range of individuals across the country, rather than being dependent on more localised participants when using face-to-face interviews. On the one hand, the method also provided the opportunity to collect the opinions of more participants in particular age groups to more easily obtain intergenerational insights. Finally, the data came in a readily-accessible text form for analysis, thus removing the additional expenses involved in transcription costs. On the other hand, there are limitations to this approach in that there is very little guarantee about the quality of the responses obtained from the questions posed, other than the research firm's panel members' general interest in participating in research. Additionally, as there is no interaction between the researchers and the participants during data collection, there is no opportunity to further probe the answers provided by participants.

Thematic analysis

The data was examined using thematic analysis involving constant comparison methods (e.g. Strauss and Corbin, 2008), an approach commonly used in a range of qualitative research methods, not just grounded theory (see Braun and Clarke, 2006). Keeping the theoretical means-end chain approach in mind, the lead author undertook a preliminary analysis of the data. This analysis involved a combination of word searches and colour

coding, together with memos to document codes and categories that could be merged into examples of themes. These preliminary findings were discussed with the second author, who is located at the same university. Agreement with the preliminary themes was about 80 per cent, with the remaining differences discussed to improve the analysis. Following this review the lead author completed the rest of the analysis independently.

To further validate the findings, the data spreadsheet and the document of the emergent themes were reviewed by the other three researchers for feedback on the thematic findings. Thus, these researchers took on the role of de-briefers (Lincoln and Guba, 1985) with a view to reducing any biases or subjective assumptions in the first researcher's analysis. Differences of opinion regarding themes and data were discussed and resolved by consensus between the four researchers.

Results

Emergent themes

Given the high number of participants in the sample it is not possible to present each person's characteristics as is usually seen in qualitative research. Instead, the sample characteristics were put into SPSS and a descriptive analysis run. The sample characteristics are provided in table form (Table I). The table shows the sample had a spread of participants in terms of gender, with 65 females and 47 males, as well as generations, with 22 participants in each age group. There was also a spread in the sample for household composition, frequency of shopping and cooking per week, as well as annual income.

Perceiving the attributes and benefits of leftovers as valued or devalued

Consumer perceptions of the attributes and benefits of a product can be positive or negative, and as such can signify whether the product is valued or lacks value to an individual. Four themes were identified reflecting the valued or devalued attributes of leftovers: tasty foods, dangerous foods, looks like spoiling and used or second-hand. These themes are now discussed in more detail.

Tasty foods: comments related to how flavoursome leftovers are, and that some foods taste even better when left for a period of time. Across the range of categories or actual foods identified, the tasty leftovers relate to dishes based on cooked meats, pasta and cooked vegetables: "These foods [roast, pasta, Thai food] often taste better the next day" (18–24 years, M) and "I luv left over roast veggies. Food precooked has a much richer flavour" (40–54 years, F). This positive sensory-related attribute of leftovers has been recognised in other food waste studies, for example as being a motivator for taking leftovers home from the restaurant in a "doggy bag" (cf. Mirosa *et al.*, forthcoming).

Dangerous foods: while some leftover foods improve in flavour, others increase in danger to household members over time. One participant stated: "my main concern with leftovers is food poisoning or indigestion" (18–24 years, F). Participants identified certain foods that they regard as potentially hazardous, especially so for meat, which is interesting as meat-based leftovers are also cast as having tasty attributes by other participants. For example: "Curries […] most members of my household regard them as a health hazard" (55–64 years, M). Here the unstated attributes are such that they have problematic consequences as a "health hazard". The example of chicken highlights concerns over the dual attributes—not only poisoning family members, but creating additional problems by somehow contaminating other foods in the fridge: "Chicken […] if leftovers are put in the fridge […] being chicken it can contaminate other foods and make people sick" (18–24 years, F).

Leftover fish/seafood is considered a high risk, taking on attributes of being laden with bacteria and creating a sense of fear in participants: "never eat leftover seafood […] too risky" (40–54 years, F) and "I am more fearful of bacteria when it comes to fish" (40–54 years, M). Leftover cream also becomes a dangerous food: "food poisoning in a tub just

Characteristics	No.
Gender	
Male	47
Female	65
Age	
18–24	23
25–39	22
40–54	22
55–64	22
65–75	22
Household composition	
Household of unrelated adults	6
Single person household with dependent children	5
Single person household with no children	15
Single person household with non-dependent/adult children	5
Two-person household (married/defacto) no children	25
Two-person household (married/defacto) with dependent children	23
Two-person household (married/defacto) with non-dependent/adult children	23
Other–live with father	1
Other (unspecified)	8
Annual income	
$140,000+	6
Between $100,000 and $140,000	14
Between $60,000 and $100,000	20
Between $20,000 and $60,000	42
Less than $20,000	16
Prefer not to say	14
Responsible for food purchasing each week	
Every time	64
Often (five to six times)	26
Sometimes (two to four times)	14
Rarely (once or less than once)	5
Never	3
Responsible for food cooking each week	
All the time (every day)	50
Often (four to five times)	28
Sometimes (two to three times)	20
Rarely (once a week or less)	11
Never	3

Note: $n = 112$

Table I.
Sample characteristics

waiting to happen!" (40–54 years, F]. Even leftover lettuce may take on dangerous consequences: "we might get salmonella" (65–75 years, F). The tensions expressed between participant's desire to not waste food but at the same time to be cautious and not get sick from the foods echoes conflicting social anxieties about the practices of domestic provisioning that have been expressed elsewhere (cf. Watson and Meah, 2013).

Looks like spoiling: while some participants measure the degree of spoiling in terms of days, others use the look of the food as a barometer. This theme arose from specific imagery participants used, from the mild to the highly graphic, when describing at what point a leftover's physical attributes devalue it to the degree where it is no longer fit for human consumption: "I toss it [pumpkin] if it goes mouldy" (25–39 years, F) and "when bananas are

discoloured and old and the skin is going black" (65–75 years, F). Bakery products also fall into the mild-image area, especially words like 'stale', 'dried up' and "mouldy". On the more graphic side, dairy is repeatedly mentioned: "If food is slimy, discoloured or gas has developed e.g. feta cheese […] yogurt – kept too long, develops bubbles and mould […][this] would prompt me to throw them out" (55–64 years, F), also "[Vegetables from a farm] sometimes they go off – worms, sprouting, rotting" (25–39 years, F), and, at the extreme end, "Rotten vegetables found in the fridge vegetable bin - we're not prepared to eat them" (40–54 years, F) and "Rotting food [dairy] is a no go!" (65–75 years, M). What was noticeable in the data for this theme is that the reported spoilage was often extreme suggesting that the point of rescue had long passed and participants were justified putting leftovers in the bin. On a similar note, Evans (2012a, b) talks about his research participants resolving questions of value by initially keeping foods that might be used in the future but then "quietly but actively" forgetting them as they sit in the back of the refrigerator as they lose value and spoil and therefore "slip into the category of rubbish" (p. 1130).

Used or second-hand: this theme relates to plate waste, which means food served to someone that is left over, and may have been potentially edible by another person at the meal, but was not. The theme was raised by two participants and falls across several food categories in the responses. One participant stated that "Half-eaten pasta is used and slobbered on" and under the fruit and vegetables category the participant suggested that the fruit platter does not get another opportunity for consumption after its "newness" has passed, "[…] fruit platters go bad quickly, but I suppose it's just that they're unappealing when they're second-hand (25–39 years, M). These quotes capture the notions of leftovers being "used" or seen as "second-hand", almost like a hand-me-down that is no longer desirable for rescue. The second participant discussed plate waste from her children: "Pasta is generally wasted because the children only eat half and nobody wants to finish their half-eaten plate", while under the fruit and vegetable category: "Nobody wants to eat the half-eaten carrots and celery that our kids leave" and under the dairy category "[…] [the] children usually serve themselves too much custard or yoghurt, and so we throw away the half-left bowl" (25–35 years, F). Again there is an implication of the food being undesirable in the way it was "used" (e.g. half-eaten, therefore not new) with household members unwilling to eat them, a theme that is similarly noted in other studies (e.g. Cappellini, 2009; Porpino *et al.*, 2015). The above set of quotes also provides insights into family dynamics that impact on plate waste: perhaps portions are provided that are too large, as well as children being allowed to help themselves.

Consequences

When examining how perceptions of the attributes and benefits move consumers up the chain of product evaluation there is a level where the perceived attributes or benefits give rise to certain self-relevant consequences (Jervis and Drake, 2014). Three themes emerged relating to such consequences: time creating, time to binning and repurposing.

Time creating: leftovers have temporal attributes where the benefits are valued to support household routines and activities. The data show evidence of participants intentionally creating leftovers during meal preparation to free up time from their cooking duties, as shown in the following quotes: "I cook big portions so I don't have to cook often during the working week" (25–39 years, M) and "They are convenient to eat when I'm short on time and don't want to cook" (18–24 years, F). This theme suggests that leftovers not only save time for busy people, but also create time by not having to spend time preparing a meal from scratch each day. However, it is noted in the literature that such intentional creation of leftovers does not guarantee that they will not become waste for other reasons, such as being forgotten in the fridge or defrosted for a meal but then other activities get in the way and they are not consumed (e.g. Evans, 2011; Farr-Wharton *et al.*, 2014).

Time for binning: as the ultimate and least desirable temporal issue for leftover food, this theme relates to participants' perceptions of the time gap between leftovers being edible and becoming unsafe for consumption, resulting in disposal. As such, the theme explores participants' heuristics for binning leftovers: "If it is seafood – binning after 24 hours" (65–75 years, F). However, for meat-based products the general time is around three days: "We wouldn't throw out food like this unless we don't get an opportunity to eat it within about three days (40–54 years, F) and "I normally throw out leftovers 2 to 3 days after food has been cooked" (55–64 years, F). Just occasionally, it is longer: "More than 5 days for fish and chicken, I throw them out" (25–39 years, M). Dairy products have short or longer times, depending on the individual: "what doesn't get used is tossed after 3 days" (25–39 years, F). Other categories have varied shelf lives too: "Typically put pre-prepared salads in the bin the next day, as they tend to go "slimy" quite quickly" (25–39, F) and "Mandarins go soft and sour if kept more than 3–4 days" (55–64, F). The discussions that represented this theme echo Douglas's (1984) theory that the social world is based on classifications defining what is dirty or what is clean, with anything classified as "dirt" or "pollutant" being removed. Disposal of leftover foods therefore becomes a matter of binning foods that qualify as "dirt" and eating those which are still considered to be "clean" (Cappellini 2009; Blichfeldt *et al.*, 2015).

Repurposing: this theme has two dimensions, repurposing through composting (the composters) or feeding such foods to their animals (the animal feeders), thus suggesting the value of returning food to the environment in a natural way, for example "Thrown in compost if they are past being edible" (55–64 years, M), and "I put them in the compost [fruit and veg], not the rubbish" (18–24 years, F). It is interesting to see that the animals that are fed are both domestic and wild: "I have a dog that tends to get leftover vegetables" (55–64 years, M), "Seafood shouldn't be reheated so if there's leftover [pasta marinara] the chooks get it (40–54 years, F),"[I] feed stale bread to the birds (25–39 years, F) and "[…] dressed salad does not keep – it usually goes to the possums" (65–75 years, F). This theme resonates with other recent studies on waste, where for example, "the act of disposal is not an end point, but can actually begin a complex trajectory that ends in re-valuation and reuse" (Mourard and Barnard, 2016).

Perceived states of being and leftovers

In this section, rather than tapping into personal values *per se*, themes are developed around participants' perceived states of being that encapsulate how they position themselves in terms of roles and actions reflecting their personal values. The data revealed three main themes: the responsible ones; the virtuous ones, composed of the composters and the animal feeders; and the blameless ones.

The responsible ones: this theme relates to how the participants describe themselves in responsible terms, thereby capturing personal values in relation to leftovers that suggest the directions the leftovers will take, for example, repurposing or disposal: "I was always taught to be careful with seafood leftovers due to the potential of getting sick" (40–54 years, M); and "I'm iffy about reheating fish and seafood […] if it's not eaten, it goes" (40–54 years, F). These quotes reflect responsible behaviour, through "common sense", being "taught" or a personal value when dealing with feeding the family, which essentially means that participants are not taking risks with household members' health, an important virtue in modern society with high concerns over food-borne illnesses (e.g. Kendall *et al.*, 2013; Meysenburg *et al.*, 2014).

Another area relating to the responsible ones is not indulging in behaviours leading to food waste in the first place, such as over-catering: "I would not prepare food that knowingly I would have to dispose of. It can always be utilised in another way" (65–75 years, F). A very definite response from this participant also suggests this stance: "I have NO concerns eating leftovers as NOTHING in my house is wasted" (55–64 years, F). The responsible ones also find new uses for leftover food, such as "[…] my wife uses all fruit that is not eaten to make fresh fruit drinks" (55–64 years, M).

The virtuous ones: the focus for these participants is not in avoiding food waste, but in justifying its existence in the household through the virtues of repurposing. Participants' perceptions are that they are doing "good" by repurposing leftovers through composting or feeding them to domestic and wild animals. The virtue is shown in ensuring that suitable leftovers have a more natural disposal; that is, not putting them in the bin where they are likely to create greenhouse gases when taken to the dump: "They never go in the rubbish bin" (55–64 years, M) and " I have no concerns, everything is composted" (65–75 years, M). Although some participants recognise it is not always possible to compost everything: "I have to dispose of it as dairy can't be composted" (55–64 years, M).

The blameless ones: this theme emerged based on participants identifying the people in their household that are more to blame for wasting leftovers than themselves. "It's them not me" is a prevailing aspect, for example: "My family is fussy […] and won't eat pasta unless it's freshly cooked " (25–35 years, F). Often children are to blame: "They [various foods] have been contaminated, e.g. the kids have used a spoon that they have been eating with and then dipped it back into the jar" (40–54 years, F) and "I have children and they are always wasting food from meals" (25–35 years, F). From these descriptions around what leads to leftovers being binned it is possible to see part of the blame apportioned to children's eating habits, suggestive of overly-large portion sizes for them to consume. Indeed the literature shows that families with young children tend to waste more food (e.g. Pearson *et al.*, 2013).

Inter-relationships between the leftovers' attributes and the perceived states of being

The final stage of the analysis examines some of the inter-relationships between the attributes and consequences of leftovers and the perceived states. This approach is consistent with the underlying premise in a means-end analysis that there is some hierarchical mapping of the attributes and benefits, their consequences and the higher-order values (e.g. Zagata, 2014). This thinking is also consistent with the notion that people's beliefs and actions form routinised types of behaviour in individuals' or families' complex, everyday lives (Cappellini, 2009; Evans, 2011; Porpino *et al.*, 2015). Figure 1 depicts the hierarchical map which is discussed in more detail below. As is the norm in research that examines the links between attributes, benefits and consumer values (e.g. Vriens and Ter Hofstede, 2000; Zagata, 2014), this hierarchical map demonstrates pictorially the

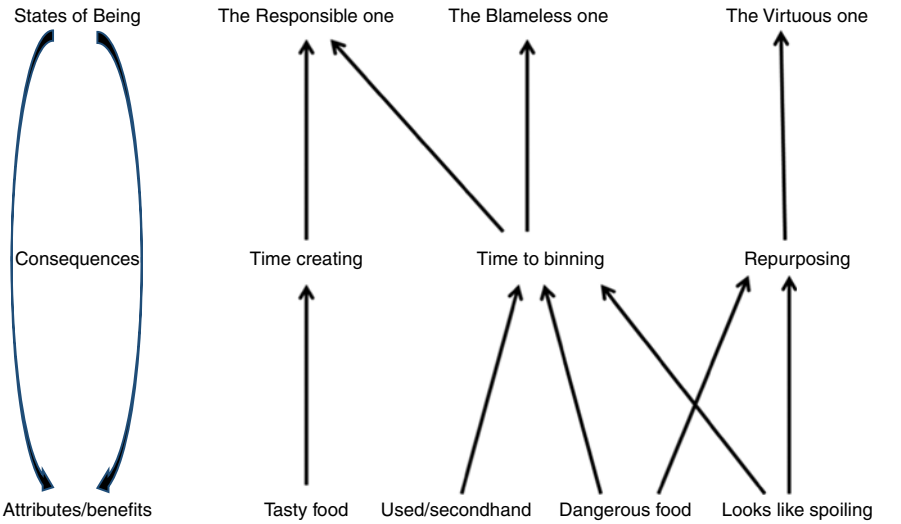

Figure 1.
Hierarchical map of attributes/benefits, consequences and states of being in relation to leftover food in households

pathways from the bottom to the top in what is commonly referred to in the literature as a means-end chain (Reynolds and Gutman, 1988). The arrows indicate the directionality of relationships, with the household member's perceptions of the attributes and benefits of leftovers leading to the consequences and then these leading to their perceived states of being towards this type of household food waste. The arrows from the "state of being" to the "attribute/benefits" levels confirms the circular nature of these relationships, as is further elaborated on below.

The dangerous foods and looks like spoiling themes have a clear link to aspects embodied in how the responsible ones fight against the devalued attributes of leftovers. Thus, quotes from the responsible ones reflect participants' know-how and competency, such as "common sense", being "taught" or a personal competence of being "iffy". The concern over illness when speaking of dangerous foods can be regarded as a personal value of competency or accomplishment, where the responsible ones prevent negative outcomes such as illness. In turn this suggests important aspects of knowledge of, and capability to, enact procedures reflecting safe food handling practices in a modern society, where there are high concerns over food-borne illnesses (e.g. Kendall *et al.*, 2013; Watson and Meah, 2013; Meysenburg *et al.*, 2014).

The notion of "good" practices through competency and know-how is also reflected in those responsible ones who pride themselves on not creating leftover wastage through good household management or being creative with repurposing food products. As domestic food waste is essentially a hidden behaviour (de Coverly *et al.*, 2008) responsible ones are not publicly rewarded for their competencies towards protecting the household members or ensuring no leftover food is wasted. Therefore such benefits may reflect more personal rewards by perceiving one's self as being a responsible household member in relation to leftovers, with personal values such as a sense of accomplishment and satisfaction.

In contrast, the responsible ones can also be undermined by the blameless ones through the used or second-hand theme. The blameless ones appear to facilitate the disposal of leftovers, rather than work to prevent them. Here there is a lack of competency in managing leftovers created by other household members' behaviours, but the responsible ones now become blameless; it is not their fault. This is particularly evident in response to the actions of children in a family, where greater competency and know-how in appropriate feeding practices, portion sizes and correct behaviours towards food handling could improve the likelihood of reducing waste or, at a very minimum, more proactive food rescue.

The inter-relationships between the virtuous ones and the themes of dangerous foods and looks like spoiling reflect aspects of competency for more environmentally-friendly divesting of leftovers rather than binning, together with know-how, in terms of what should be composted and what should not. Feeding leftovers to animals can also be a part of the virtuous ones' justification for allowing leftovers to become unfit for human consumption. This outcome arises from their interpretation that dangerous and spoiled leftovers are appropriate food for both domestic and wild animals.

The circular nature of the inter-relationships between the leftovers' attributes and the states of being is noteworthy. Not only were "states of being" determined by how individuals positioned themselves in relation to the positive or negative attributes and benefits of leftovers, the states of being appeared to also operate as guiding principles for attitudes relating to leftovers, providing "a script" (Grunert, 1993) for food consumption or disposal behaviour. Work on disposal from a broad anthropological sense, emphasises the "recursivity of disposal" practices (cf. Munro,1995, Hetherington 2004), with Munro (1995, p. 324) talking about food disposal as consisting of multiple conduits which has "has implications for the acquisition, cooking and ingestion stages in the process". This idea that leftovers are part of the circularity, rather than the linearity, of food consumption, is a useful concept that helps illuminate some of the complex non-linear interlinkages that were evident

in our study results. The multitude of practices discussed by our participants often did not follow a linear production-consumption-disposal trajectory. Rather, the circular nature of many of the leftover disposal behaviours was apparent; leftovers were moved along for lesser (e.g. lunch) meals, leftovers saved for re-heating were forgotten or not eaten as plans changed last minute, or leftovers that would have been thrown by one member of the family were saved and recooked into other meal by another.

Implications for research and practice

The findings extend the food waste research in two ways. First, by focussing purely on aspects of leftovers the study addresses this important aspect of food waste in its own right, thereby adding to research of this nature, such as studies by Cappellini (2009) and Cappellini and Parsons (2012). Second, in the Cappellini-lead studies the findings are examined from a social practice theory, where it is the descriptions and observations of everyday household practices around leftovers that are the focus. In the current study the findings are framed within a means-end approach. Thus, the findings are drawn into a hierarchical map that elucidates household members' relationships between the perceived attributes and benefits of leftovers, consequences and higher-order personal values or states of being.

In research discussing leftovers there is limited mention of plate waste where a more substantial portion is left over that could be retrieved. Porpino *et al.* (2015) identify plate waste that is either repurposed for non-human consumption or scraped into the bin. While only a small theme in the current study, it is linked into the hierarchical map and forms part of the chains relating to consumer behaviour and leftover food waste. The findings also extend knowledge regarding the less-explored role of pets in justifying food waste. The current study addresses this repurposing of leftovers through identifying larger farm animals, such as cows, as well as wild animals, such as birds and possums. However, when food security is of such global concern, there are arguments that all food brought into a household for human consumption should be eaten, rather than allowed to become inedible and fed to animals.

There are practical implications from the findings. First, the themes identified can inform social marketers' food waste behaviour change campaigns. For example, perceptions relating to the negative attributes, such as dangerous foods and spoiling, can be addressed through behavioural change messages. By providing credible and accurate information on safe food storage and freezing of leftovers, consumers can increase their know-how and competency in dealing with leftover food to reduce unnecessary waste. The issue of plate waste identified in the used or second-hand theme has practical implications. For example, animated television commercials or video clips in social media could highlight how parents can address their children's behaviours at mealtimes, particularly portion control leading to wasted leftovers, and possibly link them to other health-related outcomes, such as reducing childhood obesity.

Additionally, the three identified states of being could be used by marketers to develop household personas relating to household members involved in providing food. Such an approach would create segments for targeted marketing communication campaigns. For example, the responsible ones could be targeted to highlight the key drivers of positive behaviour towards household food waste, the virtuous ones could be the focus of environmental practices when dealing with leftover foods, while the blameless ones could be empowered with strategies to change children's mealtime and food handling behaviours or in relation to others within the household who take too much food and do not eat it. Finally, through an understanding of the inter-relationships shown in the hierarchical map the findings can provide insights for developing more integrated marketing strategies and initiatives (Kerr *et al.*, 2008; Kerr and Patti, 2013) that address this important issue from a more holistic perspective.

Limitations and future research

The first limitation is the text-based interview method. While reaching a wider number of participants with better geographical dispersion, there was no opportunity for specific probing questions when areas of interest arose. Second, the study represents a snapshot of people's reporting of information around leftover food and how they deal with this specific form of waste. It is well recognised that self-reporting and actual observations of behaviour can present contradictory results (Porpino *et al.*, 2015). Thus future research should use ethnography or "go-along interviews" (Garcia *et al.*, 2012), an interview technique that more accurately investigates participants thoughts and actions in relation to this topic of interest.

Additionally, longitudinal studies would be of benefit. Such research could determine whether and how social marketing communication campaigns affect small changes in household behaviours to help reduce leftover food waste. This combination of consumers' engagement with significant communication campaigns, such as Love Food Hate Waste, and behavioural change strategies in the home is missing in the literature, yet they could be critical to reducing the impact that leftovers have in household food waste. Research into the social dynamics and benefits of leftover waste reduction can also help inform the issue and create change building on similar research concerning the beneficial social outcomes of food rescue (Mirosa, Mainvil, Horne and Mangan-Walker, 2016; Mirosa, Munro, Mangan-Walker and Pearson, 2016). In addition to the above-mentioned ideas for further qualitative explorations, survey work, which further explored the hierarchical chains of themes of leftovers with a wider and more representative sample, is also encouraged. It would be particularly interesting to investigate, for example, if the interplay between attributes and benefits of leftovers and how household members position themselves towards these leftover foods differed depending on their role in food provisioning and cooking, the size and composition of their household, their age and other cultural aspects.

In conclusion, by focussing purely on a hierarchical chain of themes of leftovers, rather than the broader field of consumer food waste, this study addresses an area of food waste that can be controlled and reduced (Stancu *et al.*, 2016). Extending the thematic analysis to include the inter-relationships between people's attributes of leftovers and higher-order values has provided a more in-depth exploration of the topic. In so doing, it is possible to more clearly highlight where practical and theoretical attention can be focussed on this avoidable form of food waste.

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