"One Touch Is Never Enough": A Phenomenological View of Technological Interfaces in HCI

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Abstract

HCI is faced with new challenges to conceptualize interaction posed by emerging technologies such as Artificial Intelligence, the Internet of Things, and Ubiquitous Computing. To address these challenges, this article proposes a phenomenological approach to understanding the objects of interaction of these new technologies. In response to the predominance of the cognitivist model in HCI, the authors argue that phenomenology offers more appropriate theoretical and methodological foundations for approaching human interaction with new interfaces. Based on the contributions of Husserl and Merleau-Ponty, the research investigates how new technological interfaces are experienced as embodied phenomena mediated by adumbrations and subjective intentionalities. To this end, it is proposed to carry out an autoethnography with devices such as smartphones, computers, and voice assistants to analyze how these objects emerge in the lived experience. The autoetnography demonstrados with examples and topic points the meaning attributed to the object, its multiple perceptual perspectives, and the role of the body in constituting the meaning of the interaction. Thus, the study seeks to contribute to formulating new foundations for HCI from a phenomenological perspective centered on corporeality and subjective experience.

Keywords

Phenomenology, HCI, Interfaces, Autoethnography

1. Introduction

Roberto Pereira et al. point out that one of the *Seven major challenges for HCI research in Brazil for 2025-2035* is the need for the field of HCI to revisit and develop new theoretical and methodological foundations to address the phenomena that this field studies better. [1] With the introduction and mass use of emerging technologies in the social world - such as Ubiquitous Computing, Internet of Things, Artificial Intelligence, and Wearable Computing - HCI is challenged to understand and design new phenomena that arise in human interaction with this adoption, as well as anticipate and mitigate the impacts of these technologies in the social world.[2]

Initially, the main approach adopted in HCI to understand human interaction with technological interfaces was strongly influenced by the human processor model, which conceives human cognition in the so-called "cognitivist" or "representationalist" way, focusing on the brain.[3] Like a computer, in this model, the brain receives perceptual inputs from the external world, interprets this information as symbols to be processed and produces outputs to compose behavior.

The cognitivistic approach within HCI focuses on interpreting natural signs or symbols given by the design, how the user will represent these signs cognitively, and their output action. Prof. Laura Sánchez García[4] exemplifies this approach with an example of how the user would interact when faced with a door: For the cognitivistic approach, the user would look for natural signals to proceed and be able to interact with the door, treating the user's perception only in terms of the representational content of the object.

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Furthermore, in cognitivism, the subject of cognition is not involved in the world but is conceived as a neutral, impartial observer.[5] For the example of the door, he is analyzed as a passive being within the interaction, not as an active being in control. It is as if he appeared to the door and not the other way around. The cognitive approach has overlooked the importance of how people present themselves/behave in the real world. It neglects how people interact with each other and other objects around the system and the environment in which they are inserted.

A central philosophy that opposed cognitivism was phenomenology.[3]. As a philosophical approach to examining the foundations of experience and action, phenomenology focuses on the relationship between individuals and their context, especially the social context.

Phenomenology is interested in interaction as a phenomenon constituted by a whole-body being and its relations with the environment. In contrast to cognitivism, in phenomenology: 1) cognition is understood as the ability to bring a world into being, 2) the subject becomes an active agent immersed in the world, and 3) the user's understanding of interaction is inseparable from their embodiment and its subjectivity.

Returning to the example of a user's interaction with a door, in phenomenological philosophy, the door appears as a phenomenon to the subject, in which the body is constitutive of the interaction and the appearance of the phenomenon. It is also taken into account in the situation previous and future subjective notions about how to interact with a door. Moreover, the user's interaction with the door could be studied related to temporality, another relevant concept in phenomenology, in which the time is understand as felt or experienced time in present, future and past, and not only as time measured in a clock.

Beyond the example of a physical object crystallized in history as a door, the field of HCI is interested in analyzing interactions with emerging digital or technological interfaces. If we consider phenomenological philosophy as a response to the challenge of developing new theoretical and methodological foundations to better approach human phenomena in the field of human-computer interaction studies, we must analyze the following question: How would phenomenology study the phenomenon of human interaction with a technological interface?

This study aims to analyze how phenomenology would understand a technological interface as an object of interaction analysis in contrast to cognitivism.

2. Research Proposal

According to Husserl, the objects of an experience are *constituted* as systems of *adumbrative* presentations. The adumbrative presentation of objects in visual experience is inescapable, even in the imagination. When I imagine myself looking at a physical object, it is already presented in my imagination - i.e., constituted in my flow of experience - via adumbrations: I always see this physical object, even mentally, from a particular angle and distance. [6]

The adumbrations form a system in that they are not arranged randomly. If I see one side of a physical object at the moment, when I turn it over, other sides will reveal themselves in an orderly and smoothly continuous way. Moreover, there are different notions of constitution "in the case of each category of objects" in the sense that different types of objects will be differently constituted.

Furthermore, for Husserl, any given object corresponds to a myriad of noemata, in other words, how the process of experience is directed towards an object and how that object is signified within a flow of experience.

Ultimately, Husserl believed that it was possible to achieve pure human experience through phenomenological examination. The interaction experience would then be independent of our awareness of the world within our context of interaction with objects.

Building on this view, Merleau-Ponty understands that all user interaction is entangled with the user's lived world. An object of analysis in a phenomenon for Ponty must be recognized through the experience of human subjectivity, mainly through corporeality, which signifies and is recognized in signification in an interaction. [7]

For Merleau-Ponty, the body is always in direct and relational contact with the objects within a phenomenon: "The identity of the thing through perceptual experience is just another aspect of the identity of the body itself in the course of the movements of exploration". [8]

Seeking to understand objects in interactions based on these philosophies of Husserl and Ponty, the proposal of this work is to carry out an autoethnography [9] with the interfaces arranged by the authors - a cell phone screen, a computer, and an Alexa (which encompass the emerging technologies AI, IoT) to examine them as objects of a phenomenon.

The autoethnography to be conducted by the authors of this work will be carried out as follows [10]:

1. The authors will interact with the interfaces recurrently over a while to carry out popular and usual activities available on these interfaces, such as checking notifications, sending messages, checking and sending emails, listening to music and watching videos, checking the bank application, and buying goods. [11][12]
2. The authors will report on the interactions that took place in order to highlight: i) what was done with the object of interaction and how it was done, ii) how the object of interaction was perceived, manifested, and signified in the specific matter of the interaction, iii) how the researcher's body treated this object.

As this is an autoethnography, the authors will not only explain their methodological choices for each activity and their philosophical interpretation, but they will also set out in the report their interpretative doubts, successful and failed attempts, temporary hypotheses, and precarious experiences to describe how the object of interaction was constructed in subjective interaction.

3. Related Works

Accompanying the popularization of screens in all aspects of daily life, works have emerged that offer an interesting and innovative phenomenological basis for thinking about this new human interaction. Lucas D. Introna et al.[13] build upon Heideggerian philosophy to provide an essential description of a screen, in which a screen will only show itself as a screen in its function as a screen in the world where screens are what they are. The authors apply the phenomenological method proposed by Spiegelberg[14], with some modifications based on the nature of the phenomenon revealed for analysis, to reveal the essential nature of the screen's existence. In doing so, they also consider the traditional phenomenological investigation of the etymology of the words that identify the phenomenon, not only as a step in the first phase of the method, but as a complete second phase of the investigation.

In a later work, Lucas D. Introna et al.[15] propose continuing the analysis of screens-in-the-world by investigating the phenomenon of the screen, considering the fundamental intentional orientation that conditions our engagement with screens, as we behave in relation to them "as screens."

In contrast, Maria Howard et al[16] draw on Merleau Ponty and Drew Leddder to visualize embodiment in human interaction with smartphones. The authors apply the concepts of habitual body and embodiment to smartphone use, paying particular attention to the incorporation of the smartphone into bodily habit and what this means for our relationship with the information we access on this device.

Both works promote the discussion that the nature of our relationship with devices, thinking of them as phenomena, has implications for how we conceive and understand technological interaction in this era of mobile ubiquity.

Our proposal draws on the philosophies of Husserl and Merleau Ponty to analyze both smartphones and computer screens, offering a review of the same objects from previous research and their interactions, in relation to the current state of the world. In addition to bringing the analysis of screens up to date, our work now also offers an analysis of voice assistants, a recent technology that can highlight intentionality and performance in daily interactions. Finally, we use the method of autoethnography for our analysis, offering a subjective and empirical method to visualize interactive interfaces and provide topics for debate, rather than a phenomenological method of analysis.

4. Autoethnography Results

In this section, we present detailed reports on the autoethnography interaction. The authors set aside a week to record their subjective experiences with the technological interfaces.

4.1. Checking Notifications

On the computer, the authors received daily notifications from the Microsoft Teams application and email notifications during working hours. Through these hours, the computer screen was on, and on the few occasions when emails or messages were notified in Teams, these applications were not in the main context of the screen.

At the moment of notification, a dialog box appeared briefly with a summary of the message received, and the computer emitted a sound to draw their attention to the notification. The first author was startled by the sound, but his attention was quickly lost due to the disappearance of the sound and the notification dialog box on the screen. Sometimes he checked the applications after the notification appeared, and other times he just stayed on the same screen he was on before, performing the task he was doing prior to the notification. The second author reported that she was also startled by the sound, but never lost her attention to the notification, since she checked the exact moment it appeared, clicking with a mouse pad.

On the computer, during that week, the authors also received WhatsApp notifications, practically the entire time they were awake. These notifications appeared with the screen active or inactive and emitted a sound distinct from the notifications from the email and Teams applications.

When both authors received WhatsApp notifications, they promptly checked them in three different ways: i) looking at them on their cellphone, ii) switching the previously active tab on his computer and adjusting their posture to read and respond to the notification, iii) with the screen previously inactive, starting up the computer to be able to go to the application screen and read/respond to the notification.

On their cellphones, both authors received various notifications, which vibrated for the first author and didn't produce any sound or vibration for the second author. As soon as they received the notification, they read it and swiped or interacted with it, changing the context of the cell phone's home screen.

During that week, Alexa presented only one notification to the first author. He considers Alexa's notifications to be more discreet, as a yellow light began to flash intermittently. To check the notification, the author projected his voice to ask what the notification was. The author did not wait in his physical location for Alexa's response, as he did for notifications on his cell phone and computer.

4.2. Sending Messages

To send messages on the computer, the first author observed that he adjusts his posture to type with both hands simultaneously. The left hand types the keys from G to the left, while the right hand is responsible for the other keys to the right. An inclination of the spine toward the computer screen and keyboard was also noted, which may be an approximation of the activity of writing.

As the words appeared on the screen, the first author read them quickly, but without checking for spelling errors, only reviewing them after typing the entire message. For work messages, the first author did not keep the tab active to wait for a response. However, for personal messages, the author waited for a reaction to the message and a possible response before closing the active tab.

When sending messages on his cell phone, the authors observed that they lower their head a few degrees and places the cell phone in their respective visual horizon. In addition, they use two thumbs to type, with the right pinky finger serving as a body support for the cell phone. The second author highlighted the touch sensitivity of the screen in the phenomena of sending messages on her cellphone.

As with the computer, the first author skimmed the words on the screen, without checking for spelling errors, only rechecking after typing the entire message.

Most cell phone messaging apps display previous messages above the keyboard, so the authors' focus shifted from the message he was sending to previous messages. The authors waited for a reaction to

the message and a possible reply so they could lock the cell phone screen or change the context of the cell phone screen.

With the cell phone, the first author felt comfortable typing and moving around, making the activity of moving or typing automatic.

To send messages on Alexa, after requesting this command, the authors projected his voice and tried to speak clearly, "This is a test." While sending the message on the first day of the experiment, the first author remained stationary, but on the following days, he attempted to send the message while moving around his room. Alexa does not allow users to correct messages, only to send them. The message was sent without waiting for a response notification.

4.3. Checking and sending emails

For computers and cell phones, even before the first author opened the email application, he already had in his mind the feed of that application and how he would navigate through the emails. The possibility of new emails was building in this mental image, had notifications come in earlier that day.

The first author realized that he had tried to reload the email screen by pressing F5 or swiping up with his finger each time he accessed it to check for new messages.

That week, the first author had to write some emails on both his cell phone and computer. Unlike sending messages, the author's posture seemed more rigid when sending this text. The typing speed was slower, and as the words appeared on the screen, they were quickly corrected.

After sending the email, the active screen was quickly replaced, ending the author's interaction with checking and sending emails. There was no momentary wait for a response.

The second author adopted a different tone when writing work-related emails. She wrote emails exclusively on her office's computer, explaining that sending an email required her to use her hands to type on a keyboard as well as her vision, memory, and executive functions to organize the content. In addition, drafting the message for her revealed an intention to maintain social and professional ties through communication. Sending it momentarily concludes the thought process involved in the interaction, leading to a feeling of satisfaction.

The authors did not use Alexa to check their email inbox or send emails.

4.4. Listening to music and watching videos

When listening to music and watching videos, it seemed to both authors that the devices took on a new posture, just as they also took on a new posture toward them.

Because these devices were only displaying videos, they seemed less active or reactive to the authors than when they were using them to type messages, for example, where each keystroke elicited a reaction on the screen. In addition, both authors could see these devices as mere projectors or sound sources (as in the case of Alexa), sublimating their interactive nature.

The first author's attitude toward these devices also became more relaxed, more distant, like that of a spectator. He forgot that this was an interaction and that he had an active role to play.

To watch videos and listen to music, the YouTube and Spotify apps were used. For the experiment, the first author decided to time how long it took for the apps to return the first chords of the song or the first sounds and frames of a video. It was clear to the authors that when searching for music or video, the first chords or the part he most wanted to hear of that song, or the first lines of a video, were already beginning to play in his mind.

On both mobile phones and computers, YouTube videos took an average of 45 to 60 seconds to start. On Spotify, the average time to start a song was 1 to 2 seconds.

Alexa used the Spotify app to play music, which proved to be a frustrating experience for both authors. Most voice commands failed to return the desired song, despite several attempts to issue the multimedia playback request clearly and in a louder voice. Of the songs we got to play, clearly, it took about 4 to 5 seconds to start playing.

The authors believe that the longer the response delay of these interfaces, the more evident it becomes in the experience that they are interfaces. While sending messages, receiving notifications, or navigating and interacting through these screens, the interface itself becomes sublimated.

4.5. Checking the banking app

This interaction was exclusive to the author's cell phones and not available on their Alexa or computers. When entering his password to access his bank account, both authors experienced a mix of shyness and fear of privacy, even in private locations. The cell phone was closer to the body and at really close to eye level. That interfact was meant to be hidden from others at any moment, and any notifications or context changes on that screen were ignored until the interaction was complete.

5. Discussion of results

When we interacted with computers and cell phones, we couldn't help but think of them as screens. However, during our autoethnography, it became clear that these interfaces are seen as physical screens in interactions only at two moments: 1) When they are turned off, and 2) When they take a long time to respond to an interaction request.

Throughout the autoethnography report, computer and cell phone screens were constituted in our flow of experience according to the purpose of the interaction.

All activities brought the authors a sense of focus and attention to the interaction they were performing with the screen. In this moment of attention, the screen is constituted for the user beyond a set of pixels: we can already imagine the feed of an email just by receiving a notification, as well as imagine the beginning of a song or the progression of a video when requesting the video we want.

The screen extends beyond the physical object, and its intention becomes clear in the interaction. The same screen can induce a more relaxed posture when watching a video or a tense one when trying to access the bank screen.

Notifications can shift the user's focus away from the current activity and even reconfigure the interface in their experience flow. However, in the report, none of the notifications broke the interface configuration for the authors: the mobile or computer interface remained more than just a screen.

Moreover, when the authors accessed the notification, we could see all the other "sides" (whether tabs, background screens, or interfaces) of that screen in an orderly and smoothly continuous manner. This new side of the screen was neither a surprise nor a mystery to the authors, nor will it be to any user: since the shadows form an orderly system, we already imagine the screen when clicking on the notification or even when it simply appears.

It is amusing to consider that we expect a response to our interactions with screens. This notion would have been inconceivable just a century ago, when these devices were already well-established in the popular imagination. When we write that we expect a response to interaction, we are treating the screen as more than just a physical object again: it can be a channel of immediate communication between two people who are far apart, just like email.

For this study, we also paid close attention to the embodiment of interactions. Usually, when using the computer, the authors assumed a relaxed posture until a notification appeared, at which point their eyes quickly returned to a specific focus and their bodies were pulled toward the computer: Their shoulders arched toward the computer, their heads tilted forward, and their posture in the seat moved closer to the edge.

To respond to some notifications, the first author noticed a change in posture from the legs to the head: Legs that were previously stretched out bent; hips projected forward, bringing the spine along with them; shoulders arched toward the screen, and the head moved much closer to the pop-up that appeared. It was as if the computer was asking the body to be closer.

When sending messages, the hands move faster than the wrists on the cell phone and computer. Moreover, this rapid movement that generates automatic output brings a sense of machination and automation of the body within the experience. If our posture adjusts to bring us closer to the computer,

our hands exercise the idea of rhythmic touch on an object. As for a pianist or a typist, the keys make it clear that our object of interaction is a physical object, a machine, but at the same time, doesn't the automation of this touch on the keys also make it an extension of the hands?

Continuing with the issue of embodiment, but dealing with a physical object in which touch is absent. For Alexa, we can see that the two authors projected their voice every time they wanted to interact with the assistant. A distinct attitude towards this object was evident, a performance towards this technological artifact.

In a study conducted by Eran Raveh et al.[10], the authors assessed whether there was a change in speech for participants who asked the same questions to Alexa and then to an individual. It was possible to find an effect similar to that reported in our autoethnography for speech intensity: Since the device and the interlocutor were approximately the same distance from the participants, there was no apparent reason for the participants to speak louder to either interlocutor, but even so, the participants tended to speak louder to the device.

One explanation for the tendency to speak louder to the device is the intuition that a computer-based system has more difficulty understanding human speech and therefore needs a clearer signal. Another explanation may be the illusion that Alexa feels more distant than a human interlocutor because Alexa is not an embodied agent. Considering that the goal of an interaction is to be as efficient as possible using a minimum amount of energy, it seems that changing these features helped—or at least appeared to help—interact more efficiently with the device.

6. Final Thoughts

Since 2024, HCI in Brazil has been challenged to understand new user interactions that arise with emerging technologies in the social world. The cognitivistic approach initially adopted to understand these interaction phenomena, restricts analyzing the user's perception only to the representational content of the object and analyzing the user as a neutral, impartial observer in the interaction.

This cognitivistic approach seems insufficient for understanding human-computer interaction phenomena for the authors. Due to the need to revisit and develop new theoretical and methodological foundations to better approach the phenomena in the field of HCI studies, the authors propose to adopt a phenomenological approach to analyze the interaction phenomenon, and more singularly, the objects in the interaction phenomena.

Using the method of autoethnography, this article approached interaction objects as objects constituted with intention and related to the user's body in the flow of subjective experience. The restriction of analyzing only the representational content of the object by a neutral and impartial observer is replaced by the idea that the object is constituted for the active user in a unique flow of experience.

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Declaration on Generative AI

During the preparation of this work, the author(s) used DeepLTranslator and Grammarly in order to: Grammar and spelling check. After using these tool(s)/service(s), the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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