In my everyday life, I encounter several slightly annoying design flaws. Before reading Don Norman's *The Design of Everyday Things* (Norman, 2013), I never paid much attention to these flaws, often blaming myself for not knowing how to use certain everyday interfaces properly. However, after reading Norman's book, I now realize that it's not me, but rather the design of the machine, tool, or system that's often to blame. Furthermore, I have also learned more about how interactions could be improved from the research paper *What is an Interaction?* by Kasper Hornbæk and Antti Oulasvirta (Hornbæk and Oulasvirta, 2017).

One clear example is my front door. I love being at home, but as soon as I reach my front door (image 1.1), my mood drops. According to Norman, "The design of the door should indicate how to work it without any need for signs, certainly without any need for trial and error" (Norman, 2013). This however, is not true for our door. It looks like a normal door and works on hinges that open outwards, but the problem is how you unlock and open it. A regular door lets you put the key in, turn it right, and open it while holding the key. But with our door, you have to insert the key to just the right depth, turn it left instead of right, and push the handle down while pulling the door open. This design makes it nearly impossible to open the door with one hand. The door handle needs to be pushed awkwardly deep, so you can't do it with one hand while turning the key. At least there's some upside: a thief wouldn't probably figure it out easily.

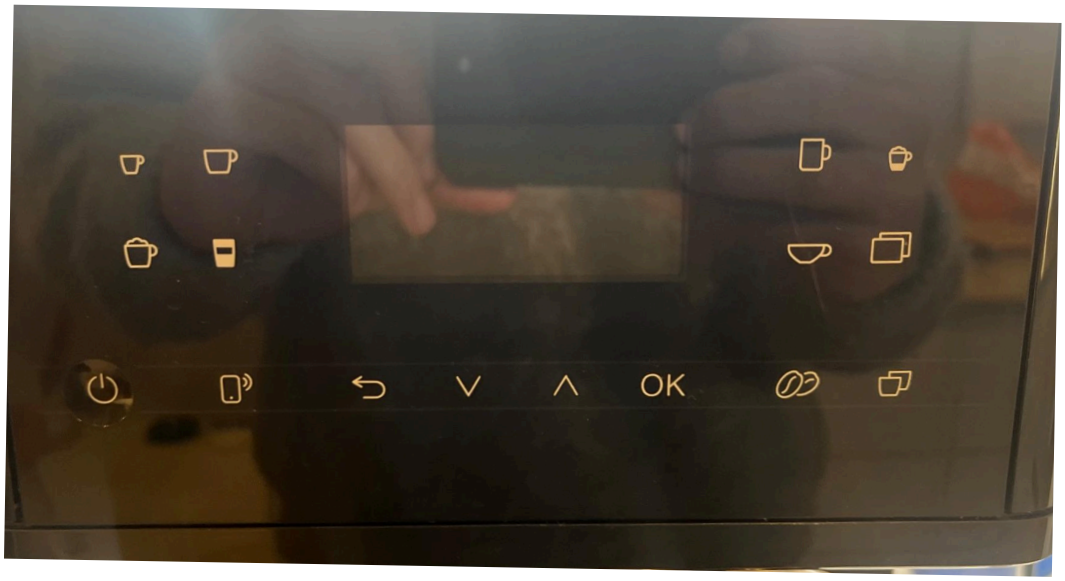
Image 1.1

While a thief may have the motivation to bother with our front door, our vacuum (image 2.1) cleaner is another story. We have one of those electric vacuum cleaners that I don’t use as much as I should, now knowing it’s due to its design flaws. The vacuum cleaner itself is quite easy to use. You only need to hold in one button, and it starts to suck. However, the problem appears when you actually need to vacuum something. There is the choice between having it on a lower power mode and being highly inefficient at sucking, or on a higher power mode, which makes the battery last for only a few minutes. Neither of these choices are quite terrific.

Image 2.1

What’s an even more annoying apparatus that I use way more often, is our coffee machine (image 3.1). Despite having it for over three years, I still don’t know how to use all its functions. I can make my daily coffee, but that’s about it. The real trouble starts when someone else tries to use it. This machine, which is meant to be easy to use with many features, is overcomplicated. Norman sums this up well, “With complex devices, discoverability and understanding require the aid of manuals or personal instruction. We accept this if the device is indeed complex, but it should be unnecessary for simple things" (Norman, 2013). Making coffee is a basic everyday task, so it shouldn’t be this difficult.

Image 3.1 & 3.2



Turning on the machine is simple. You press the clearly marked button in the bottom left corner, and after about 20 seconds, it’s ready to use. But once the machine is on, the confusion begins. The machine has fifteen buttons (as shown in image 3.2), but all you want is a regular cup of coffee. Seven buttons show some kind of pre-programmed drink. You press one and hope it’s the right one, but the machine starts making a drink without telling you which one it’s preparing. More than often, it stops mid-brew to tell you to fill the water tank or add beans. But the screen

doesn’t show how to do it either. And if you accidentally press a milk-based coffee button without attaching the milk container, the machine sprays hot water everywhere.

In my view, this machine is unnecessarily confusing, especially for new users. A coffee machine should be simple enough for anyone to use. Some easy adjustments could make the interface more enjoyable. I believe the machine's interaction with the user is poorly designed. The designers should have applied the concept of “Interaction as a Dialogue," as explained by Hornbæk and Oulasvirta (2017). This concept focuses on making interaction cycles easier to understand, more direct, and simpler, which would make this machine much more user-friendly.

To improve the coffee-making process, I would first enlarge the screen. With an enlarged screen it would be possible to visually display how and where to fill the water and beans. The drink names could also be aligned on the screen with the button symbols. Second, I would add a confirmation step after selecting a drink. Even though this may slow the process down it would make it much easier for the user knowing which drink to pick. This confirmation screen could also show instructions for connecting the milk container if needed. Finally, I would include two sensors, one for the water tank and one for the bean container, so the machine warns you before you start brewing if anything is missing. Nothing is more frustrating than realizing halfway through that your coffee isn't being made because something needs refilling.

While these are my personal suggestions, there are established human-computer interaction (HCI) principles for improving design. One of the most relevant is Norman’s Seven Stages of Action (Norman, 2013).

Norman's Seven Stages are: (1) forming a goal, (2) forming the intention, (3) specifying the action, (4) executing the action, (5) perceiving the system state, (6) interpreting the system state, and (7) evaluating the outcome. Let’s look at the coffee machine through these stages.

The first stage is when the users approach the machine wanting to make coffee. The goal is simple and clear, and in this sense, the machine works fine. Next stage the user decides how to accomplish the goal. However, with 15 buttons, it’s pretty hard to figure out which one to press. Jakob Nielsen's Usability Heuristics state that "the design should speak the user's language" (Nielsen, 1995). But the coffee machine’s unclear symbols make this difficult, and that’s why some displayed text would be needed. Third is specifying the Action. Here, the user picks which button to press. Unfortunately, the confusing button layout means users often end up pressing one at random. This like earlier explained would easily be fixed by adding some text. Fourth is

when the user executes the action. However the problem here is that once a button is pressed, the machine provides no feedback. It starts brewing right away without confirming if the selected drink was correct. So at the fifth step when the user perceive the system state, he or she has no way to stop the machine once it's brewing. It may stop on its own due to errors like missing water or beans, but as mentioned it doesn't provide clear instructions on what went wrong. As Nielsen (1995) mentions, "Good error messages are important, but the best designs prevent problems from occurring in the first place. The sith step is when the user is interpreting the system state. If there's a problem, such as an empty water tank, the machine shows vague error messages that don't explain what to do next. A better error messaging would improve this step significantly. The seventh and last step is when the user is Evaluating the Outcome: Lastly, users evaluate if their coffee turned out as expected. First-time users will likely be disappointed, as the machine doesn't give any confirmation before starting the brew, making it hard to assess whether their choice was correct.

The designers of this coffee machine could have improved the interface by going through Norman's stages in their design process and considering real-world user feedback before releasing the machine to the public.

References:

- Norman, D.A. (2013). *The Design of Everyday Things*. Revised Edition. Basic Books.
- Hornbæk, K. and Oulasvirta, A. (2017). *What is an Interaction?* Proceedings of the CHI Conference on Human Factors in Computing Systems, 5040-5052.
- Nielsen, J. (1995). *10 Usability Heuristics for User Interface Design*.