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CS-C3120
Human-Computer Interaction

Everyday Interactions

Exercise 1

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Acronyms

HCI Human-Computer Interaction. 5

HSL Helsingin Seudun Liikenne / Helsinki Regional Transport Authority. 2

LCD Liquid Crystal Display. 1, 2, 5

TMB Transports Metropolitans de Barcelona / Metropolitan Transport of Barcelona. 2, 3

1 Background Readings

From the provided list, the book *"The Psychology of Everyday things"* [1] and the article *"Gestural Interfaces: A Step Backward in Usability"* [2] have been chosen. Both delve in the basics of interacting with everyday objects. The second, tough, dives a bit deeper in the modern implications regarding Gestural Interfaces that the first only touches in broader terms, referring instead to the user interaction problems new technologies face when are being developed, and the common cycle they share in that regard.

2 General Analysis of Three Everyday Interfaces

2.1 Wireless earbuds by 1More

These wireless earbuds are one of the many one can find in the current market (see Figure 1). They connect via Bluetooth to any compatible device, and offer a variety of features and controls to the user. From noise-cancelling (with three different levels of intensity) to everyday controls for whatever one might want to play (stop/play, next song, previous song, etc). Its principal limitation is pretty straight-forward: it only has one possible control, one that is not even intuitive at first: the surface on top of each earbud is tactile, meaning it works as a button. This only control has in it combined all possible controls; except for the Bluetooth paring function that is turned on automatically if the case lid is open (which further adds to the confusion of an unaware user). The tactile surfaces in each earbud do not even have differentiated functions for the left and right earbud, turning two potential buttons into one. Needless to say, this makes it confusing to use, for every interaction depends on an intricate combination of pressing, releasing, and holding the tactile surface of one of the earbuds.

Figure 1: Wireless earbuds by 1More, out of their case.

2.2 Oven-Microwave by Siemens

This device, which combines commonly used appliances into a single one, has an initially typical design comprised by a simple Liquid Crystal Display (LCD), a total of eight buttons, and a radio-like rotating turner to navigate the multiple menus (see Figure 2). However, the fact that multiple functions have been combined into one in search for simplicity makes understanding its workings

harder than it should be for someone unfamiliar with a Siemens oven. Adding to the confusion, unless the "heat types" menu is discovered by the user, it is difficult to discern whether an option is an oven function, a microwave function, or something else. Despite the number of buttons and the use of LCD, the overall labyrinth the user has to navigate through before heating their meal makes the functioning of this classic household appliance incredibly challenging to the uninitiated.

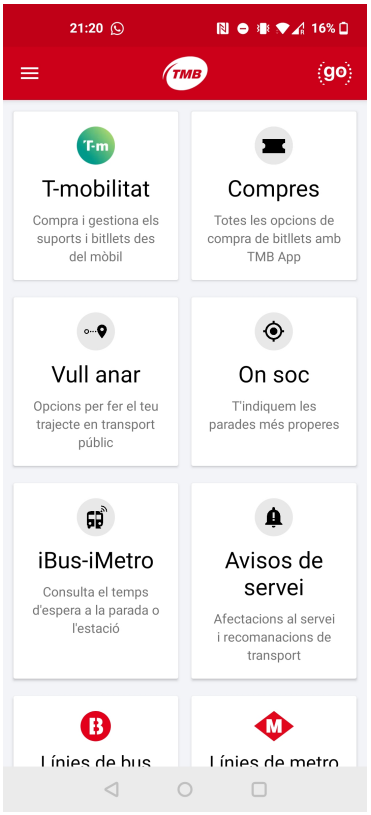
Figure 2: Oven-Microwave by Siemens, installed in the author's kitchen.

2.3 TMB App by TMB

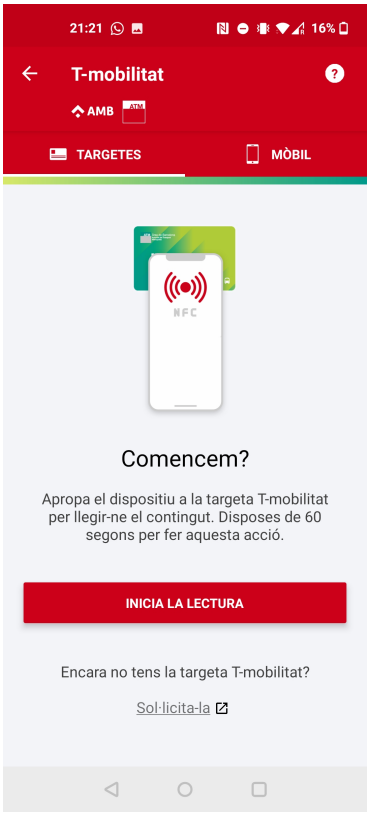
Transports Metropolitans de Barcelona / Metropolitan Transport of Barcelona (TMB), as many other public transport agencies around the globe, has in recent years developed a mobile app where every information, trip planning, and ticket buying can be done [3]. Despite the commodity it could provide to millions of potential users, its capabilities are far from what a user expects of one such app. In enormous contrast with Helsingin Seudun Liikenne / Helsinki Regional Transport Authority (HSL) [4], TMB's app has poor integration of all its services, multiple paths to reach the same conclusions, and an overall counterintuitive app map. To exacerbate its challenges, Barcelona has two other transit authorities (regional and state run respectively) that use the same fare system as TMB but have their own apps. While the political environment needed to solve this later problem seems unlikely to happen in the near future, there are many issues with the base app that TMB should focus on regardless.

The landing page when opening the app offers you way too many options (see Figure 3a). T-Mobilitat (TMB's new smartcard), then "Compres"/"Buy", "Vull anar"/"Go to", "On Soc"/"Where am I?", iBus-iMetro, "Avisos de Servei"/"Service announcements", and a long etc. Many of these options offer different menus that ultimately result in the user getting the same information: updating the tickets on your Smartcard (be it on your virtual one on the phone or the physical one), getting directions, or knowing when will the bus or metro arrive at a certain station (be it the one you are waiting or the one you want to reach). The issues with the app only get worse once you combine it with the limitations the T-Mobilitat smartcard currently has. Once the user reaches its related menu, either through T-Mobilitat or "Compres"/"Buy" in the main menu, one can choose between reading a physical smartcard, or to do so with the virtual card in their phone (see Figure 3b). On one hand, this latter decision will result in the phone automatically opening the related app, which needs also a separate installation and setup. On the other hand, reading the card to recharge it will require the

user to go to TMB's webpage to finalize the shopping process. The same will be needed in case the user does not have a card. Going to this webpage will require a repetition of the log-in process and different profile setup. Plus, the user will have to return to the app afterwards to complete the process of uploading the recently bought ticket to their physical smartcard.



(a) Landing menu when opening TMB App.



(b) Display now shows "heating types" menu.

Figure 3: Two of TMB App's multiple menus.

All in all, it is a shame that many of these features, that are well thought, are so poorly implemented and displayed to the user. Having real-time information on the location of buses and metro trains, a service to give the user directions and to facilitate transfers between modes of transportation, and the fact that the user does not need to go to a physical machine to upload a ticket to their physical card are all great features every transport authority should offer their users, and TMB has them.

3 Detailed analysis of an Oven-Microwave by Siemens

This 2-in-1 Oven-Microwave by Siemens device is located in the author's kitchen. While generally smaller than similar appliances, it is so in order to help save space in limited kitchens. Rather obviously, the fact that it combines two common appliances into one also helps in that regard. However, the desire by the manufacturer to showcase their new ways of heating meals gets too often times in the way of everyday use.

Let us see how it welcomes the unprompted user. Upon just turning it on, the device displays a caption that reads "4D hotAir" (see Figure 4a). This feature is exclusive of Siemens ovens, and serves as heat type *"Ideal for all types of food, 4D hotAir allows you to cook sweet and savoury simultaneously on up to 4 shelves, without flavours and smells intermingling."* [5]. Nevertheless, to someone unfamiliar with this feature, it is something confusing to start with. Is it a microwave function? An oven function? A combined function? Something else? What is worse, if the user is to skip this function in search for something more familiar, this initial menu only displays oven-related heating functions. Where are the microwave-related options? For that, the user has to press "menu" and reach the "heating types" menu (Figure 4b). Here, one can choose between "Microwave", "Microwave combination", and "Meals" (see Figures 4c and 4d). Strangely, "Oven" is not a heating option in this menu, so the user has to restart the device in order to get back to the "Oven" options.

(a) Display shows "4D hotAir" after turning it on.

(b) Display now shows "heating types" menu.

(c) "Heating types" menu, microwave combination.

(d) "Heating types" menu, meals option.

Figure 4: Oven-Microwave display menu.

The curiously named "Meals" option is a case of questionable wording. It offers a variety of preset heating types meant for cooking different meals, that can be fine-tuned to adapt to the amount of

that meal one is to cook. In any case, after selecting a type of heating and the desired temperature (or power in the case of the microwave mode), the oven starts. Up until this point, three buttons have gone completely unused, for they only serve a function once the device has started warming: “rapid heating”, “timer”, and “temperature information”. To add to complexity, these three are not even in the same side of the device; they are mixed among the buttons used until now.

In short, many parts of the interaction should be redesigned from the ground up. Nevertheless, it is not all bad. The amount of buttons, the distribution, and the overall design of displayed on the LCD is quite good. Navigating the menu using the rotating tuner and the two back and forward buttons is very intuitive. The high-contrast colours make it easy to read even when not completely clean, and the fact that the background is black by default makes it also a gentler display when used at night. Once the oven starts to heat, many small details in the display are immediately noticed and understood by the average user, such as an increasingly longer and redder line as the device heats up, or another blue line by the timer that helps to quickly visualize and get an idea of what percentage of the time has passed.

4 Improving the Oven-Microwave using HCI

Norman, 1998 [1] discusses many of the challenges brought by the combination of many features into one, and this oven-microwave displays many of them. This is combined for some extra difficulty with the will of the designers to display in front page the exclusive features of the device.

To start with, the welcome menu should be the “Heating types” menu. Since the user is knowingly using a 2-in-1 appliance, having to choose between heating options is expected. Thus, getting this prompt automatically would follow the mental model an everyday user has for this kind of appliance, as described in chapter two of *“The Psychology of Everyday things”* [1]. If this same “Heating types” menu maintains, as it now does, the “Settings” options at the very end the need for a “Menu” button is no more, freeing up space and visual clutter, reducing complexity, and even manufacturing costs; plus it would allow for a more natural mapping of the appliance (*page 81* [1]). Once the oven function is chosen, it is fine if the first option to be shown is the Siemens-unique “4D hotAir”. However, the oven functions it aims to substitute should also be available. Reducing the number of options can sometimes be positive for Human-Computer Interaction (HCI), but in the case of very commonly used appliances like an oven, keeping things familiar and intuitive should be a priority and not artificially difficult (*page 124* [1]). An experienced user can for sure appreciate the convenience of the “4D hotAir” function, while the inexperienced should have also access to a familiar option, or even a more concrete one, instead of the all-in-one do-it-all.

Similarly, in order to avoid the need for previous experience operating the oven, the “rapid heating” option should also be prompted just before starting the heating of the oven, after choosing the heating type and temperature. The reason behind this is that when the user has the goal of rapid heating, this decision is naturally taken before the oven is turned on, and not while the oven is already working. Having to press the “rapid heating” button (and having to battle the menu that appears on the LCD once the user presses said button) after the oven has started to heat up and not when the type of heat is chosen not only goes against the mental model one has, but also against the Stages of Execution a person goes through to achieve a goal (*page 47* [1]). The user not only has to know of the existence and functioning of the rapid heating mode and associated button and menu, but also has to execute these steps separately from the previous ones, turning one execution cycle (rapidly heat the oven) into two (heat the oven, make sure it does so rapidly). As an extra benefit, prompting the user through the LCD would too reduce complexity, free space and visual clutter, and cut on manufacturing costs for another button.

References

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