



## Short communication

## Does meal duration predict amount consumed in lone diners? An evaluation of the time-extension hypothesis

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## ABSTRACT

The time-extension hypothesis has been proposed to describe why social facilitation (the tendency for presence of co-eaters to increase the amount eaten) occurs amongst groups of diners. However, it is possible that time-extension could increase the amount eaten in the absence of social effects. Therefore, the aim of this study was to assess whether prolonged exposure to a food environment without social interaction could increase consumption. Lone diners ( $n = 141$ ) were observed eating in a fast food environment. The items consumed, meal duration, estimated demographics (sex, weight status and age) and whether or not the participant was reading were recorded unobtrusively. Lone diners who were reading spent longer eating ( $M = 17.36$ ;  $SD = 8.23$ ) than those who were not ( $M = 8.88$ ;  $SD = 5.47$ ), but energy intake was less than 200 kJ greater, and not overall related to time spent eating. The fact that time-extension did not alter the amount eaten in lone diners is discussed in the context of previous studies and the theory of social facilitation.

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## Introduction

In the context of eating behaviour, the term social facilitation refers to the tendency for the mere presence of co-eaters to increase the amount eaten. This effect has been observed in multiple diet diary studies in which participants record foods eaten, the time spent eating and the people present over a 5 or 7 day period (de Castro, 1990, 1994; de Castro & Brewer, 1992; de Castro & de Castro, 1989). One social facilitation study demonstrated that the presence of one other person increases individual consumption by 28% on average, over and above that consumed when alone (de Castro & Brewer, 1992). The time-extension hypothesis has been proposed to describe why social facilitation occurs (de Castro, 1994; de Castro & Brewer, 1992). This hypothesis posits that the presence of other people increases meal duration which consequently increases the amount eaten.

Experimental and natural observational studies have suggested that meal duration is associated with larger group size across eating environments (Bell & Pliner, 2003; de Castro, 1990, 1994; de Castro & Brewer, 1992; Pliner, Bell, Hirsch, & Kinchla,

2006; Sommer & Steele, 1997; Stroebele & de Castro, 2004). Although it was initially proposed that the rate of eating may determine time-extension, this hypothesis was not supported (de Castro, 1990). More recently it has been suggested that time-extension results in increased intake due to prolonged access to food (Pliner et al., 2006). It has also been observed that time-extension is not merely a phenomenon associated with social interaction. Sommer and Steele (1997) reported that when lone diners read, meal duration increased. In the absence of data quantifying the amount eaten, it remains unclear whether time-extension, associated with reading when dining, is associated with increased energy intake.

The current study was designed to determine whether prolonged exposure to a food environment without social interaction can increase the amount consumed, in order to test the hypothesis that reading at an eating occasion will increase meal duration in lone diners and that prolonged meal duration (facilitated by reading) will be positively associated with the amount eaten by lone diners in a fast food restaurant.

We focussed this investigation on the fast food environments because standardised portions and menus allow for more precise measurement of the amount of food eaten and because previous observational studies confirm the potential influence of time-extension on diner behaviour in this setting (Bell & Pliner, 2003; Sommer & Steele, 1997).

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## Method

### Procedure

Observations occurred between 1600 and 1900 h at McDonalds' restaurants in the Adelaide Central Business District, Australia. This time was identified as the busiest time at the restaurants during pilot testing of the methods. Twenty-four unique separate observation sessions were conducted between June and September 2007, equally distributed across weekdays. All lone diners who entered the restaurant and sat alone at a table in the observable area were included in the study. Any consumer who began eating alone but was joined by any companions during the meal was excluded from observation.

The observer sat and unobtrusively recorded data directly into a Personal Digital Assistant (PDA) while slowly consuming their own items. Data categories were piloted using two observers across nine separate sessions to ensure accuracy. The final data categories were: the sex of the diner; their estimated age ('15–25'; '26–35'; '36–45'; '46+'); their estimated weight status ('overweight/obese' or 'not'); the time the meal began (from the moment the person started eating at their table); the time the meal ended (recorded when a person left the table), whether or not the person was reading or using technology (listening to their own music or using a laptop) and the foods eaten (e.g., 'Big Mac, small fries'). Additional notes were made describing any behaviour where people did not simply order, sit, eat and leave the restaurant (e.g., returning to the counter for more items or departing with food items).

The Human Research Ethics Committee at the School of Psychology, University of Adelaide, South Australia, approved the current study.

### Data analysis

Records of the items eaten were used to calculate the total energy consumed (kJ) according to nutrition information from McDonalds' website (McDonald's Corporation, 2006). Drinks were excluded from this calculation due to the inability to distinguish diet and non-diet soft drinks. Some items were not distinctive according to their packaging. This included six varieties of Deli-Choices Rolls (ranging from 1630 to 2540 kJ, affecting 4 orders observed in total), two chicken salads (472–955 kJ, affecting 0 orders), three types of McFlurry (1640–1970 kJ, affecting 4 orders) and one burger (double cheeseburger/triple cheeseburger/beef and bacon burger; 1810–2360 kJ, affecting 16 orders). Where these items were recorded, the kJ consumed was estimated as the mean value of the varieties available for each food type.

In three cases, a diner ordered more items after they had consumed their initial foods. Two ordered a frozen soft drink which they then departed the restaurant with and therefore no adjustments were made. The final diner returned to the counter to order more food (an additional burger). In this case, the time taken to order was subtracted from the time spent eating and the new item added to the list of foods they had consumed. All diners observed ate all of the items they had ordered aside from six people who left the restaurant with an item they had ordered. All of these were drinks, therefore no adjustment to their kJ needed to be made to their data.

Meal duration was calculated as the difference between the time eating started at the table and the time the participant left the table.

Data were analysed in Statistical Package for Social Sciences version 15 (SPSS Inc., 2006) using multiple regression. Participant sex, age and weight status were entered to control for any potentially confounding effects. A variable (herein referred to as "time of day") describing whether eating began in the early part of

the observation session (1600–1730) versus the later part (1731–1900) was also entered to control for any potential effects of different meal occasions (afternoon snack versus dinner).

## Results

### Sample

Data were recorded for 141 lone diners (109 male, 32 female). Sixty-eight of these were reading. Four used technology (listened to their own music or used a laptop) when eating in the fast food restaurant. Reading materials included newspapers, study materials and novels. Given the small number of observations including the use of technology, this behaviour was not differentiated from reading. Most of the participants were rated as normal weight (83.0%). The "15–25" age category was most strongly represented (48.9%), followed, in descending order, by the '26–35' (22.7%), '46+' (15.6%) and the '36–45' (12.8%) age categories.

### The effects of reading on meal duration and amount eaten

Meal duration ranged from 2 to 44 min with an average of 31.21 min (SD = 8.18). The mean amount eaten was 3452 kJ (SD = 1334) with a minimum of 582 kJ (three McNuggets) and a maximum of 7500 kJ (one Big Mac, one Double Quarter Pounder and one large fries). Diners who were reading ( $n = 72$ ) spent an average of 17.36 min (SD = 8.23) at the meal occasion and consumed 3366 kJ (SD = 1385) while those who were not reading ( $n = 69$ ) spent 8.88 min (SD = 5.47) at the table and ate 3541 kJ (SD = 1282).

The presence of reading material or technology was a significant strong predictor of meal duration, with people who were observed reading remaining at the table for longer (see Table 1). Reading did not predict the amount consumed. Being overweight positively predicted time spent eating and amount consumed, but only weakly. There were no gender differences in meal duration or amount consumed. Separate analysis indicated that meal duration and the amount eaten by lone diners were not significantly related,  $r = .10$  ( $p = .389$ ).

## Discussion

According to the time-extension hypothesis extending the time at a meal occasion may increase the amount eaten. Consistent with previous observations, reading was associated with prolonged meal duration (Sommer & Steele, 1997), but not amount consumed. Overweight status was a significant confounder for both outcomes in that it was associated with both prolonged meal duration and greater intake, although the effect was small in both cases.

Only one consumer was observed returning to the counter for additional food. Therefore, in a natural environment, access to food may not be enough to drive consumption. It has been suggested

**Table 1**

Beta and alpha values for models predicting meal duration (in min) and the amount eaten (in kJ) by lone diners in a fast food restaurant ( $n = 141$ ). Significant values are bolded.

	Meal duration		Amount eaten	
	Adjusted $R^2 = .288$		Adjusted $R^2 = .048$	
	$\beta$	$p$	$\beta$	$p$
<b>Reading</b>	<b>.52</b>	<b>&lt;.001</b>	-.03	.776
Participant sex (male)	.06	.445	.13	.151
<b>Overweight</b>	<b>.19</b>	<b>.009</b>	<b>.18</b>	<b>.036</b>
Participant age	-.07	.351	-.17	.066
Time of day	.05	.479	.14	.094

that people eat with company more often than alone (Redd & de Castro, 1992) and that eating alone in public is stigmatised (Sommer & Steele, 1997). Returning to the counter for more food may fuel the feeling of stigmatisation and prevent diners ordering more items.

We noted that dessert items were ordered in combination with 'meal' items (such as burgers and/or fries) in a single visit to the counter. Therefore, it is also possible that consumers simply order all of their items up front as a matter of course. Without data on the ordering behaviour of people in groups in this study, it is unclear if not returning for more food is unique to lone diners or whether general ordering etiquette in the fast food environment in Australia accounts for this observation.

The lack of evidence for time-extension in lone diners may also indicate that there is something unique about the way that social interaction extends meal duration (relative to reading) that may encourage increased consumption. It has been hypothesised that the distraction associated with the presence of other people may increase intake (Hetherington, Anderson, Norton, & Newson, 2006). Yet distraction is not exclusive to social interactions. Moreover, subsequent studies have failed to support this suggestion and therefore implied that distraction does not underlie the social facilitation effects that have been observed (Bellisle & Dalix, 2001; Hetherington et al., 2006).

Other research suggests that it is more likely that eating with other people moves consumption from a utilitarian act to a hedonistic one. Consumers' perceptions of eating atmospheres, lighting and socialising have all been identified as aspects of the food environment that can increase intake (Feunekes, de Graaf, & van Staveren, 1995; Wansink, 2004). When people eat with others, the food may be rated as "better tasting" than when eaten alone (Bellisle & Dalix, 2001) and meals rated as "happier", with participants perceiving themselves to be more excited (despite no physiological differences in arousal; Stroebele & de Castro, 2004). In contrast, in a cross-over diet diary study manipulating whether people ate exclusively with company, alone, or as 'normal', when participants were required to eat meals alone, they reported greater levels of depression and consuming fewer calories from fat compared to when they ate with other people. Interestingly, eating 'normally' was very similar to eating exclusively with others because consumption generally occurred in the presence of at least one other person (Redd & de Castro, 1992). Therefore, it is possible that increased food intake is somehow associated with other unique influences of social dining beyond meal duration. In the context of our results, this may mean that reading was used to reduce the discomfort associated with eating alone while not necessarily improving the eating atmosphere and therefore the desire to eat more (or eat more energy dense foods).

This study focussed on lone diners and time-extension in the absence of the effect of social facilitation. While it remains possible that time-extension and increased consumption are related to social interaction, further studies are needed to unravel how meal

duration and the number of people present interact to increase the amount eaten. It is plausible that the kinds of effects ascribed to social facilitation processes are limited in takeaway eating environments because food portions are fixed and, unlike in home or experimental environments, food is not provided in a buffet. However, social facilitation effects have been witnessed for shopping behaviour (Sommer, Wynes, & Brinkley, 1992) and in restaurant dining (Stroebele & de Castro, 2004) suggesting that the amount eaten could be influenced at the ordering stage and more specifically that social facilitation can occur in fast food environments; further data are needed to clarify this speculation.

### Conclusion

Our results indicated that lone diners could prolong meal duration without increasing the amount they consume. This suggests that increased consumption in group situations cannot be explained solely by increased time in the restaurant. Thus indicating the need for reconsideration of some assumptions of the time-extension hypothesis and further exploration of how the effects of meal duration may be subject to certain social conditions being met.

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