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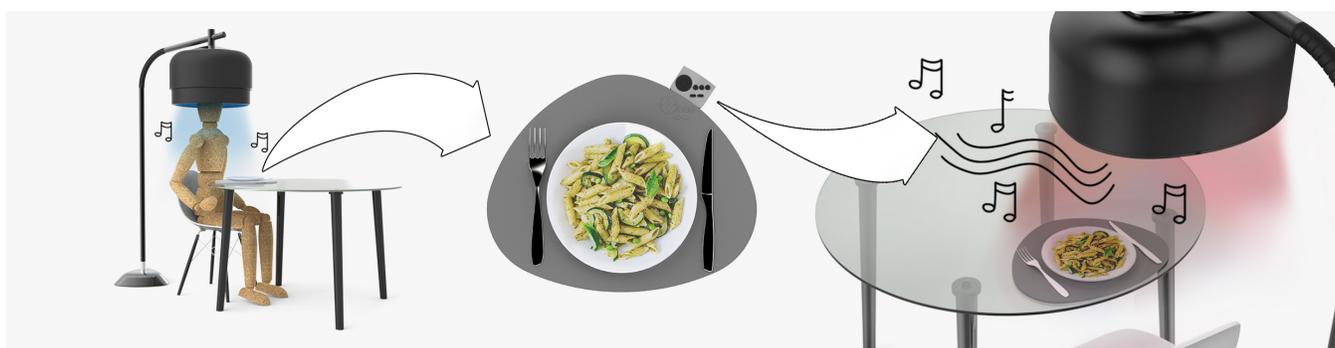
# Mattpod: A Design Proposal for a Multi-Sensory Solo Dining Experience

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**Figure 1:** MattPod for solo diners aims to encourage the user to focus on the eating experience contributing to a reverie in eating.

## ABSTRACT

The consumption of a meal is not just a bodily requirement but can also carry significant symbolic meaning. Solo dining is often contrasted to a shared eating experience and portrayed as an inferior way of eating a meal due to lacking essential social and normative qualities. Human-computer interaction research increasingly explores different ways of enhancing the solo dining experience. However, a focus seems to be on recreating aspects essential to the shared eating experience, such as a dining companion being present, rather than trying to enhance aspects that solo diners enjoy and, therefore, contribute to a reverie in eating. Based on earlier research findings, we developed a design concept that includes sound and visual elements supporting the multi-sensory eating experience and encouraging the user to concentrate on the food rather than seeking distraction. The formative usability evaluation results indicate that the proposed design needs further refinement to evoke the anticipated effect.



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## CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in interaction design**; *User studies*.

## KEYWORDS

Commensality; eating alone; solo dining; human food practices; design prototype

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## 1 INTRODUCTION

Eating a meal is a bodily necessity but can also carry great significant social and cultural meaning [29]. The literature distinguishes between two main eating experiences: commensality and solo dining. The term commensality — meaning either eating together or eating at the same table [12] — is commonly described as the ideal form of meal consumption and linked with a positive social influence such as promoting social bonding [6]. In contrast, the act of eating a meal alone — also referred to as “solo-dining” — is often depicted as inferior due to being less pleasurable, associated with loneliness and unhappiness [4, 6] and indicative for feelings of solitude and social isolation [20, 28]. In addition, studies indicate

negative solo dining experiences include feeling bored and stressed due to feeling isolated [3, 28]. The increased prevalence of solo dining occasions, including more people living alone [9, 30] poses the question of how the eating experience can be enhanced effectively.

Research focusing on supporting the eating experience has explored the use of interactive technology in the food preparation and eating context [14]. Explorations conducted in this context are referred to under the terms “Digital Commensality” and “Computational Commensality” and focus on the shared and solo dining experience [22, 27]. It appears that a focus in Human-Computer Interaction (HCI) projects seems to be to either let solo diners connect with other people or create some kind of artificial dining companions [1]. For example, by developing social robots that can keep the diner company [7, 13, 19]. These approaches imply that solo diners prefer a commensal eating experience. However, qualitative studies indicate that solo diners enjoy specific aspects when eating alone, including a level of freedom and lack of social norms [18, 21, 28]. However, studies exploring such aspects are still scarce and designing solutions that contribute to an enjoyment and “reverie” [15] in the eating experiences seems to have received little attention in HCI projects. This project addresses this area, and we propose a design concept tailored to the solo dining experience and consequent reverie in eating by enhancing experiential qualities that solo diners enjoy rather than mimicking a shared meal experience.

This study is part of a larger research project consisting of three phases following a human-centred design approach. We used a scoping literature review for phase one to investigate the benefits and drawbacks of commensality and eating alone. We analyzed an online food diary for phase two to explore the experience of solo diners and determine specific user requirements [1]. Results of phase one indicate that solo dining is perceived as lacking commensality-related aspects rather than being seen as a unique and, at times, pleasurable experience. Phase two, involving six solo diners, suggests that solo diners enjoy the cooking experience, feel relaxed and perceive eating alone as a moment of self-pampering. In addition, participants enjoyed visual and sound aspects (e.g., listening to music) while eating. Findings from these initial two phases were used as part of the design process we report here. For this study, we focused on the following research question: **How can a product design enhance the experience of eating alone?**

## 2 METHOD

### 2.1 Procedure

We first focused on an expansive design process [16] to explore various HCI concepts for solo diners. We used different personas and design scenarios to facilitate the ideation process. Based on our previous research results, the different personas and scenarios outlined eating-specific situations and tasks.<sup>1</sup> The first author, a trained designer, used the material to generate initial directions for possible HCI concepts in a first brainstorm. We conducted a second brainstorming session with three other designers with different backgrounds (industrial design, graphic design, and fashion design) who were regular solo diners. The brainstorming session took place online using the online collaboration tool Mural. The session entailed four steps (1) introducing participants to the topic; (2)

developing ideas based on the personas and scenarios; (3) grouping the developed ideas; and (4) evaluating them based on the aspects of “perceived value” and “importance” in a design evaluation matrix [24]. The chosen designs led to the definition of three design directions: (1) companionship/entertainment; (2) playful dining; (3) relaxation/me-time. The first author conducted an exploratory sketching session and developed three concepts for each direction mentioned above<sup>2</sup>. In a consequent step, the three workshop participants rated the different design concepts using a multi-criteria analysis [11]. We chose the design with the highest rating for further refinement using a serial design process [16]. The design chosen was titled “Solo Dining Cocoon” and developed as part of the design direction “relaxation”.



**Figure 2: Section A and B show the experience prototyping. Section C shows the low-fidelity scale model developed as part of the design process.**

The serial design process started with sketching different shapes for the cocoon. After exploring diverse ideas, we used solid modelling computer-aided design (CAD) to refine further the overall shape, interactive features (e.g., remote control) and general size. We also used a low-fidelity scale prototype and used experience prototyping [2] to test the design features that were developed with CAD software, see Figure 2. We created visualizations of the final design in the form of 3D renderings and two video animations explaining the functionality of the final design – MattPod – for evaluation purposes.

### 2.2 Design concept



**Figure 3: MattPod delivers sound and lighting cues to create a personal space.**

The chosen design concept “MattPod” is a solo dining cocoon, which creates an enclosed space for the solo diner to reduce distraction and increase focus on the food, see Figure 3. Criteria for the

<sup>1</sup>See doi:10.4121/21103525

<sup>2</sup>See the nine concepts: doi:10.4121/21103525

design included contributing to the multi-sensory eating experience as a moment of me-time, facilitating self-nurturing, and being perceived as relaxing. MattPod consists of a stand and extendable shade element that creates an auditory and visual experience to encourage diners to concentrate on the food and eating process. The user can pull the shade down to extend over the user's head and reduce visual distraction. Inside the cocoon changing coloured lighting and music are displayed to support the eating experience. This approach focuses on reducing external distractions such as watching TV while eating. Therefore, it differs from current practice, where diners use music and light to contribute to the eating experience. The user can control the interactive components of MattPod with a remote positioned in the placemat to avoid any potential distraction that devices such as a smartphone could evoke.<sup>3</sup> MattPod offers three sound and light experiences to enhance the dining practice of solo eaters: a relaxing, amusement, or cuisine mode. We chose these settings based on previous results and studies indicating that sounds can contribute to the enjoyment of food [18, 21, 26]. The *relaxing mode* includes a combination of slowly changing lights and sounds played inside of MattPod's shade (e.g., sea sounds, bird chirps, wind blowing, etcetera). The *amusement mode* provides a more cheerful environment by displaying quicker color lighting changes while playing the favourite selection of music of the user to facilitate a celebratory atmosphere. The *cuisine mode* can bring back memories related to the solitary eater's food by displaying soundscapes related to the food (e.g., Spanish music when reminiscing about the last vacation).

### 2.3 Evaluation

Due to Covid-19 restrictions, we used an online survey for the formative usability evaluation [23] of the developed design and gathered feedback on the shape and proposed user experience. We explored to what extent MattPod contributes to a positive dining experience for the solitary diner and if the three criteria: 1) "Me-time"; (2) "Self-nurturing"; and (3) "Relaxation" were achieved. The survey was set up using the online survey platform Qualtrics and consisted of four parts, see Table 1. The pilot we ran indicated that completing the survey, including watching the two videos of combined five minutes length, reading the instructions and getting some food for the test, would take approximately 15 minutes. We recruited solo diners through the platform Prolific.<sup>4</sup> Screening questions were included to exclude participants not eating alone. Participants received £8.95 hourly rate. Twenty-three participants took place in the survey. Six responses were excluded due to providing the same answer to each question or filling out the survey in less than eight minutes which was deemed too short to follow the instructions to eat as part of the evaluation. Of the final 17 participants, twelve were male and five female respondents, see Table 2. This study was approved by the University of Twente, and participants provided informed written consent.

## 3 RESULTS

Participants indicated that they would enjoy their food when using MattPod, but respondents also reported that they would not use

MattPod if they had the device at hand (Figure 4, section A). The initial reaction to the concept and aspects regarding likeability, feasibility and relevance were mixed (see Figure 4, section B). Participants gave high ratings for feasibility but relatively low ones for relevance. Regarding the need for the concept, most participants did not see a reason to use MattPod or consider what they are currently using as a better option (Figure 4, section C).

The survey asked four questions regarding the perception of the experience of eating alone before and after introducing the final design to the respondents. All participants evaluated eating alone as neutral or satisfying without using MattPod (Figure 5). Most participants rated eating alone while using MattPod as very and somewhat satisfying, but an increased rating of a negative experience was also noted (Figure 5, section D). The evaluation of the features to enhance the experience of eating alone (relaxation, self-nurturing and me-time) before and after using MattPod suggest that MattPod influences these aspects, but not in a noticeable positive direction (Figure 5, section A-C). There was also a significant decrease in the perception of the me-time feature (Figure 5, section A).

As part of the survey, four open-ended questions explored why participants would use or not use the proposed design and asked for liked and disliked features. Among the reasons to use MattPod, respondents frequently mentioned that MattPod could aid in eating slower, help focus on the food, provide me-time, and help to relax. Respondents indicated that they liked the music. Replies also included that they would feel relaxed while using it, its noise-cancelling features, and the lamp-resembling form, making it easy to integrate into the decoration of the house. As reasons not to use MattPod, respondents mentioned the size of the product to be rather big, the perceived comfort (respondents indicated that having the device around the head would be uncomfortable), and the fact that "watching TV is not possible while using MattPod". Respondents disliked the enclosing pod (some participants expected the MattPod might evoke claustrophobia) and the large size. Some people evaluated the device's music while eating as "a bit creepy". Overall the positive comments indicate that MattPod could help participants focus on the food.

## 4 DISCUSSION

We followed an iterative design process to address our the research question: **How can a product design enhance the experience of eating alone?** From our initial design exploration, designs focused on the directions companionship/entertainment, playful dining, or relaxation/me-time. After evaluating design concepts for each direction, we chose one specific concept for relaxation to develop further. The final design evaluation of the selected design concept MattPod indicates a mixed effect on the experience of solo diners. The design seems to contribute to relaxation but induced a partially negative effect on me-time and aspects of self-nurturing. Furthermore, the overall satisfaction of eating by oneself appears to decrease with the use of MattPod. Participants might have connected this negative evaluation to the enclosed cocoon shape that aims to reduce external distractions (e.g., the use of smartphones or TV). Feedback indicates that not all participants appreciated this intended effect, and the enclosed space was perceived to give rise to claustrophobic tendencies. In this context, it needs to be considered that we

<sup>3</sup>See the scenario description: doi:10.4121/21103525

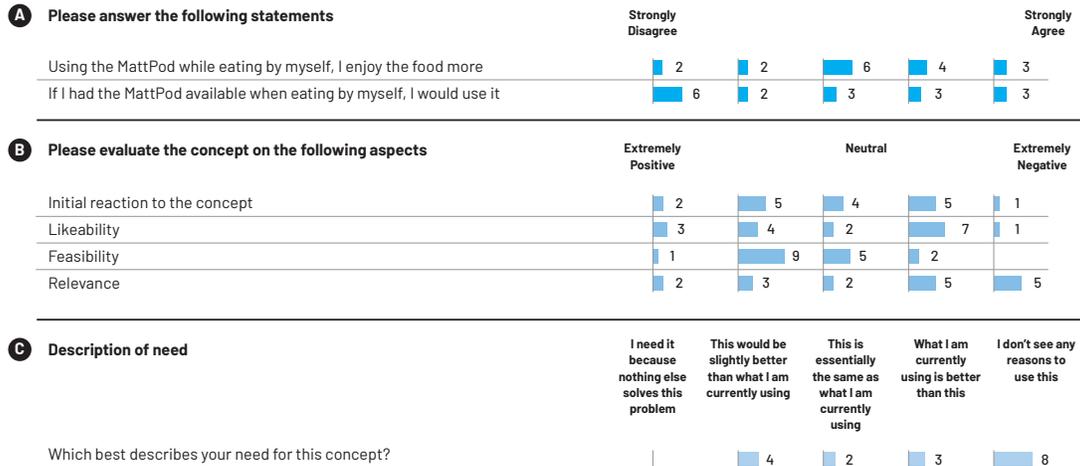
<sup>4</sup><https://prolific.co>

**Table 1: Overview survey components**

Part	Detail	Aspect
First	Introduction and description study purpose	
Second	Solo dining experience	Instructions to prepare a small snack and eat the first half of it alone to re-enact the activity of eating alone
	Rating of three items on a 5 point Likert scale (1=strongly disagree to 5= strongly agree)	Aspects relating to eating alone experience including (1) increased relaxation, (2) me-time and (3) perception of self-nurturing
	Rating of one item on a 5 point Likert scale (1=very satisfying to 5=very unsatisfying)	Overall experience of eating by oneself
Third	MattPod Introduction	Watching a 2-minute video clip that explains Mattpod (see <a href="https://vimeo.com/565617398">https://vimeo.com/565617398</a> )
	Rating of four items (1=extremely positive 5=extremely negative)	(1) Initial reaction to the concept; (2) Likeability; (3) Feasibility; and (4) Relevance
	Rating of three items (1=strongly disagree 5=strongly agree)	Aspects relating to the use of MattPod when eating alone (1) Increased enjoyment; and (2) use if it would be available
	Rating of one item (I need it because nothing else solves the problem/ This would be slightly better than what I am currently using / This is essentially the same as what I am currently using / What I am currently using is better than this / I don't see a reason to use this)	Perceived need for MattPod
Fourth	Simulating the MattPod experience	Watching a 3-minute video (see <a href="https://vimeo.com/565575592">https://vimeo.com/565575592</a> ) while eating a snack alone
	Rating of three items (1=strongly disagree to 5= strongly agree)	Aspects relating to MattPod regarding (1) (increased relaxation); (2) Enjoyment of me-time; (3) Perception of self-nurturing; (4) Increased enjoyment of food; and (5) Use of MattPod if available.
	Rating of one item (1=very satisfying to 5=unsatisfying)	Value of the MattPod experience
	Three text entries	(1) Reason for use/not use of MattPod; (2) Most liked aspect; and (3) Least liked aspect

**Table 2: Sample characteristics of formative usability evaluation using an online survey**

<b>Gender</b>	Male (n=11) • Female (n=6)
<b>Age</b>	20-30 years (n=9) • 31-40 years (n=6) • 41-50 years (n=0) • 51-60 years (n=2)
<b>Eating alone</b>	0-1 days per week (n=1) • 2-3 days per week (n=2) • 4-5 days per week (n=5) • 6-7 days per week (n=9)
<b>Country</b>	South Africa (n=4) • Greece (n=2) • Mexico (n=2) • Portugal (n=2) • Netherlands (n=2) • Italy (n=2) • England (n=1) • France (n=1) • Sweden (n=1)

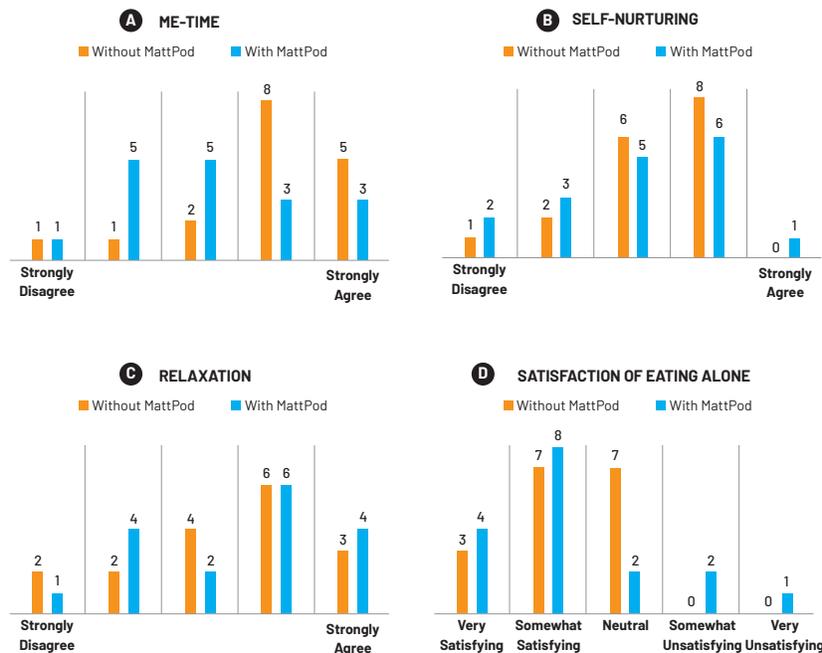


**Figure 4: Evaluation of MattPod (n=17). Section A reports on usage of MattPod, Section B reports on impression of MattPod, and section C reports on the need for MattPod.**

used videos for the evaluation due to Covid-19 restrictions. Evaluating the experience with a functional prototype and conducting additional interviews about the experience, could provide further insight and reveal additional improvement points. A working prototype could be realized using hardware components suitable for rapid prototyping, such as Arduino or Rasberry Pi boards combined with off-the-shelf LED strips and speakers. A potential technical application could also explore the use of noise-cancelling speakers

as described by Hu et al. [10] to increase the intended effect of reducing sensory distraction while eating.

During the design process, we used experience prototyping to understand the final experience of MattPod. Based on our experience, the enclosed space did not evoke any feelings of discomfort or perception of claustrophobia. However, testing the prototype in the intended user context could help clarify if the shape impacts the ability to drink from larger vessels and if the remote control



**Figure 5: Evaluation of whether or not MattPod fulfills its design directions compared to normal solo dining (n=17). Section A reports on me-time, Section B reports on self-nurturing, Section C reports relaxation, and Section D reports on the satisfaction of eating alone.**

is easy to use when users are inside the cocoon shape. The qualitative feedback provided valuable insights concerning accepting and refining the design concept. For example, a future iteration on the concept or HCI project exploring a similar design space could investigate if lighter and slightly translucent material could help to mitigate negative associations and increase the overall user experience (see, for example Lemke [17]). It might also be possible to include the light features on the table's surface instead of a cocoon. HCI projects have explored this possibility in the context of shared eating experiences but not for solo diners [5, 8, 31].

Furthermore, enhancing aspects that allow the user to personalize MattPod could help address participants' negative comments. For example, a MattPod app could enable the user to configure the pod's preferred settings (lighting intensity, volume, etc.) or record the users' general information (age, musical preferences, selected songs, relaxing sounds, etc.). This would allow the system to tailor the music and match the atmosphere to the type of food the solo diner is eating. Playing music as a kind of sonic seasoning to contribute to the eating experience has been explored in a commercial setting [26]. For example, Chef Heston Blumenthal served diners as part of the dish "Sound of the sea" an mp3 player playing sounds of crashing waves and seagulls to enhance and complement the food experience [25]. Overall, the formative evaluation brought mixed results, and the concept was not rated very relevant or useful on most dimensions. However, in the open-ended questions, some participants mentioned that they liked the idea because it could help with aspects of relaxation, me-time, and self-nurturing, precisely those aspects we had in mind when designing it.

## 5 CONCLUSION

Eating by oneself is often seen critically and, in many cultures, associated with stigma. However, societal changes have led to an increase in people living and eating alone. This research reports on the design process of a cocoon-shaped design aiming to reduce external distraction to contribute to a feeling of relaxation, me-time, and self-nurturing. We performed a formative evaluation using a survey with videos displaying the intended use and functionality of MattPod, which brought mixed results. Our findings indicate that the current design needs further refinement to evoke the intended effect. However, responses also suggest that the design could help focus on the food, eat slower, and help the user relax. Further iterations and tests using a fully functional prototype are needed to evaluate this potential effect.

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