To the Screens Themselves!

A Phenomenological Approach to Understanding Interactive Screens

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Master of Science Thesis

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By

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[1] University of Twente Staff description

[2] Mediated Vision (2007) page. 176.

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Summary

Screens are everywhere and fulfill an ever larger percentage of our daily interactions with technology. However, screens themselves are hardly ever the subject of inquiry. This thesis asks what screens are and who we can research their interactions with humans and society. By using and commenting on the work of Lev Manovich, a trichotomy of static, dynamic, and interactive screens is developed using physical characteristics of screens. Static screens can be seen as pictures in paintings or posters, dynamic screens have moving images and force an observer to be the passenger of the screen, and interactive screens give control to their users by enabling them to alter the content of the screen. Interactive screens are chosen as a main focus of this thesis, because they present the newest iteration of screens and are therefore the least researched.

The tradition and thoughts of phenomenology is chosen to research the interactive screens. The main task phenomenology gives itself is to research the structures of human consciousness using a first person perspective. By inquiring into how screens are experienced using methodologies of phenomenology we can describe what screens are to us. Two distinct branches of phenomenology are chosen to give a full perspective within the tradition. Lucas Introna and Fernando Ilharco provide a traditional transcendental, yet existential, phenomenology of screens. Don Ihde provides a global postphenomenological approach to technology.

The second chapter discusses Introna and Ilharco who claim that screens, in their broadest sense, have an essence of already agreement. This is to say that screen are an intrinsic part of our world and that we trust screens as much as we trust that world. By using this notion of screens behavior of them can be explained. Cases were developed to show how screens have already agreement in different areas like screens in the public space and screen in medical practice. The essence of screens is a compound of attracting attention, evading experience and presenting relevance. Screens show us what we already agree upon in our society. This used to research that society and to design screen such that they are efficiently used in our society.

A few challenges are uncovered in this chapter. First, the notions of essence becomes problematic in an existential phenomenology. While Introna and Ilharco do develop a traditional Husserlian analysis they have adopted a Heideggerian existential foundation. Second, More research also revealed that existential arguments are difficult to maintain when applied to interactive screen. The virtual worlds that interactive screens can present does not connect well with existential explanations of the world.

The third chapter presented a second phenomenological approach: a framework of ‘human - technology - world relations’. Ihde describes four of these relations: a hermeneutical, an alterity, an embodied, and a background relation that we can have with technology. The trichotomy of screens fits in this framework by mapping the first three relation to the three types of screens. Here we

notice that interactive screens are becoming embodied. This is to say that we experience a world through them and this gives the novelty that we are presented with a new world within the screen.

Here we notice that the framework is not complete and resembles an axiomatic constructive theory, something that Ihde warns us about as trap of non-phenomenological inquiries. Also we note that the theory of Ihde does not deal well with the world where interactive reside in. For a full understanding of interactive screens we need also to look at how the screen acts in the world, instead of looking at how it changes our intentional mind.

In the last chapter the materiality of human - technology relations is contrasted with the essentialistic approach of the second chapter. The two methodologies appear not to be greatly conflicting, but rather give a phenomenological account of screens from two different complementary perspectives. However, a gap appears when we put the two perspectives on the ends of a spectrum.

This gap can be filled using empirical philosophy and was found in medical anthropology of Annemarie Mol, José van Dijck and Maud Radstake. Mol also introduces a notion of ontological multiplicity, which can aid our problems with essences in an existential phenomenology. That is to say that if we want to use existential phenomenology with a traditional Husserlian method we need to realize that the essence that such a method will produce are temporal, relativistic, and probably multiple if applied in the praxis.

Medical anthropology was used to show that an empirical study in the form of a praxiography can aid to see how screens are enacted in the world. Two perspectives can then be analyzed, one from the idea of interactive screens as a phenomenon in the conscious mind, the other screens as parts of a larger praxis.

An understanding of screens was finally formed that showed that interactive screen are powerful changing agent in our current society. How we perceive many elements of todays world as well as how we perceive our bodies has changed with interactive screens. The way we perceive the world will be extended by worlds we create ourselves on our interactive screen to cope with an increasing complexity of technological capabilities of our society.

A phenomenological approach of interactive screen is useful and insightful in both phenomenology as well as screens themselves. This inquiry gained insight into the subtle arguments concerning phenomenology, its existential argumentation and if which different ways we can perform these kinds of analyses. To the screens themselves!

0. Preface

“Any sufficiently advanced technology is indistinguishable from magic.”

I believe that most people see technologies in the fashion of this third law of Arthur C. Clarke, they see most technology as magical. It applied to me, and even after many years of studying technology some technological artifacts still seem magical to me. When I was a teenager, I was fascinated by these complex technologies that surrounded me. This resulted in a plentitude of questions I had about the technological world and our place in it.

I realized that most advanced technologies had a computing element in them and starting a bachelor in computer science seemed obvious to answer my questions about how all these technologies worked. I realize that although computer science brought a very fruitful line of questioning, it is also not the only type of questioning. Understanding technology, how technology works and how it is constructed is one thing. Understanding what technology is and what it does to us when we use it is a completely different thing.

During my masters program I turned my question to a different abstraction level next to the one I was educated in during my software engineering bachelor. My attention turned to screens when I contemplated the question behind the series of paintings of surrealist Renee Magritte called “La trahison des images” or the treachery of images. These paintings depict an image of a pipe with a subtext, ‘this is not a pipe’ or ‘this is still not a pipe’. This is seemingly contradicting and asks what the status of imagery is within our world. Is the pipe real, what is a pipe, what is the status of this reference?

Fig. 1 Renee Magrittes *La trahison des images* served as a main inspiration of my thesis.

The question asked in this series of painting directed me to a different more fundamental question. What are screens? While we can find philosophical investigations into photography, television, and other technologies with screens as a prominent feature, screens themselves always seem to escape our attention, academically.

Screens are also intangible and at first sight contradicting, if we for example look screen up in a dictionary we will find that the antonym of the verb to screen is to show. If verb form of the word screens means to hide what can we know of the noun screen, do screens hide or protects something?

After I choose my research topic I had to choose a method of researching this interest. The methodology of phenomenology that I was introduced to in my first lectures during my masters

always impressed me due to their originality and complete opposite perspectives from the methods I learn to think with during my bachelors thesis. While writing and discussing my thesis I realized that I was not only developing an insight into screens but that was also reviewing phenomenology as a method. This thesis has therefore a dual nature, on the one hand it discusses screens, while on the other hand it is critical evaluation of the usability of phenomenology applied to concrete technologies.

During my thesis I had help that deserves to be acknowledged in this preface. I need to thank my supervisors for their patience while I was developing my ideas and direction. I have not been an easy student for them to guide, but in the end I think we can all be satisfied with the results of our cooperation. Next to my official supervisors I wish acknowledge Jaak Vlasveld as an informal supervisor and help to structure my thoughts on this subject and the good talks I have with him. I also want to thank the Twente Toastmasters club for their friendly atmosphere, and for providing a stage to test my ideas. Especially Joe Laufer and Julie Bytheway, whose proofreading of some of my work brought necessary textual refinement. I thank screen researcher Mettina Veenstra for the time she took have an informal talk about screens and her great blog about screens in the public space that always presented interesting and inspiring screens for me to contemplate on. Finally I want to finish these personal thoughts by thanking my ever supporting girlfriend Sanne for her motivating words after difficult discussions with my supervisors.

And now, to the screens themselves!

1. Introduction

Contemporary society is a screened society. We live with, by, and through screens. Screens have been taking up an increasing percentage of daily human interactions with technology since the past century. We work behind screens, we shop through them, we entertain ourselves by them, we read on books on them, we communicate through them, etc. Even some of us live our second or digital lives through them.

Surprisingly screens themselves are hardly researched in the humanities and social sciences. Most research in these fields are on the products that incorporate screens and are not about the imaging technology itself. The main questions I asked myself in this thesis is what screens are, what they do, and how do they influence our society, and the way we perceive the world?

Understanding screens and what they do is crucial in understanding many technological interaction or technological mediated interactions within our society. The thesis that you see before you will represent the results and the argumentation of this investigation.

1.1. Why Screens?

I needed to answer the question, “Why research screens?”, frequently when I told people what I was writing about screens. More specifically the question were ” What do you mean when you say that you want to research screens?” and “Aren’t you just researching computer screens?” The answers to these questions will be given in this introduction. The reason screens were initially chosen is that I realized that screens are everywhere and that they affect our daily lives.

This can be seen when a little time is taken to focus on the various screens that surround us. To start close to home, let’s look in our pockets, coats, and bags where we probably all find one or two devices that have screens with either telephone and/or media player capabilities that are used daily and sometimes continuously. Also, most of us already work behind a computer screen for a large amount of time per day at jobs or at home. Some jobs even rely on just the imaging that is produced by screens, like certain physicians, pilots and stock brokers. The ubiquity and diverse implementation of the screen makes it hard for us to see the screen as an independent technology.

So why do we need to understand screens, when screens are not seen as an independent technology? Although screens themselves are usually not seen as such, it is its function that has driven technologies into new forms and makes new ways of interaction with technology and the world possible.

Take the mobile phone as an example. Mobile phones used to be large devices with only physical buttons, they had limited use and capabilities. The first screened mobile phones introduced menu structures, which gave the phone extra capabilities like phonebooks, text messages, games, etc. The screen on a mobile phone grew in size in its short history to where they now take over almost the

entire device. This can be seen in phones like the IPhone and HTC Touch. Although mobile communication is the main technology here, it is the screen that provided much of the possibility to innovate and to the let mobile phone develop the into all round media and communication device that it is today.

Another example is the computer. Again, here the screen provided a large momentum in its innovation, next to of course an increase in computing power and decreasing chip sizes. By not being stuck to a single way of inputting or outputting data, the screen helped the wide spread introduction of computers. Synonyms of the computer screens, like monitor and terminal, show that screens were once devices that were observed, not interacted with. The screen used in a two way communication manner only started to be introduced since person computer in the 1970-ties.

Fig. 2 This artwork of mobile phone design as Russian dolls by Kyle Bean shows this evolution of mobile phone. Each smaller phone can be fitted within a larger version. Notice the explosive increase in screen space in the last device.

1.2. Why Research Screens?

Next to these obvious devices that apply screens, a large amount of other devices also incorporate screens, like alarm clocks, busses, trains, bus stops and train stations, watches, microwaves, fridges, photo cameras[1], toys, information posts, etc. Screens are taking over an increasingly larger amount of our technology interactions from other devices. We see that screens are everywhere and that screen will probably become even more ubiquitous in the future. It is its ubiquity that raises my interest in this type of technology. Although there are academic disciplines dedicated to the technologies that incorporate screens, like television studies or internet studies, Screens themselves are also almost never the topic of inquiry The motivation to research screens is therefore also based on this absence of them being topic of inquiry.

Therefore I devised my research topic to investigate screens, where my greatest fascination is for screens that we can interact with, by mouse, keyboard, or touch, or even interact with just by standing in front of them. In short, screens that are interactive. In this I am no different from any other person who is fond of new gadgets. I am intrigued by the novelty of these types of screens that can change by interacting with them. At the same time I am also aware that these technologies

1 Even disposable cameras have screens. See http://www.time.com/time/gadget/20040825/

are not new, screens that we can manipulate are as old as the keyboard, the computer mouse, the joystick, etc. The difference is that interactive are used in most new devices.

Screens can be categorized using different typologies. For example, screens that you can touch, screen that you only watch, screens that are fixed, screens that are mobile, etc. In the next section I will research which differentiation of screens is meaningful and useful if we want to know more about what these newest screens are and do.

1.2.1. What Type of Screen Should we Research?

We need to limit ourselves to a certain type of screen to not be overwhelmed by the great numbers of different screens. In this section a typology of screens will be investigated, to compare screens that I intuitively call interactive to other screens that are not. A typology will serve as means to focus our inquiry into those that are most valuable to research. The work of professor Lev Manovich of the Visual Arts department at the University of California deals with a typology of screens, and it is this typology that will serve as my starting point. In the book *The Language of New Media*[2], Manovich discusses media in its widest form and briefly discusses a genealogy of the screen[3].

Manovich provides a systematic argumentation about the implications of a culture that is becoming increasingly more digital. He therefore looks at screens from an angle that is laden with new media, its properties and boundaries. The relevant part in his book is its typology of screens, a typology that was earlier development in *An Archeology of the Computer Screen*[4]. Manovich makes a trichotomy between a classical screen, a dynamic screen, and a computer screen. To check its usability for researching the newest types of screens understanding of what this division entails needs to be developed.

Manovich begins by looking at screens from a historical perspective, therefore he develops a definition of the screen by defining the oldest known type of screen, the painting. Manovich calls this type of screen, the classical screen. He typifies using the following statements:

"The existence of another virtual space, another three-dimensional world enclosed by a frame and situated inside our normal space. The frame separates two absolutely different spaces that somehow coexist."[5]

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[2] Manovich (2001)

[3] See *The Language of New Media* (2001) page 95 and onwards, also see *An Archeology of a Computer Screen,* Manovich(1996) for a more extensive discussion.

[4] Manovich (1996)

[5] Manovich (1996), section 2

and as a:

> *"flat rectangle that acts as a window into the virtual world"*[6]

What he calls a classical screen therefore includes paintings, murals, photographs, and other visual expressions.

With the introduction of cinema, the magic lantern, and other technologies in the nineteenth century Manovich's second type of screens came into use: the dynamic screen. The dynamic screen shares the properties of the classical screen; that is to say that it also has a flat, rectangular surface, but with a dynamic instead of a static content.

In the middle of the twentieth century the computer screen is introduced in early radar systems. Manovich states that the real time component of these new screens are of importance. Thus computer screens are the third and youngest iteration of screens, they have the same properties as classical and dynamic screens. That entails having flat rectangular surfaces with moving images, but now these images are in real time. We now have a trichotomy of types of screens: classical, dynamic, and computer screens that can be used to map the screens that we now still interact with.

We now need to question whether this typology can describe those screens that are of interest here. Screens that change, screens that can be interacted with. When reading further in the work of Manovich we see that he holds a very strong position against calling any new media interactive. In *the Language of New* Media*,* Manovich even opposes the idea of screens that are interactive by stating that the notion of interactivity is "too broad to be truly useful"[7], because all hist type of screens are according to him, interactive.

Screens of the personal computer, mobile phone, handheld device, etc., intuitively seem to be bound by their interactivity, but they fail to be fully encompassed by calling them computer screens. Also most of these screens are not real time as in the example of the radar screen. Do we need to add another type of screen to Manovich distinction or do we need to develop an alternative typology of screens? Let's start answering this by posing a new question: why does Manovich claim that all screens are interactive and that interactivity is not a useful distinction here? The description of interactivity in *The Language of New Media* shows us why interactivity should not be seen as a differentiating quality. From Manovich's background of cognitive science, he does not only see interactivity as a property of physical action and manipulation of artifacts; but also as a mental activity.

According to Manovich, interactivity is structural and necessary in all world engagements and we should not make the mistake that interactivity is a pure physical component of world interactions, Manovich points out: "the psychological processes of filling-in, hypothesis forming, recall, and

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[6] Manovich (1996), section 1

[7] Manovich (2001), page 55.

identification [...] are mistakenly identified with an objectively existing structure"[8]. Interactivity should be seen as not only a process of physical action, but as a psychological or mental process as well.

Can we use this typology to analyze these newest types of screens in cell phones, personal computers, and other screens that can change their content by our direct actions with them? Our focus is on the physical interaction that we can have with screens, not on the status of the images they present to us. Manovich presents us with these different statuses by relating these types of screens by their presented temporality: fixed images for the classical screen, moving images of the past for the dynamic screen, and finally real time images of the computer screen. It is not the temporality of the depicted images that is of interest here, it is the way we interface with these new screening technologies that is fascinating. It therefore, seems that using the temporality of the images as the basis of a typology of screen would not work in this inquiry.

I will therefore develop an account of screens based on the historical insight of Manovich, but will switch the basis of a typology of screens to focus on the way we physically interact with them, on their physical capabilities that provide us with different options to interact with them.

1.2.2. A Typology of Screens based on Physical Properties

In this section I will develop a distinction that presents types of screens directed at our physical actions. I suggest a typology which is directed at the physical properties but is close to the definitions that Manovich gives. When we look at the categories of screens from a more technical stance we see that there is indeed this distinction between a classical screen, dynamical screen, and computer screen. However, these categories seem askew.

All types of screens in Manovich typology refer to a different category: the classical screen refers to a period in time, the dynamic screen to a physical property of that screen, and the computer screen is a specific technological artifact. I propose a different trichotomy based on screens physical properties, instead of this strange grouping of different categories. I agree with Manovich that all screens do indeed have a flat, rectangular surface that separates two coexisting but distinct worlds. I also agree that the separation should be in the line of a classical, dynamic and computer screen distinction. However, to research the newest screens that we interact with I will need a division that shares the single category of physical interaction, I therefore propose a trichotomy of a static screen, dynamic screen, and interactive screen.

The difference between these screens is in the way the observer is forced to interact with the technology. In all static screens, the observer needs to interact through standing still and being fixed in place. The static screen gives us only a fixed set of perspectives. The image that is presented is static, does not change, as an observer of these screens a perspective is imposed on us by the

[8] Manovich (2001) page 57.

screen. This can be seen in photographs, paintings, and posters. If the image that is presented to us does change we are forced to incorporate the perspective of the image.

Dynamic screens are even more restrictive in this sense because they need a confined spectator.[9] When observing a dynamic screen like the television there is no time to gain a perspective like in the static image, instead the sequence of images is forced by the constraint of a dynamic screen. Many of the mid-twentieth century screens are of this sort, like cinema and television.

Interactive screens are becoming ubiquitous and let their content be influenced by their users to various degrees. For example there are bus stops that have screens that show us when the next bus is due, something which is already very common for metro systems. Also, Mobile phones nowadays have device encompassing screens that are under the control of its users. These screens create a different relation with their users, contrasting the static and dynamic screens. Interactive screens do not restrict the user but are restricted by them: they need our input to function and the user has a direct influence on what they depict.

There are many different typologies of screens possible, the question is what typology of screens is useful to enhance our understanding of the capabilities that the newest screens that are starting to surround us. I have investigated Manovich' typology which probably proves useful if you want to make a historic case of screens and new media, but it is not applicable if we want to raise the question what a certain type of screen does to the way we are in the world. While historically the division between classical, dynamic, and computer screen is valid, in this work we will use the static, dynamic, and interactive distinction.

To conclude, why do we focus on interactive screens within this typology, instead of focussing our attention to static screens, or dynamic screens? Interactive screens, being the latest iteration of screens are the most interesting at this time. We have seen the magic lantern, cinema screens, and television screens for some time now and their influence is well researched. Now all of these screens are becoming interactive. What does it mean when we can influence the worlds behind the screen instead of just observing them, what does this type of interactivity do to how we treat screens and how they treat us? An inquiry into understanding interactive screens is necessary in a world where these types of screens are becoming increasingly ubiquitous. This however, does not mean that we can avoid to talk about static screens and dynamic screens. Although interactive screens are the latest iteration of screens, they still coexist with the other two types of screens and. This even goes as far that in many cases, they will replace the other types of screens. Also I will frequently need to contrast interactive screens with the other types of screens to fully understand their difference.

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[9] For a more extensive history of the observer and the screen see Oliver Grau's *Virtual Art: from Illusion to Immersion* (2003)

1.3. How Should we Research the Interactive Screen?

We have now established that there is a need to research interactive screens, due to our more than frequent use of them in our daily technology interactions. We developed a typology of screens based on physical actions in such a way that we can distinguish between how some screens demand different interactions. We choose the interactive screens as our main topic of research. Now we need to develop a methodology to research the interactive screens.

To research the interactive screen we need a methodology that can analyze those aspect that are of interest to us. These aspects are not the technical aspects of screens like their sizes, color depth, bezel, etc., we are not doing a market research on screens. We need a methodology to research the differences in using interactive screens opposed to the use of the other screens in the just proposed trichotomy. We should therefore focus on the experience of these screens. In this section, a brief analysis of methodological possibilities will be discussed, one will be chosen and further developed in the sections following this one.

We can research the interactive screen in at least three different ways. First, we can research them by looking at how they are used in different devices and find out how their users interact with these devices, and find out what are the common features of these screens. We could then try to find what all of these screens in these devices have in common and try to understand what screens are by abstracting the functionality of all these devices. Second, We could take one device which has an interactive screen, the mobile phone like the iPhone, and see how this specific device interacts with us. Finally, we could forego the screen altogether and look how the screen itself is experienced by its users. While the first two are screen oriented, the last is user oriented. That is to say that the last type of inquiry does not start at the device but at the experience of the user.

If we try the first of these possibilities, research technology that is used in almost all appliances from the combination of those specific devices, than it is likely that such an inquiry becomes overshadowed by the devices that embeds the interactive screens. Researching screens from a perspective of their implementation would necessary mean an analysis of the device that holds the screen, not the interactive screen itself. Can we then try to develop a methodology that researches screens in a multitude of devices to overcome the overshadowing effect of the device that holds the screen?

We would then need to try to find as many examples possible of interactive screens in devices, see where they are different and where they are similar. The combination of all the elements these screens have in common should provide a basis for researching screens themselves. We could then describe screens by what they have in common now. However, this type of inquiry cannot tell us what interactive screens can bring to us in the future. We see that screens are popping up where imagination failed only a few years ago. Who would have foreseen that car windows are becoming screens that are able to present radar images, a speedometer, and every possible other kind of information. With projection every surface can become a screen, as we see in radical new devices

like tables that function as touch screens[10] and instant cubism displays[11]. Whenever we try to create an abstraction of screens by generalizing screens we tend to forget that screens come in all shapes and sizes and that the future is likely to bring all sorts of screens that we cannot imagine now. An inquiry into interactive screens can only by useful if it can tell us something about the screens today and future screens. While we using this style of reasoning we can investigate what screens are and do now, but we cannot state anything about the possible future of interactive screens.

If we follow these arguments, two types of reasoning cannot be used to analyze screens: reasoning through the generalization of devices and using specific devices to see what screens are. We are looking for a method that can see what screens do without falling in the traps that were just mentioned.

We need a methodology where we can research interactive screens using the experiences we have with them. While an iPhone is a completely other device than the HTC Touch they both have a similar user experience of their respective screens. This also holds for the computer screen and the mobile phone, while these device are different still our experience of them as interactive screens does not change. I therefore choose a branch of philosophy that brings a method that connects well to the requirements made in this section. Phenomenology researches what and how we experience the world. It does this by not focussing on screens as something in itself but as an object of experience. Let's briefly look into its history to see if and why phenomenology is a good choice as our methodology.

1.4. A Brief Introduction to Phenomenology

Phenomenology can be seen as an independent branch of philosophy from the early twentieth century onwards from the work of philosopher Edmund Husserl. Its main objective is to research the structure of human consciousness as seen from a first-person perspective. This seems highly abstract and philosophical, therefore this section will briefly describe what phenomenology is and how it can be useful to understand interactive screens.

With phenomenology we can research what screens are to us and how they interact with us by researching what and how we experience. Using the methodology of phenomenology we can answer questions like: what does the capability to interact with these devices do to the way we perceive them? What changed when we went from a mobile phones without screen to a mobile phone with screen, and how can we structurally understand this. Now, how can a phenomenological method of researching screens answer these questions? The motto of phenomenology gives the insight to understand this.

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[10] See Microsoft Surface Computing on their promotional page www.microsoft.com/surface/

[11]This is an artwork that projects a face, if the canvas touched an pressed the screen detects the indentation of the canvas and projects the same face but a different angle on the spot of the indented surface thus creating a cubistic image. For a visual demonstration see www.youtube.com/watch?v=0Bps2XuOtwg

“Zurück zu den Sachen selbst!” or “To the things themselves!” marks the start of the phenomenological enquiry. This motto of phenomenology describes the direction philosophy ought to have taken in the twentieth century according to phenomenology’s founding father, Edmund Husserl. Husserl believed that philosophical inquiries should adopt a first person perspective, this in contrast to other sciences which generally uses a god’s eye perspective of doing research. He believed this because according to him the only thing that we can be certain of is that we perceive: that is to say that the world is seen, felt, heard, smelled, etc. Therefore the only way to say anything about that world is to investigate our experience of that world. To the thing themselves is therefore a reference to these things that is experienced where the things are the phenomena in our experience.

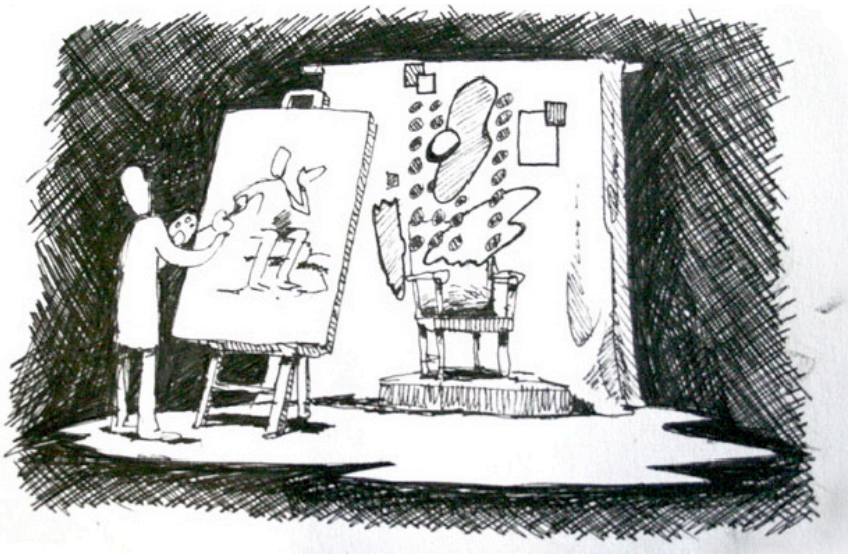

Fig. 3 Banksy shows us in one of his few sketches how phenomenology understands the relation between perception and world. The only thing we can know about the world is that which we perceive, but perception is always interpretation.

Also by trying to describe to world according to god’s eye perspective of the natural sciences leaves out an important idea, namely that we inhabit the world that we try to describe. A phenomenological investigation can therefore give us unique insight into what interactive screens are and what they do from a perspective that is not possible in the natural sciences.

Researching screens using phenomenology brings the advantage that we research the structure of human consciousness. That is to say it researches the way we perceive the world. The vocabulary is therefore given that enables the ability to explain what screens do in the world. This is something which is not possible using any of the other previous described methodologies. Phenomenology is therefore excellent for an inquiry into a technology that has so many faces in so many products. There is no need to go into all these products, rather an inquiry is made how these products are experienced.

Husserl pointed out that we should adopt a presuppositionless position before we can analyze the structure of human consciousness. We should suspend all ideas and suppositions we have about the entity we are researching: reducing the phenomenon to a phenomenon in consciousness. By removing all actuality and materiality from the object of inquiry we can see the object as it truly is. How this idea is developed since the early twentieth century depends on the philosopher that executes a phenomenological inquir . This will be apparent in the following chapters. Thus, Husserlian phenomenology is about researching bare phenomena by looking at the experience of the phenomena itself.

By investigating how we experience screens using phenomenology, we can answer the question like how screens influence perception of the world. It should also be explain some odd behavior when interactive screens are used. It gives insight into what role screens play in everyday life. Why screens are used in the way they are and it gives a direction to the question whether we should want to use interactive screens in the way they are used now.

However, the tradition of phenomenological inquiries has followed a rocky road. There has been criticism of phenomenology in the twentieth century which have to be answered to validate the results we will get from our analyses. The main points of interest here is the way phenomenology deals with a concept that is call essences of things and the idea that the mind is intentional, that is to say that the mind is always directed towards something.

An essence in phenomenology refers to what something really is, before its practical idiosyncrasies. However, essentialistic thinking has been considered old fashioned for some time now. So why did Husserl uses essences in phenomenology, and what are essence in phenomenology? Essences, according to Husserl, have a necessary truth contrasting to the truth claims that natural sciences make. This is connected to the idea that the only things we can say something sure about is what we experience. The different philosophers in that will be discussed have different uses for this idea of essences as we will see in later chapters.

Intentionality means directed consciousness. The idea that consciousness is being conscious of something. We are never just angry, we are angry *at* something, love *something*, aware *of* something,etc. This something is than topic of our inquiry. Researching that something reveals how we are aware of it. It also show that we can only be aware of the objects of our experience, it can therefore be deduced that we have no direct access to the world that is experience, only the experience of that world is accessible. Phenomenology is therefore not a dualist methodology which differentiates them from the natural sciences.

Given this description of phenomenology and knowing that it is a method that is over a century old the question arises whether it is still usable to analyze interactive screens? Philosophers Lucas Introna and Fernando Ilharco are certain that this is possible. In three papers they wrote in 2000, 2004 and 2006 they have developed a phenomenology of the screen. Other philosophers like Don Ihde and Peter-Paul Verbeek describe technology in a wider postphenomenology of technology

manner. Both the phenomenological and the postphenomenological approaches have faced the previous mentioned criticisms and came to two distinct types of methodologies, both of them will be studied in this thesis.

So two specific types of phenomenological inquiries will be used, each of them have a different view on the scope and usability of the ideas of phenomenology. So before developing a phenomenological inquiry into interactive screens an introduction of these two already developed perspectives will be given. In the following chapters these two methodologies will be further investigated.

1.4.1. Introna and Ilharco's phenomenology

Lucas Introna and Fernando Ilharco remain fairly close to the original Husserlian position in phenomenology. They do respond to a set of critiques on phenomenology. They appear to be fascinated by the classical phenomenological reduction but also realize that the original position by Husserl cannot be maintained. Therefore they introduce a perspective that belongs to one of Husserl's students: Martin Heidegger.

Heidegger was not only a student of Husserl, but also one of his critiques, known for his ontological oriented existential phenomenology and for the introduction of a hermeneutical approach within phenomenology, both these perspective will be explained in the following chapter. Heidegger plays an important role in the phenomenology of Introna and Ilharco and puts a large mark on the continental philosophy of technology as it developed to its current form.

The results of Introna and Ilharco's analysis of the screen is very interesting. Introna and Ilharco claim that screens have an *already agreement* when we perceive them. That is to say that we always already agree with what is presented on the screen uncritically. This happens because the screen is an intrinsic part of the world we live. That what is seen on screens is just easily accepted as physical reality itself.

1.4.2. Ihde's Postphenomenology

Don Ihde is a well known philosopher of technology from the United States of America. He has been writing on technology and phenomenology since the late nineteen-seventies. During his studies in phenomenology he developed a postphenomenology of technology, where has answers many questions that are raised against traditional phenomenology.

What is postphenomenology? Ihde describes this when he says:

"The relativity of pragmatist[/postphenomenology] and phenomenological analyses [...] is a dynamic style of analysis which does not and cannot claim 'absolutes', full 'universality,' and which remains experimental and contingent."[12]

[12]Ihde (2003)

Fig. 4 *The controller of the Universe by Damian Ortgea shows the ideas of existentialism, that the human subject should be the start of phenomenological inquiry, beautifully.*

This is also one of the differences between the methodology of Introna and Ilharco and Ihde's ideas. Where the first tries to claim a more a-priori approach of phenomena, postphenomenology states that this cannot be claimed. This difference can be demarcated in a more transcendental phenomenology as in the traditional kind of Introna and Ilharco and a more existential postphenomenological interpretation, but the difference is far more subtle. If Introna and Ilharco would not have added the existential phenomenologist Heidegger in their methodology this demarcation between the two methodologies would be far more rigid. How these two - on phenomenology based - methodologies differ will be explained in later chapters.

While Introna and Ilharco have written extensively on a phenomenology of the screen, Ihde has not done such a particular exercise in his postphenomenological perspective. In contrast to Introna and Ilharco an original analysis will have to be developed here. Most interesting difference in their result of a phenomenology of a technology can be describes as a difference in focus on the technology itself in Introna and Ilharco, and particular focus on the human relation to the technology in Ihde.

1.5. Case studies

We need to be critical while developing these phenomenological perspectives of interactive screens. We need to test the theoretical artifacts that will be the products of these inquiries. Both theories provide us with insight on the use of interactive screens by investigating how they appear as phenomena in the conscious mind, and the way we can describe how the intentional mind is directed at interactive screens.

To test the outcomes of these inquiries two case studies will be developed over the course of this research. The first will concern itself with interactive screens in the public space, the later with interactive screens in medical practice. It will thus become possible to test the strengths and weaknesses of the phenomenological approaches by applying the found understanding of interactive screens to these cases and see how and if they can explain how screens act.

These case studies will also show whether the phenomenological methodologies are in themselves sufficient for researching the interactive screen or any technology for that matter. While Ihde describes the relation to technology from his pragmatic postphenomenological position, and Introna and Ilharco describe what the essence of screens are from their more transcendental approach, neither provides the tools to give insight in how screens act when they are in use.

This problem has been identified by post-phenomenologist Peter-Paul Verbeek in *What Things Do*[13]. In this seminal book Verbeek travels on the road of contemporary philosophy of technology. A movement that was started by philosophers like Martin Heidegger and Karl Jaspers. He evaluates the work of these earlier philosophers of technology as well as the recent work by Don Ihde. Verbeek identifies that technologies also needs to be researched in what they do instead of the more ontological question of what they are.

To do so Verbeek introduces the work of sociologist Bruno Latour, who developed a perspective where there is no dichotomy between humans and artifacts, which he calls Actor Network. Verbeek translates the work of Latour to a philosophy of technology to help to explain how technology *acts*. In this thesis the work of Bruno Latour will not be used to explain the way technology acts, because the cases as a means of conformation have already been chosen. In Actor Network Theory a description of what technological artifacts do happens through describing the network that the artifact belongs to.

Instead, I will let myself be inspired by the work of philosopher Annemarie Mol, who‘s incidentally is close to the work Bruno Latour. In the *Body Multiple: Ontology in Medical Practice*[14], Mol describes a praxiography [15] of the practice of diagnosing and treating atherosclerosis. It describes how the illness is enacted in various practices in the hospital. That is to say that atherosclerosis is different ontologically for an internist than for a pathologist. While first finds atherosclerosis in the the diminished ability to walk for a while in patient, a pathologist would see it as a cracking sound when squeezing a removed artery.

In the final chapter I will review the two phenomenological approaches and the cases that we used to describe interactive screens. I will summarize its strengths and weaknesses and I will finally

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[13]Verbeek (2005)

[14] Mol (2002)

[15] A praxiography is description of praxis and in the work of Mol this is derived from anthropological ethnographies

present how an approach to understanding interactive screens from a combined praxiographical and phenomenological perspective can aid us to come to a more fully understanding of interactive screens.

1.6. A Phenomenological Approach to Understanding Interactive Screens

This chapter introduced the research topic of screens. It showed that screens are everywhere, and that screens need to be research as a technology in itself, not as embedded in a device. The world that humans reside in will become increasingly co-inhabited by the screens we develop. Understanding how these screens work and seeing what they do, gives us the insight and tools to evaluate and design them.

Screens have been around for millennia, and it is only a certain type of screen that will prove world changing in the future. Therefore this chapter develop a trichotomy of screens consisting of a static, dynamic and interactive screen. The last type of the developed trichotomy will be the main focus of this thesis. An interactive screens distinguishes itself from the dynamic screens and static screens by the ability that it gives its user to directly influence the content of the screen.

After we have chosen and narrowed down our topic of inquiry to interactive screens, a methodology of research was developed. This methodology is not based on looking at screens in the devices that incorporate them. Investigating screens in devices would most likely push the inquiry towards the idiosyncrasies of the host device rather than provide a good insight into the screens that are used. It will neither use a methodology based abstracting insight from a list of devices that incorporate interactive screens, because such list will never be complete.

The chosen methodology of analysis was found in a branch of philosophy called phenomenology. This branch uses a first person perspective to analyze the structure of human consciousness. This type of methodology gives insight into how interactive screens appear as phenomena in our consciousness and can therefore transcend analyzing screens in devices and abstracting insights from a list that incorporate interactive screens.

Within the tradition of phenomenology existing research has been found on screens in the works of Lucas Introna, Fernando Ilharco, and Don Ihde. First Introna and Ilharco will provide a more traditional perspective on screens from a classical phenomenological methodology. Afterwards Ihde's postphenomenological perspective will be investigated which will lead us to a more fully analysis of the interactive screen.

These two distinct phenomenological inquiries will be supported critically by using two separate case studies: the first about screens in the public space, and second about screens in medical practice. By applying the insight the methodologies give us we should be able to pinpoint the strengths and weaknesses of these research directions. In the final chapter the strengths and weaknesses of these case studies are then also critically examined. This will yield a enhanced phenomenological approach to understanding interactive screens.

This brings us to the main question that this thesis will answer: How can we use phenomenology to analyze interactive screens? This entails what we discussed, meaning an overview of phenomenological methodologies as well as critically examining them.

This leads us to some specific question per methodology that we need to answer in the next chapters. First we need to analyze the viewpoint of Introna and Ilharco. How are they applying phenomenology to screens? Is this viewpoint correct, can it withstand the criticism of phenomenology? If not what do we need to do to create a methodology that does withstand these criticisms.

Secondly, how do we deal with the postphenomenology of Ihde? Can we get similar result using his methodology when applied to our interactive screens? Chapter 3 will look critically at Ihde's postphenomenological methodology. Here the focus will be on both contrasting the postphenomenology to the phenomenology of Introna and Ilharco. Can postphenomenology explain interactive screens in a different manner than the phenomenological method and vice versa? What do both leave behind and what do they gain?

The final chapter will discuss the answer to these questions: a reapplication of the combination of the findings of the critical analyses of phenomenology to interactive screens will be formed. This will be supported by a critical analysis of the cases that were used to test the phenomenological methodologies. This will then yield the answer to the question what interactive screen are from a postphenomenological perspective. The consequences of the our frequent use of screens will again be put to the test and an advice will be formulated in this concluding chapter.

2. A Phenomenology of Screens

Two phenomenological approaches to screens will be put forward. The first of these is a traditional phenomenological that is presented in this chapter. Although the choice of an approach based on phenomenology has been clarified in the previous chapter, why the analysis of Introna and Ilharco must be justified before other available methods and steps are chosen. The methodology and its results will be critically examined to determine the usefulness of this approach. Also, these results will be checked by examining a case study of two screens used in two very different locations: screens in urban spaces and screens in medical practices. The scope of this methodology will reveal itself when applied to these cases and will form the basis of possible criticism.

Phenomenology has been applied to many fields and many subjects[16], but screens are rarely one of those fields. In the literature of phenomenology over the past 20 years, I found only a few papers that directly address screens as their subjects. I will therefore start my own inquiry by examining these papers, which were all co-written by Lucas Introna and Fernando Ilharco.

To develop a specific phenomenology of interactive screens an adaptation of their analysis of screens needs to be augmented in such a way that it will yield interesting results for interactive screens. As discussed in the previous chapter, interactive screens differ from other types in the created typology, and it will be interesting to see whether the application of the results to the cases of their analysis will yield different results in different types.

Before I apply Introna and Ilharco's conclusions to the urban and medical screens, I will first explain what the conclusion of Introna and Ilharco is and how they reached these conclusions.

2.1. Already Agreement of Screens

Introna and Ilharco came to the conclusion that screens have *already agreement*. What this is, what it means, how did they arrived at this notion, and how it applies to screens will be dealt with in this section. Already agreement is according to its conceivers the essence of screens, which means that it defines screens and something that does not have this essence would not be a screen. Introna and Ilharco describe already agreement as follows:

"Already agreement calls our attention, attracts us, makes us look at the screen in its screen-ness, and simultaneously condemns to forgetfulness that which was agreed upon"[17].

They arrived at this description by performing a phenomenological analysis. We will follow the arguments that are posed in their phenomenological analysis of screens in the following sections and then we will be able to understand what this already agreement is and how it fits within the phenomenological tradition.

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[16] Introna and Ilharco (20040, page 222.

[17] Introna and Ilharco (2000), page 313.

In this tradition a range of different types of analyses have been developed, and different styles of inquiry have been developed. Introna and Ilharco explicitly adopted and combine three different styles of reasoning, two which focus on content and one which focuses on structure. The structure of their analysis was adopted from the American philosopher and phenomenologist Herbert Spiegelberg [18] and contains seven steps:

1. Describing a particular phenomenon
2. Analyzing its etymology
3. Performing the phenomenological reduction
4. Investigating essences
5. Apprehending essential relationships
6. Watching modes of appearance
7. Interpreting concealed meaning

Their theoretical foundation is a mixture between the ideas of the phenomenologists Husserl and Heidegger. What this means will be discussed after I summarize what Introna and Ilharco did for each of step of their inquiry.

2.1.1. Describing Screens

The first step of describing a particular phenomenon is an important one of phenomenology [19]. It tries to describe the experience of the screen itself, how it comes to us through our sensory perception. This can be achieved by doing away with or bracketing all assumptions or presuppositions that might block the experience of our subject. This includes for example that we should not look at the physical constraints of screens and that we need to avoid very concrete examples as the basis of our inquiry.

The first thing that Introna and Ilharco noticed when they describe screens is that the screen itself is hardly ever seen: it *evades attention*. We never see the television screen, we see the news, documentaries, and movies. We also never see our telephone screens, we see the current time, a text message or a caller number identification. However, what a screen present to us does the exact opposite. Whatever is on a screen always gets our attention, and we always seem to focus on the content of screens. If we for example visit the office of a friend, we tend to glance at what that person was doing on their computer, or when a television is, on conversations seem to diminish. This is a tension between the screen and its content. Content almost forces itself on us, whereas the frame tries hard not to be noticed. Thus Introna and Ilharco start their description by saying that screens evade attention but simultaneously attract us to watch what is presented to us.

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[18] Herbert Spiegelberg is a phenomenologist who brought the traditions and ideas of phenomenology to the United States.

[19] Almost tautological when we look at the word phenomenology itself we see that it is derived from the ancient Greek words phainómenon, meaning "that which appears", and lógos, meaning "study", so the description of that which appears is fundamental of phenomenology.

When we look closer at the *demanding of attention* and the evading of experience of the screen, we see that the former of these is related to what we demand about the content of screens. Screens need to present relevant information to their users for them to be able to be recognize as screens. When we think of screens, whether it is a website with a weather radar, a television program, or a list of bought items at the local supermarket's cash register, we always see screens as presenting relevant information. Without this relevancy a screen can not be recognized as such. A screen without relevant information would appear to our experience as either a piece of furniture or we would not pay attention to it at all.[20]

If my telephone screen, instead of its menu, just showed random colors, we will experience two kinds of things. First, we think or claim that the screens is broken, it does not represent something useful anymore but still fulfills its light emitting technical requirements. Furthermore we would not recognize the screen as a screen anymore. Our interest in it completely disappears even though the colors variation could be quite aesthetic.

2.1.2. An Etymology of Screens

So the primary description of screens is that it evades experience, but demands attention and that it present relevant information. This forms the foundation on which the other steps of the phenomenology inquiry are based upon. The second step of their analysis was an etymology of the word screen. An etymology describes the origin of a word. According to this part of the analysis words gain their meaning from older usages of words and these meanings shift over time. An etymology is conducted within this type of phenomenological research to avoid more presuppositions that could be left in the description of the phenomenon in the previous step, as well as attempting to uncover why we name a phenomenon in a specific way, and how we can see this in the development of the word and its kindred words.

Ilharco and Introna both analyze the previous meanings of the word screen from angel-Saxon/ Germanic and romance languages groups and relate the word screen back to those origins. Due to my own language background, the Dutch word *scherm* is a very telling example of how the meaning of a word evolves. A *scherm* can now refer both to a screen as in a computer screen as well as a barrier for wind, fire, sun, or anything else that needs to be protected or blocked[21]. Scherm is a

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[20] A Dutch weather site buienradar.nl started to present in the top of their site a small indexing number on how the Dutch stock market is doing. That what we put on screens is not necessarily relevant. However that which we decide to put on a screen can indicate its relevance.

[21] The Dutch word scherm is also the Dutch translation for the sport fencing, which is again related to the screen in its protecting definition. While writing this thesis the misunderstanding that I was writing about the sport happened frequently, for me this shows that although scherm is the Dutch word for screens as we discuss here, but it not seen as research topic, which strengthens the evading of attention thesis by Introna and Ilharco.

derivative of skirm, which means shield in Old High German, referring to the latter of the two contemporary definitions.

Screen also has another meaning in its English verb form. To screen is to select, and a screening can be showing or presenting a movie or any other moving images. Screening as selection can be seen in job application processes where people are selected based on certain criteria. What all these words and usages have in common is a *call of attention* whether it is to see something, to protect against something or to select something. This common denominator strengthens the earlier found call of attention in our description of the phenomenon screen.

It is worthy repeating here what I said in the preface. The antonym, (words with an opposite meaning of a given word) of to screen is to show and to include. The meaning of the verb form of screen is, actually opposite to what the noun form of screen do[22]. Screens show and reveal other worlds to us, but simultaneously protect that world and prevent us from us entering it. Similar to the evading of experience and attracting of attention, this analysis of the previous meanings of the word screens draws attention to contradictions which are interesting in themselves and reveal to us the complex nature of the screen that we are trying to get to understand here. The conclusion of Introna and Ilharco's etymology is that the history of the word screen shares the idea of attracting attention, and everything that needs a screen or screening demands attention.

2.1.3. A Phenomenological Reduction of Screens

In the previous two steps of the seven step inquiry of Introna and Ilharco, we have seen a basis of evading attention, calling for attention, and of presenting relevance. Hereafter Introna and Ilharco reduce the phenomenon of screens phenomenologically. When we want to perform the phenomenological reduction our aim is to reduce the notion of screen to solely a *phenomenon in consciousness*. We want to isolate one thing to experience, which means that we should remove all actuality, context and empirical form from the object of inquiry. We should "concentrate on the phenomenon screens as it appears in consciousness, not as thought, or as we assume it appears in an 'outer empirical world'." [23]

[22] See Wornik.com on screens, a very interesting site that uses social instruments to trace the development of words in the English language.

[23] Introna and Ilharco (2000), page 308.

Our assumption here is that screens are computer screens, telephone screens, information displays, etc. However, we need to realize that a screen is not a surface with a gray or black cover: any surface can become a screen, using a beamer for example. A screen is not confined to a box we watch television on or through which we interface with a computer. Some experimental cars have shown superimposed radar data and infrared imaging on windscreens to enhance vision while driving through storms and fog; therefore a window can become a screen. There is also research for embedding tiny visualization technology in contact lenses. This means that size is less important than we might think, and rather the visual aspect is more important. Some fighter pilots also use screens in their helmets which depicts all kinds of tactical information superimposed on either a camera image outside or on a translucent screen.

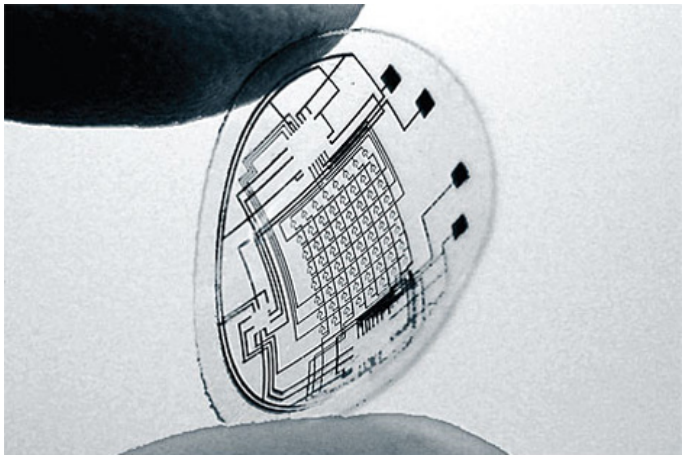

Fig. 5 An early example of a screen in a contact lens

What we think are screens is shown in popular media where we see their use in a way that just balances on the edge of the actuality of current technological possibilities. Movies like the Robocop[24] series and Minority Report[25] show the fringes of screening technology at the time of their development. In Robocop it was the heads-up displays that augmented the vision of Murphy (RoboCop) to show the technological deterministic outer world divided into good and bad, threatening and harmless. Beside the ethical discussion here, we can take the hint that what we think of screens is societal and technological dependent.

This idea is strengthened by the interactive screen of Minority Report which gives us another understanding of a screen and its actuality. The screen is reduced to a glass plate, see-through and interfaceless. No buttons appear and all user interactions are hand gestures. These are not unlike Jef Han's famous multi touch interface (2006) [26], the iPhone (2007) and most recently MIT's Sixth

[24] Robocop is a science fiction movie directed by Paul Verhoeven in 1987 about a cop who was shot a officially killed. However, some parts of his body were used in an experimental robotic cop (RoboCop). In the shots where the camera shows what RoboCop sees we see an augmented reality vision with formal analysis projected on the vision in text.

[25] Minority Report is a 2002 movie based on a Philip K. Dick novel. In this movie images and impressions are ordered on a translucent screen using hand gestures only.

[26] Jeff Han gave a famous TED presentation about a novel multi-touch interface (http://www.ted.com/talks/jeff_han_demos_his_breakthrough_touchscreen.html) and formed the founded Perspective Pixel (perspectivepixel.com)

Sense (2009)[27]. We should confuse that which is new and vanguard with being closer to the essence of screens. Rather, we should observe that screens are continuously changing, and what we consider screens with their physical and technological possibilities is not necessarily the future of the physical screen.

We can think of even more radical screens. Theoretically, Brain Computer Interfaces (BCI's) can replace screens by implanting a chip in the visual cortex of the brain. Through these chips it might be possible to alter what we see on a very fundamental level. An application of a BCI communicating with what is seen with the eyes and then augment visual perception with extra information about what is seen. The barrier between screens as superimposed over our vision in a physical manner, i.e. before the eyes, and altering what we see by altering the visual cortex are not so different from each other.[28] This teaches us that screens are not only bound to light emitting surfaces but that there is something more going on. So the question still remains, what are screens? For something to be a screen, it does not mean that that something needs to be tangible or physical.

This is what Introna and Ilharco mean when they want to find the essence of the screen. They look for that aspect that is not tied into the physicality of any screens that we can think up or use as an example now, thus overcoming the problems of other types of investigations of screens discussed in the introduction. In this reduction, Introna and Ilharco find that the ideas they have are strengthened here. When removing presuppositions from the world, they notice that without - either of the previous described commonalities of the screen - presenting relevant data and attracting attention a screen would lose its *screenness*. That is to say that screens would not be recognized as screens without these commonalities.

Thus we have a solid list of what all screens have. We have deduced that all screens: are calling for attention, evading experience, and presenting relevance. This is a list of what screens have in common, without either one or the other a screen as we gather them from our experience would not be a screen: a screen that does not attract attention is just a piece of furniture or some colors; a screen that does not present relevant data is not recognized as a screen; and a screen is in service of that data, effectively removing its physical self from attention. This is however not *the* essence of screens, the one thing that all screens do.

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[27] Massachusetts Institute of Technology's (MIT) research group Fluid Interfaces led by Paetti Maes developed an screenless screen by projecting on whatever surface the platform finds interesting. See Maes' TED talk for a more extensive presentation of this technology. (http://www.ted.com/talks/pattie_maes_demos_the_sixth_sense.html)

[28] This is also a main argument within phenomenology as I see it. The question is not what the 'real' world out there looks like, but what the mind perceives.

2.1.4. Investigating the Essences of Screens

To get from this list of commonalities to the essence of screens we need to investigate the essences, which is the fourth step in Introna and Ilharco's inquiry. Up until now, we have looked at what all screens have, but according to Introna and Ilharco there is one essence of screens without which we would fail to be able to recognize the screens as it is. The core of this part of the analysis is implicitly done with the following criteria of recognition in mind: the *"ability to recognize the object as the object it is" (2000, page 310).*

This part of the investigation will culminate in a tentative essence of screens. It is that which the phenomenon screens defines, not only the screens that we have investigated up until now. To get to this essence they compare screens to mirrors, and notice that although both can hold the same image they are not interchangeable. Whereas mirrors reflect the world we are in, screens actively present it.

2.1.5. Apprehending Essential Relationships and Watching Modes of Appearance

So even when a surface presents the same data as another, it does not necessarily mean that both are screens. For example, when a screen is not recognized as a screen anymore, let us take a trip to a large Chinese railway station filled with screens, just like any Dutch railway station is. For a Dutch tourist who cannot understand written Chines characters arriving at a Chinese station and trying to find information, screens will not present themselves. Screens will not even be recognized as screens. They would just be meaningless ornaments. Similarly, if I would configure my cell phone to present everything in a script that I do not know, it would no longer be a screen to me. Without the presentation of relevant data we do not recognize a screen as a screen, this idea is closely tied to attracting attention. Relevance and attracting attention go hand in hand, and this is why a television screen attracts attention because we presuppose that what we will see is relevant and vice versa.

What can we learn from this? It means that what is put on screens shows us the world we are already living in: it shows us what we consider relevant and hides what we consider irrelevant. Although we cannot objectively point to something as being an instance of the phenomenon screen, we can see that screens are recognized as being part of a world that we already live in. This is why the screens in a train station in China can be acknowledged as screens to the Chinese, but not to the travelers that are not capable of reading the language. Introna and Ilharco sum up this part of their analysis with the following essential description of the screen: *"the essence of screen is to mediate our being in the world by presenting relevance in that world" (2000, 311).*

Thus we cannot see screens without inhabiting the same world that the screen inhabits. However, if screens are these phenomena that appear to synchronize with our goals and needs at a given time and actions for us to be able to recognize them as screens, why do they also try to hide themselves from our attention, why do we never gaze at screens but always look at their content? Combining

how the screen relates to the world and how it appears in that world, are the next to steps in this analysis where we notice just that. Screens also have an essence of hiding and concealing themselves and to further refine the essentialistic notion of the screen we need to consider this.

2.1.6. Interpreting Concealed Meanings

This is then again connected to the last phase of the inquiry, interpreting concealed meanings of screens. Phenomenology tries to study phenomena, but it is however impossible to so without being aware that we are already in the world that we try to analyze or describe. The last step in our analysis is to bring our discovered essences of screens back into the world we already inhabit.

Here we realize that the research that we have been doing on screens already takes part in a given world and thus the answers that we get are also given in that world. We need therefore to question the tentative essence of screens that was given above. The questions that rise are what is to mediate our being in the world and why is relevance important here?

If we already are in the world, what do screens mediate to us? It is our agreement of the world that it mediates. That is why we see screens as always presenting relevance. Screens present relevance because we already agree with the world we live in. Screens and what they show within society is already agreed upon, and does not mediate a world but mediates our meaning and the relevance we give the world we live in. That's also why screens attract attention from us, because it is their content that is always relevant for us to see. Through this process Introna and Ilharco came to the conclusion that the essence of screens is *already agreement*.

To summarize, during this enquiry we have seen our understanding of screens go from a description of the phenomenon, where we noticed that screens evade experience but attracts attention to its content and whatever is on screens seems relevant. These concepts were strengthened by an etymological enquiry, which were then used as a basis to phenomenologically reduce the phenomenon to a phenomenon solely in consciousness. This, in turn, gave us the tools to investigate the essences of screens and review what we see as the commonalities of screens. Then a tentative essentialistic essence was described as a mediation of ourselves in the world. By regarding that we are already in that world, we realize that the mediation of screens is our common agreement of that world instead of mediating of the world itself. This then reflects and justifies our previous findings within the investigation of the screen. Therefore we can conclude that the essence of screens is already agreement.

2.2. Case Study

In this section we will see how and why this phenomenological enquiry is useful when we apply it to two types of cases. The cases that are used in this section will be used throughout this thesis. I will therefore start with a general introduction of the application of an interactive screen within the public space and medical practice. After this introduction I will show what we can learn about the behavior of those interactive screens given our ongoing phenomenological inquiry.

2.2.1. Interactive Screens in the Public Space

The public space contains all those spaces that are accessible to anyone, for example a shopping centre, a town square, public roads, etc. Putting interactive screens within these spaces is somewhat of a challenge. Most screens in the public space are either static, billboards, road signs, shop signs, etc, or dynamic, information signs, public television, etc. So which interactive screens do exist in the public space?

Interactive screens distinguish themselves from static and dynamic screens by the ability to change their content in direct relation to actions of its users. When trying to find these screens in the public space, we come across two very distinct uses of screens. I will argue for a screen *in* the public and screens *of* the public space. Where the latter is always necessary a member of the former, but this does not hold vice versa. Let me expand on this in the following two paragraphs.

Screens *of* the public space that fit the profile of interactive screens range from simple traffic signs, screenings of sport events, art installations, etc. Another example is a new initiative of the Dutch government to place screens next to provincial roads in Utrecht[29]. These screens give information about how crowded the nearest highway is and, if required, suggests alternative routes. The interactivity here is that when vehicles drive in a certain direction the signs will change accordingly[30] to optimize the traffic flow. The hope and presupposition here is that what is presented on the screen will change the behavior of drivers. Thus, screens *of* the public space are public screens, accessible by all, all the time.

However, not all screens *in* the public spaces are always screens *of* the public space. Several interactive screens are used *in* the public space that do not belong to the public. Examples of these types of interactive screens are cellphones, navigation systems, watches, etc. Also some screens that belong to the public space disappear from it when used, like ticket machines and cash machines. Navigation systems in cars are a very interesting case here to expand on. Every now and then an article is published in a newspaper or news website that tells a story about someone being lost in a forest for several days due to their car navigation system, or people driving into canals because there should be a road there , or people driving on ice, etc. Can this behavior be explained by the notion of already agreement?

The notion of Introna and Ilharco shows that screens are so embedded into our culture that we already agree with them, just like in the examples above. It is therefore not strange that some people blindly trust their car navigation devices. It is inherit to the screens that they employ to convey their navigation functions. Likewise is the presupposition of the local government of Utrecht justified when developing those screens pointing to less crowded highways. Already agreement, as the essence of all screens, states that we do not question screens, that they are an

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[29] http://www.ad.nl/groenehart/woerden/3265984/Tien_miljoen_voor_borden_over_files.html

[30] This can be seen as a form of crowd-sourcing.

intrinsic part of our society. They also communicate what is relevant and these traffic direction signs will therefore probably work as expected by the designers.

Urban screens as advertisements also have already agreement. This means they can serve as a tool for investigating culture in the public space by investigating the content of those urban screens. We could for example tell what kind of values a certain culture has by investigating the content of urban screens. It would be interesting to see if there is difference in culture that is noticeable through these screens.

An example could be found by looking at what kinds of products are advertised on urban signs. It would be interesting to investigate what kind of different screen contents appeared in the urban space before and during our current economic recession. When the values of the world we live in change, so do the screens that we already agree upon in the public space.

An argument could be made that the values of the general public or of the perceived or wanted public are embedded in their urban screens. We see advertisements for expensive cars, not only to advertise their existence but also to co-create the world in which it is desirable to own such a car. This is to say that already agreement is not one directional but is just as much part of the world we live in as it helps shape that world.

Introna and Ilharco develop a similar argument for information displays in office environments. They develop the case that if an organization would want to change their work procedure they would need to change the screens of their workers. If we would, for example, want to switch from a group based working method to a project based working method we need to develop the interface of the computer screens in such a way that the procedures that are important in either type of work are placed to the front or removed from the screens.

This also shows that the methodology of Introna and Ilharco provides us with a perspective on screens similar to the scope their methodology, that is to say that it transcends the specific first person perspective. It gives us insight to tell something very general about screens. In the examples above we see what we can learn from our world when observing screens and what we could possibly achieve when we change the screens that surround us.

Thus according to Introna and Ilharco, the essence of screens lies in our already agreement of them. If applied to the public space, where the screens that we come across are not of our choosing, we can learn two things: one, that we can study the world we actively live in, our being there, by observing the screens that surround us; two, if we are in a position that we can determine screens in the urban space then we could also influence the world that people might already agree with.

This last perspective is of course already a part of an old narrative, beautifully laid out for us in dystopian books like George's Orwell's 1984 [31] where screens play an important part in modeling the inhabitants of Oceania. Where propaganda is ubiquitous and quotes like "War is peace" and

[31] Orwell (1949)

“Big brother is watching you” are on urban screens everywhere. This is so intuitive to us that it gets the inhabitants to accept their current never ending war situation as well as keeping them in line by the drawing attention to the ever watching cameras. This in turn leads to all kinds of ethical questions about screens in the public space, which would be a good follow up investigation.

2.2.2. Interactive Screens in the Medical World

The medical world is also filled with screens, we can think of screens at the end of MRI scanners, CT scanners, endoscopic devices and ultrasonographic devices. The common goal of these devices is to uncover a view of what happens inside the body. Interactive screens are not very common here and only the latter categories qualify as interactive screens.

Endoscopic devices are cameras at the end of a flexible tube that can be inserted into the human body. Ultrasonographic devices transmit and read sound waves that are then translated into an image of the inner body. It is interesting that in both of these devices the image is constructed through both the patient as well as the controller of device. Any movement of the patient is reflected on the screen, but the angle, focus, and location are determined by the operator; although the patient is usually discouraged from moving by the controller in many procedures. This means that these devices operate on two levels, they can either be interactive or dynamic. Is there then a difference in the way we can explain the behavior of these devices using the notion of already agreement?

Interactive screens differ from dynamic screens in the way they create a screen observer relation. In a dynamic screen the observer is fixed and subject to the images the screen provides. They are taken on a journey of whatever the screens present them. This type of screen observer relation is thoroughly embedded in our culture by the means of, for example movies where we are taken on a screen journey for an hour and a half.

The inquisitive form an ultrasonic scan takes does not seem to work with the same understanding of already agreement. The notion of already agreement dictates to us that the screen is always relevant to us because of it being part of the world that we already accept. If we consider a pregnant woman seeing her unborn child for the first time on the monitor, the same behavior is seen as in the case of the navigation system, the screen is already agreed upon. I would imagine that comments like “is that my child?” are not uncommon. Here the depicted child on the screen is accepted as the actual child, and the screen supplants the vision of the mother. Likewise the physicians agree with what they see on the screen. Physicians use diagnostic screens like these to convince and inform their patients of their conditions. Screens then convey the agreement we have with them, making them tools of communication.

The idea of already agreement of screens does not seem very fruitful in this case. In the previous case exploration, we saw that we could study the our being in the world by studying the screens that surround us, and that if we were able to change the screens that we interact with we can

thereby change how we are in the world. In the medical case however, we see that the technologies does indeed change the way people act. For example, we can detect genetic defects in fetuses and the parents are then subsequently faced with questions about abortion or of special preparation for the child. This is not solely due to the screen, but more the larger practices surrounding new medical technologies.

We have seen screens in two separate fields where I applied the conclusions of Introna and Ilharco, we have seen that these distinct types of screens have this notion of already agreement, and that what is on screens, whether they are medical screens or urban screens attract attention, and produce relevance. What is called relevance here is a relevance that is connected to that we all already agree with what is presented to us.

2.3. A Critical Reflection

After the methodology of Introna and Ilharco, their conclusion and the application of this conclusion to describe and explain screens in the urban spaces and in the medical practice, I will critically reflect on this, which means that we will dive deeper into phenomenology. I will investigate the difference between the general conception of screens that is used in Introna and Ilharco and the trichotomy of screens of the introduction more closely to see if there is a significant difference between the two, based on the outcome of the cases. Also I will question whether the methodology of Introna and Ilharco is valid within contemporary debate of phenomenology, most pressingly of the scope of what they call the essence of screens. I will however start by providing a broader philosophical understanding of the foundation of Introna and Ilharco's methodology.

2.3.1. Being in the world and essences

At the end of the analysis of Introna and Ilharco it becomes increasingly important to realize that we are already in the world that we attempt to research. It is this understanding that will also be important to understand more of the underlying philosophy of their inquiry. The idea of being in the world is not an original idea of Husserl's phenomenology. It was later introduced in existential phenomenology with the ideas of Martin Heidegger.

Martin Heidegger was a phenomenologist of the first half of the twentieth century. While he was a student of Husserl, he did not completely agree with the work of his mentor. Vice versa, Husserl did not agree with what his student was doing to his first philosophy. It is interesting to see how Introna and Ilharco add the Heideggerian idea of being in the world to their method to achieve their result. It is important to realize how this inclusion changes the scope of their results within philosophical debate.

This existential branch of phenomenology can be described using Jean-Paul Sartre's claim that *existence precedes essence*. In his famous lecture *Existentialism is a Humanism* he stated:

"*What do we mean here by 'existence precedes essence"? We mean that man first exists: he materializes in the world, encounters himself, and only afterwards defines himself*" [32]

Then in turn, what did Sartre mean here within the wider scope of phenomenological inquiries, i.e. if you compare this to the phenomenology that was used before this existential turn? Husserl's original phenomenology can be described as a transcendental phenomenology, which brought forth the phenomenological reduction. Transcendental phenomenology tries to find unchangeable aspects of phenomena in consciousness, which are called the essences of those phenomena. They try to find essences that transcend the world, even before we experience it. The results of such a reduction are however on par with the idea of existential phenomenology. In the existential phenomenology this is flipped, existence precedes essence.

Existence before we encounter ourselves is brought under the notion of being in the world. This concept was introduced in Heidegger's book Sein und Zeit (Being and Time) where he claims the notion of Dasein, or being-there. This being-there refers to an always being in the world. We can never escape being in the world, we are always thrown forwards in that world. This is to say that we are not mere bystanders being taken on a metaphorical road, but we are aware that we are traveling. We can therefore make the choice of taking a turn now and then, and speeding up or down: we can shape our existence.

Heidegger states that an artifact only gains meaning in use. Therefore the motto of phenomenology '*to the things themselves'* needs to be reinterpreted because things are never 'themselves', they are always situated, *in* the world. Things cannot just be as themselves: it is in use that they uncover a specific self. Human beings give meaning to the things in their use, and this is a completely different idea than the transcendental phenomenology.

A famous example used in Sein und Zeit is that of the use of a hammer. A hammer is only a hammer when used as a hammer. We can look at a hammer as much as we like but we will never see a hammer as a hammer, because the hammer needs to be used to be in itself a hammer, and when it is used it uncovers its hammerness in the world. Just like screens disappear from experience, the hammer also disappears from experience when used. We do not focus on the hammer but rather on the nail that we want to drive into the wood. Heidegger calls this disappearing of experience ready-to-hand (zuhanden). Opposed to a hammer that has attention, which is called present-to-hand (vorhanden). When the hammer becomes present-to-hand the hammer attracts attention by not being a hammer or questioning its hammerness: it is either broken or does not function properly. Thus the object we call a hammer is only a hammer if that is its use at certain moment. A hammer would lose its hammerness if it was used as a paperweight for example.

[32] Sartre(2007) page 22.

An existential phenomenological inquiry is therefore more an ontological inquiry, whereas a transcendental phenomenological inquiry is an epistemological one. This means the latter takes a world for granted and tries to know that world through the phenomenological inquiries, whereas a more ontological inquiry tries to find out what that world is that we are confronted with and co-shape.

How does this affect the scope of our inquiry and can we see this in the application of the results in the previous cases? For one the essence of screens, as Introna and Ilharco call them, is not universal. Already agreement is not a universal quality of screens: it is imposed on them for this world we live and kept that way as long as we keep constructing the world similarly. We could for example imagine a future where screens are everywhere, immersive. We could imagine a future with continuous augmented reality as a lens on the eye. We would now consider that a screen, but will they also see that as a screen in the future?

By using Heidegger as one of the fundaments of their phenomenological inquiry, Introna and Ilharco have described screens from a position of being in the world. It is this world, our culture, that limits the usability of their investigation. We cannot know how screens will be used in the future and we cannot we say anything about the essence of future screening technology. What we can say about screens is how they are used now, and this gives a temporal essence, but an essence not the less.

2.3.2. The essence of interactive screens

Using a trichotomy of screens instead of the conception of screens in general, questions the whether the question posed by introna and ilharco is valid. Can we use essence that they developed of the screen when we inquiry into the interactive screen? Do we need to change or tweak the conception of already agreement after it has been tested in the two cases? Before we answer this question we should contemplate what Introna and Ilharco would think of our trichotomy of screens.

If we consider the description of screens Introna and Ilharco give us in their papers, they implicitly state that there is no difference between interactive and dynamic screens and they forgo static screens altogether. We have already seen however, that the essence of screens can explain the behavior of the screens that surround us. For example in the case of advertisement in the public space, it is therefore usable to inquiry into the workings of static screens. We can claim that Introna and Ilharco discuss the validity of their described essence of screens to the dynamic and interactive kind when we look at the examples they give in their work. However should we make a separate essence of screens for each of types of screen in the trichotomy of screens that was developed in the introduction?

The only way to see if their is a need to a phenomenological reduction for each type of the screens is to review the seven step analysis, keeping in mind only one of the kind of screen, the interactive

screens. If we find a different kind of essence for this screen then it becomes fruitful to inquire if we need to develop a tailored understanding of screen per category.

So we need to again start with a description of an interactive screen as opposed to the screen of Introna and Ilharco. At first glance an interactive screen behaves similarly to the already researched screen. It does evade experience and attracts attention, it also presents relevance. The interactive screen has a very wide usage, considering the definition of the user being actively able to change the content of the screen. It is in the use of interactive screens that we find important differences. Interactive screens provide us with the ability to *imply immersion* into the world of the screen.

Implying immersion of interactive screens can be seen in all kinds of places, most significantly in first person video games. These games emulate a first person perspective and create a world that can be engaged in. The world can fully immerse the user in attention and translation of movement. Going forward means pressing the 'w' button[33], moving your head means moving the mouse, etc. More abstract forms of immersion are also possible in altering a spreadsheet or surfing the internet.

Analyzing the etymology of the *interactive* screens becomes problematic due to the adjective interactive. The idea of an etymology of screens is that it researches the (past) meanings of the word screen, not of interactive screens. As interactive screens are here used as the name of this type of screens that is has a specific physical possibility then it is not useful for us to do such an analysis for the word interactive.

Now we need to answer the question whether interactive screens appear to us differently than screens as discussed by Introna and Ilharco. Do screens still adhere to the tentative definition that Introna and Ilharco make *"a being in-the-world as focal interpretative surfaces presenting our relevant data for our involvement in the world"*[34]? Interactive screens are here no different from the Introna and Ilharco conception of screens.

So thus far interactive screens only specifically distinguish themselves by implying immersion. Does this then affect how screens appear in our consciousness? We will see this when we watch the modes of appearing of interactive screens. As explained before in this step we will see how interactive screens, by evading experience, attracting attention, presenting relevance, and the newly added *implying immersion* appears in the world as screens.

We can imagine different modes of appearing of screens with the added immersion. For example, this can be the experience of programming computer software, working on a spreadsheet, or most

[33] If I would say that forward in most first person simulations or games is similar to pressing the up arrow would state that I have no such intense experience with playing video games. The most commonly used movement keys are on the far left of the keyboard to leave plenty of room to control the mouse with the right hand.

[34] Introna and Ilharco (2000), page 309.

revealing, engaging in a virtual world. We feel that we co-inhabit the world of interactive screens.[35] Having a bachelor's degree in software engineering, I have experienced in developing projects where the programming code begins to have a life of its own. You become the code and intuitively feel where the architecture of the program needs adjusting. Similarly, in virtual worlds we actively create a world that is distinct from the world that the screen exists in. Already agreement goes only as far as the screen, and virtual worlds of the interactive screen need to reestablish agreement in themselves. The immersion of interactive screens changes the idea of already agreement by being thrown into a virtual world alongside to the physical world.

This has problematic relation with the use of an existential foundation in Introna and Ilharco, who presuppose an already being in the world. If we can choose our being in a virtual world, can we say anything about that world from this existential tradition? The statement 'existence precedes essence', or: we shape our world only after we start existing in it states that the world is given. However, in a virtual world, be it a video game or spreadsheet, our essence can be actively chosen by ourselves before we exist in that world.

This is of course different from the idea of essence that Introna and Ilharco uses, which is directed at the screen instead of ourselves. However, the concept of essences that Introna and Ilharco uses is, given their existential phenomenology, in line with the idea of essences of ourselves. Essences of ourselves is precisely what the statement "existence precedes essence" is directed at. When we put this concept of the essence next the idea of existing in the a virtual than this poses no problem, because we still shape ourselves after existence. It shows us how mutable that essence is that we develop, that we for example can adapt to spreadsheets and abstract games.

Imagine these arcade games[36], where the controls operate a space ship protecting earth as in space invaders, or a paddle in a Pong match, where we exist in that virtual world by our alterations of it. Although these games are abstract in their presentation, we are quickly able to control and understand the purpose of such games. This also happens in far more complex games like god games, where the player acts as a god trying to construct or manage a world from a god eyes perspective. This means that interactive screens presents us with worlds that we do not necessary already agree with.

These games can sometimes take over the way we perceive the world even after playing that game. After images appear where the world can appear as still having the objectives that the game also has. This has been described in popular literature [37] as the Tetris effect. Where players who

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[35] Robbie Cooper had a beautiful video project about children immersed in video games. See robbiecooper.org

[36] Arcade games are not only iconic to the nineteen-seventies and eighties but are a common pastime in the internet generation as well, with website that contain more than 18,000 games. See Kongregate.com as an example of these types of games.

[37] See http://www.citypaper.net/articles/032196/article038.shtml , retrieved on September 9th, 2009.

frequently played long stretches of the game had the tendency to analyze the physical world in optimum ways of fitting objects in it together.

Thus, whereas static and dynamic screens have an 'already agreement' by the fact that they exist in a world that we agree on. Interactive screens create the possibility to still be screens but to give us access to worlds that are not necessarily the world that we are already in. This effect can strengthen the already agreement of screens but they also carry the possibility for the user to be re-thrown in the world, into a virtual world. This affect our cases and the essence of interactive screens in such a way that we need to realize that screens take their place in the world, but that interactive screens create the possibility of new worlds distinct from their screen predecessors.

What is the implication for the essence of interactive screens, compared to the broader conception of screens? Interactive screens have a component of implying immersion, and immersion can question the already agreement of screens. Immersion tells us that already agreement should be understood as a flexible already agreement, we quickly adapt to new interfaces if we are able to engage in a relationship with them of the interactive screen.

2.4. Conclusions

This chapter introduced a phenomenology of screens based on the research of Introna and Ilharco. Their inquiry resulted in a phenomenological essence of screens that is called already agreement. Already agreement is that screens exist in a referential whole of the world we live in. Already agreement explains other qualities we found that screens have, like attracting attention to the content of screens and simultaneously avoiding giving attention to themselves. Also screens always tend to present relevance, and likewise hide what is considered not relevant within a given context.

We then applied these conclusions to two cases of screens in both the public space and medical practice. Here we notice that already agreement helps to explain the behavior of screens in these areas as well as confining the usability of screens in the public space. In the medical screens, we saw that the interactivity of screens is not a necessary component of the screen, but rather something that is constituted through its use and can therefore be a dynamic screen for one and an interactive for another.

The cases showed that this methodology of researching screens in particularly interesting when applied to a perspective where screens are observed or altered. It has difficulties to explain the close human relation to the screen. The concept of already agreement is very applicable to urban screens or screens in the office but not so much in the medical case. This is to say that the results can answer the question why we look at screens and how they play a role in our everyday lives, but not how we look at screens.

In the critical reflection we went deeper into the foundations of the method of Introna and Ilharco and expounded on two subjects. First, the deceiving classical methodology that is used in the

analysis with a more recent foundation in existential phenomenology; Heidegger's Dasein changes how we should look at their conclusions and the scope of what they call essences.

Finally we looked if the essence of screens should be altered for the interactive screens specifically. We have noticed in our cases that already agreement of screens have a profound impact in the application of interactive screens, and that interactive screens create the possibility to engage in a virtual world, a world that needs to be agreed upon in itself separate from the already agreement of screens.

So from a traditional phenomenological perspective, we have learned that screens are an important part of the world we live in. They are so important that we do not even see them anymore but accept them at first sight. We learned that interactive screens are screens that only deviate from other types in use and that we need to have a flexible understanding of already agreement when discussing them in this framework.

3. A Postphenomenology of Screens

The phenomenology of the screen in the previous chapter gives us insight into how screens act from a traditional perspective in phenomenology that applies essences. The conclusion of the methodology that Introna and Ilharco developed is that screens have a form of *already agreement*. That is to say that screens serve us in society by conveying what we as a society already agree upon, this can be known only as such within that *already agreement*.

After we have seen this traditional phenomenological approach developed through the minds of Husserl, Heidegger, Spiegelberg, and finally Introna and Ilharco we will in this chapter go into the postphenomenology of interactive screens. The approach in this chapter is a response to phenomenology and was developed by Don Ihde and commented on by Peter-Paul Verbeek.

Although both postphenomenology and phenomenology try to describe the structure of consciousness, postphenomenology claims different boundaries. Ihde describes these by dismissing transcendental/universal truths and restrictions to consciousness, instead he devises a pragmatic style that is experimental and contingent.[38]

Why do we want to use this extra approach within our inquiry? We have seen that the lessons learned from the previous chapter are useful for understanding screens. However, it is not a complete understanding, since there are some problems with the idea of essences in their approach, as well as the usability of explaining more detailed person to screen interactions. Ihde's framework is a direct reaction to phenomenology and is not essentialistic. The way Ihde uses a contemporary phenomenological approach and applies it to technology makes his ideas interesting and useful to look into.

We will start this chapter with just that, a description of Ihde's framework. Then we will use this new perspective to research the same screens as we used in the previous chapter. This will raise new question about the framework and will fill some gaps identified in the work of Introna and Ilharco. At the end of this chapter I will review if all gaps have been filled, or if a new gap has been created by combining the insight of these two approaches.

The framework that will be discussed, describes different types of relations that people can have with technology. These relations can be explained by using the trichotomy of static, dynamic, and interactive screens. We will see that all these types of screens combined will almost cover the entire breadth of Ihde's framework of relations.

Lets explain these mediating characteristic of Ihde's framework by describing how people engage with the world through different types of screens. If we use the trichotomy, described in the introduction, we will see that all these types of screens will almost cover the entire breadth of Ihde's framework.

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[38] Ihde(2003)

3.1. A Framework of Human-Technology Relations

Ihde develops four different types of human technology interactions: an embodied relation, a hermeneutic relation, an alterity relation, and a background relation. All of these relations describe a certain role that technology plays in our world interactions. They should be seen as split in two major categories. While the first two can be seen as two extremes of one spectrum, the latter two are special due to their specific world interaction. Next to these two main categories we can consider the entire scope of these categories a continuum of human technology relations.

Ihde uses the following model for describing human technology world relations:

I - technology - world

The dashes here stand for the relation between either world and technology, or I and technology. By describing and developing variations to this model Ihde emphasizes the four different types of relations that humans can have with technology. Within Ihde's forthcoming models one of the dashes will be an arrow. An arrow indicates the directionality of the mind[39]. In the most basic conception of Ihde's structure of the intentional mind an 'I -> world' relation would be the standard. A dichotomy is created between the experienced world and the technology within it to investigate that distinction.

This relation to the world is an outcome of thinking of the world with a conception of mind that is intentional. We cannot be just aware but need to be aware of something, angry at something, happy about something, etc. - this entails a relational aspect of perception and mind.

In the following sections I will explain this framework of human technology relation using the trichotomy of the introduction. Each of the types of screens can be placed within a specific relations of Ihde's framework. We will start with the static screen and the hermeneutic relation, then the dynamic screen and alterity relation and end with the interactive screen and the embodied relation. Using the insight of the previous chapter we will see that screens cannot engage into a background relation. We will also notice that the dynamic and interactive screens have the same qualities as their predecessor, as suggested in the introduction as well.

3.1.1. The Static Screen and the Hermeneutic Relation

Static screens always need to be interpreted, they present a world that looks physically real, but is not. All of our interactions with the static screen are interpreting actions, or hermeneutic actions as Ihde calls it. Despite the idea that Manovich gives us that we interact with world in the painting, picture, or poster we only interpret it[40]. We always need to learn how to read these static screens.

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[39] Verbeek in Kockelkoren(2007), page 44.

[40] The difference here is what is called 'world' in Manovich's work and Ihde's. Where Manovich uses a very loose conception of what world, Ihde always refers to the physical world

Examples of art and roadmaps are good cases to show this. In roadmaps we need to learn how to see our own place on them, we need to know in what direction a map is created and we need to understand the various symbols and colors and figures of it. The same thing happens with art, we need to learn how to read a futurist, or cubist painting, before we can suddenly 'see' the painting. This is not limited to only the case of abstract art, but for every relation we have with static screens.[41] These are not results of a direct experience of the world, but rather a cultural understanding of it.

Interpreting and uncovering new ways to relate to the world is not at all bounded to visual imagery. The written language, more interestingly braille, is also an example of this idea of interpreting the world through technology. The hermeneutic relation that Ihde talks about has its theoretical origin in exactly this type of interpreting. Heidegger introduced hermeneutics into phenomenology and broadened its scope from a textual interpretation to an existential understanding.

Ihde's Hermeneutic relation is represented by using the following model:

I -> (technology - world)

The 'I' in this model does not interact with the world through technology, but technology that works together with the world and brings an experience that is in need of an interpretation or a reading for our world interactions. Two main examples are dominantly used in the literature concerning this type of postphenomenology of technology: the radio-telescope and the thermometer.

The two features that these technologies have in common is that they depict a technological mediated world. Instead of feeling the temperature outside we read the temperature from the thermometer. A hermeneutic relation supplants the senses by an interpretive kind. For the mind to know that it is cold outside is not the same as feeling the temperature outside, yet we consider the experiences as similar. Getting acquainted with today's temperature. In the case of the radio-telescope this effect is even stronger. With our natural senses we will never be able to 'see' as a radio-telescope does. The technology interprets and translate the world before we are able to perceive it.

3.1.2. The Dynamic Screen and the Alterity Relation

The static screen changes our relation to the world by presenting it through the technology. The dynamic screen adds to this by creating the opportunity to engage with the moving images. We notice that the dynamic screen continues to have a hermeneutic relation with its users. Dutch television culture is a good example of this. In contrast to the German and French television habits,

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[41] This reminds me of a colloquium given by Dr. Paul Martin Lester I once attended during my studies. He asks his daughter to draw the story of the Itsy Bitsy Spider at age 4 and 9. There we were able to see how the presentation of that story changed through understanding of imaging convention. Lester refers with this to the work of Baudrillard, which could be a very useful follow-up investigation after this thesis.

the Dutch do not generally dub their television programs but subtitle. Watching a foreign movie in the Netherlands is therefore for the Dutch usually a mixed act of reading and watching. Where the spoken words are supported by a written translation which uncovers a whole new way of watching television and spoken words.

Next to the hermeneutic relation, the changing images in dynamic screens simultaneously engage into a conversation with its observer[42]. When viewing static screens there is always a necessary relation to the world it depicts, however in changing images the sequence of images forces a fixed perspective observer that is lead by the dynamic screen. The screen can become a 'quasi-other' as Ihde calls this. A quasi-other has a kind of autonomy, that is to say that it is independent of yourself. Examples can be all kinds of technology like toys, computer games, artificial intelligence programs, etc. Noticeable is that the technology here does not represent a world, rather it is a semi-person.

For example, I always watch a daily Dutch television talk show with my housemates that discusses news, culture, and politics. The television acts as a quasi-other here, usually providing the basis for a discussion about the same topic on a meta-level among me, my housemates, and the people discussing a the same subject on the television. It is not uncommon to want to react to a television show, commenting on it in real time and therefore creating this quasi-other that is talked to.

Another good example of the difference between the hermeneutic and the alterity relation of dynamic screens is that of CCTVs in supermarkets which act as warning to show that you are being filmed upon entering the store. You see yourself walking in from an unnatural viewpoint and the fact that you see yourself avoids you taking up the perspective of the camera. An interpretation of the dynamic screen arises: that you realize that you are being watched by someone or something: the screens represents this other.

Ihde calls these relations to technology 'alterity relations' meaning a relation that is not to the world through technology, but a relation to the technology, which can have an independent relation to the world. In cinema, television, and other moving images there is this possibility to engage into a conversation with the dynamic screen. This is however, not always possible without also a hermeneutic relation to technology. That the news reader is not a small figure inside your box and more contemporary also a flat person, needs to be understood before an alterity relation can be engaged in.

Ihde's postphenomenological framework of relation to technologies has two of these relations that do not focus on the human technology relation, but on different technology world relation. The alterity relation is the first of these two, the other is the background relation:

I -> technology (- world)

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[42] The observer also changes roles. While the observer was fixed in one perspective with static screens, the observer in dynamic screens are forced to follow the perspective of the depicted images.

When having an alterity relation to technology the technology is usually the end of the experience. With these technologies we do not look at the world but rather at the technology. Examples of these types of relations are a ticket-machine, most computer software like spreadsheets and word processors, music boxes, and other devices that can be seen as a pseudo-others.

3.1.3. The Interactive Screen and the Embodiment relation

What is going on with the latest iteration of screens, the interactive screen? Interactive screens have the property, the presupposition here, that we can change their content. What does that mean for our interaction with the screen? We will notice that something seems controversial in Ihde's theory.

Interactive screens are similar to the older iterations of screens in their abilities to engage in hermeneutic and alterity relations with their users. They are different however in their ability to let themselves be embodied by its observer. Interactive screens act like glasses or contact lenses that we wear to be able to see better. Being able to change the content of screens by interacting with them by keyboards, computer mouses, or just moving, replaces our access to a world within the screen.

Interactive screens can be compared to books and movies. A book can create a whole world where the reader can be submerged in, so can movies. Contrary to movies and books that have solely a hermeneutic and/or alterity relation, interactivity gives the ability to do something novel: to also be able to change that world.

Computer and console games are an excellent fit of two of the composition of different relations; whether we take a racing game, a first person shooter or a massive multiple online role-playing game. All of these games have elements that are embodied in their interactivity (mouse, keyboard, controller, and the screen itself) and have an alterity relation. The games themselves are not physical cars or persons in the world.

Diverse monitoring systems serve as a good example for composition of embodied and hermeneutic relation that screens go into. For example, through screens we are able to control and monitor huge machines like a submarine. Controlling its spatial location by controlling the content on the screen. While we embodied the interactive side of screen we need to interpret the data on the screen in its relation to the physical world.

The embodied technologies is where the people interact with the world through the technology. An embodied relation is represented by using the following model:

(I - technology) -> world

This means that the technology is crucial when it is used but disappears from our experience, it is embodied. Classical phenomenologist also uses examples that fit this model. Maurice Merleau-Ponty for example describes how our world experience changes when we wear a high hat or in

Merleau-Ponty's case a woman with a feathered hat[43]. Heidegger uses a hammer as an example, but glasses, canes, telescopes and microscopes, cars, and other technological devices can be used as examples of the embodiment relation.

The main idea of the embodied relation is of technology that withdraws from attention and that there is a two way relation to the world: one from the I to the technology to the world and world to the technology to the I. Embodied technologies always magnify and reduces experience. Looking through a pair of binoculars magnify what you are able to see from a distant, but simultaneously reduce that which is close by.

In Ihde's framework this idea applied to screens becomes problematic, because all his models are based on a relation that is 'I - technology - world'. With interactive screens there is no necessary world, there are worlds that can be created at leisure. Is this not the alterity relation? No, it is subtly different. The alterity relation describes the relation between person and technology with the technology as the terminus of experience. However the experience is through the screen to the constructed world not the physical world.

What does this mean from an original phenomenological stance? Using the more classical approach of phenomenology this would be no problem, because experience of a constructed interactive world is just as valid as an experience of a 'physical' world. However, Ihde's framework misses that technology itself can become a world too.

3.1.4. The Screen and Background Relations

As we have seen in the previous chapter, screens always attract attention. They never fulfill a background relation as described in Ihde's framework. The background relation in Ihde's framework is characterized by its lack of direct human interactions. This type is best explained through the example of a central heating system in a house. Most of the time we do not notice the heating system and the system independently interacts with the world. This is modeled by:

I - (- technology - world)

Notice that the first interaction is also between brackets these types of technology relation are active independently but have an interaction with the world.

Ihde's framework supports one of the conclusions Introna and Ilharco make: screens attract attention. All the relations that could be described using the trichotomy of screens presented in the introduction need our attention to exist. The embodiment relation, the alterity relation, and the hermeneutic relation all require an active participation on the user side. The only relation that does not require such active attention is the background relation and it is precisely in this where the screen loses it clear boundaries of either being a screen or something else.

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[43] Merleau-Ponty(1958) Page 165.

In the diagram below we see a visual representation of the way different kinds of screens are engaged in different kind of human-technology relations.

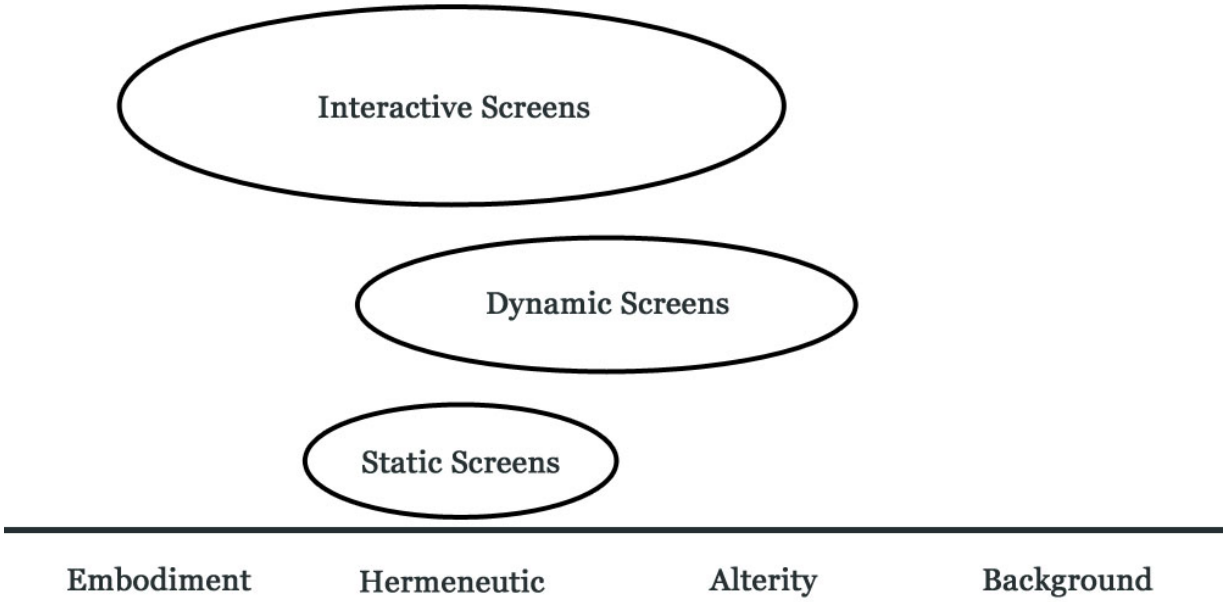

Fig. 6 An overview of different screens in the spectrum of Ihde's framework

Now, we must remember that we are talking about a spectrum here where the relation between human, technology, and world can shift according to a change in use of the technology.

Sunglasses with corrective lenses are a perfect example for the spectrum between embodied relations and hermeneutic relations. While the amplification of sight falls more under the category of embodied relations, the shading effect of the sunglasses are definitely a hermeneutic relation through which the world changes and is in need of reinterpretation.

Now what did this framework gives us and how does it apply to interactive screens? Instead of looking at the screen detached from its physical environment Ihde looks at technology from its user relation. Both methods are valid in the sense that they give us insight into how the structure of our consciousness works. Ihde provides us with the tools to analyze specific ways that we use different technologies, and we have see above that different types of screens have a different relation to their users.

In the next section we will apply the breath of this framework to the same cases that were used in our previous chapter. This can then assist in a comparative analysis of both the methodologies that will be addressed in the next and last chapter.

3.2. Case Study

3.2.1. Interactive Screens in the Public Space

We have seen that Ihde's framework is the product of a phenomenological inquiry, but has a completely different outcome compared to Introna and Ilharco. Starting with urban screens we will again see that not only do we already agree with them, like in the previous chapter, but that their interactivity again is important in the relations it has to people. It changes their position within the Ihde's framework and thus our relation to them.

Screens in the public space are mostly dynamic due to the nature of these screens and when they become interactive they usually retreat from the public space in that use, like in the example of the automated teller machines. Most screens in the public space are either static, billboards and such, or dynamic, information screens and such. The example below is a combination of dynamic and interactive screens in the French city of Florence.

The city is currently developing an interactive bus stop together with MIT's city lab[44]. This bus stop will have two kinds of screens, one will be dynamic, displaying temperature, air quality, and how long it will take for the next bus to arrive. The other system will include an interactive screen that will display historical information of the town, can give directions, and can read out personal announcements on request.

Fig. 7 This photo by Jason Powell shows how the screens can provide a different perspective of the world

We will both see a combination of dynamic screens and interactive screens and thus and if we apply this bus stops to Ihde's framework than, according to their phenomenological qualities, hermeneutic relations and embodied relations can be identified. Let's start with the first of these.

The dynamic screen displays temperature and air quality definitely engages in a hermeneutic relation, where the user *reads* the temperature and air quality instead of otherwise experiencing it. A translation of the systems sensors takes place via the screen which helps us to gain an experience and perspective that would otherwise not be attainable. We see that human intentionality changes with the dynamic screens and that our options of seeing the world expand through these screens.

[44] See http://beeldschermen.blogspot.com/2009/06/futuristische-abris-in-het-historische.html

Therefore, by reading of the screen, the number of ways we are able to perceive the world grows. In Heideggerian terms, the world is revealed to us in new ways. The fact that we can now read the air quality of a bus stop in Florence creates a new me as well. I am now able to do something with my new perspective on the world, I can choose to take the first bus out of town, or decide to go by bike to work instead of using my car.

Another good example of this effect is the addition of buienradar[45] to our universities information systems that can be found on screens near most of the exits of buildings. Buienradar presents us with the a radar image of the Netherlands that shows us clouds that can produce rain. If I wanted to take my bike home from the university and I would first look at these information screens I have, together with that technology, a different intentionality. That is to say that I do not only look at the clouds outside, but can also see if these clouds or the clouds that are coming might bring rain. This then can change my intension of biking home or taking the bus, or going to a local pub with friends.

With the interactive screen, two things happen: the system can either become a quasi-other as in the alterity relation where chat bots, search engines, and other kinds of information systems can be operated through the screen or the screen can become embodied, if it for example is a navigation device or a screen that shows historical photos of the site where the screen is placed, taking over the eyes of the observer and showing them an alternate world.

Ihde explains how both these types of co-constituted human technologies relations work. Where we would have first observed the world as simply being there looking at a historical sight using photographs and paintings on the street changes how we are in that world. We are at such times no longer directed at the present but view the world from a past perspective as well, and probably more important is that we see the difference between the two.

So what can we learn from this application of Ihde's framework to the above examples of urban screens? For one, it is difficult to find interactive screens in the urban space and interactive screens in this perspective can only be a one-on-one relation. That is to say that collaboration on screens is more difficult to explain using the four categories of Ihde. Imagination shows us that urban interactive screens are screens of collaboration, due to the nature of its user in that particular environment.

In the previous chapter we developed the tools for seeing urban screens and their already agreement, urban interactive screens could be already agreed upon but could also questions this already agreement. For Introna and Ilharco it does not matter how many people collaborate on one screen because they would all see the screens in a similar manner. For Ihde a difference arises between interactive, and static and dynamic screens. In some cases screens are interactive according to theory in this chapter and dynamic for other observers. Screens are interactive for

[45] See a dutch weather website that indicates and predicts the falling of rain in the ever wet Netherlands. www.buienradar.nl

those who actively change the content and dynamic for those that merely observe the screen. Ihde can therefore describe more thoroughly the direct user technology experience but at the same time fails to hand us tools to look at screens in a wider perspective.

We Have also talked about a case of the sometimes strange uses of car navigation devices. Where people place trust in these devices and often do not end up where they needed to be. Can the embodiment of interactive screens explain this behavior? On of the ideas of embodiment is that it alters the experience of the world by incorporating it into the human body. In this case it alters our vision of the road and the car. This changing perception sometimes has such a profound affect that these drivers blindly follow their car navigation devices.

This is similar to for example a hammer to nail something to a wall or a spoon to feel if a sauce is not lumping. The hammer or the spoon disappears from experience and the hammer and spoon seem to be incorporated in the body. This also happens with interactive screens, the screens itself disappears and that what it presents to us has equal value as what is seen on the actual road. Not only do they present an already agreement from a cultural perspective, they also change how we experience the world by augmenting it with its output.

3.2.2. Interactive Screens in the Medical World

An interesting aspect of the interactivity of the screen becomes apparent in the medical example of in the previous chapter. While using a sonograph for looking at fetuses only the operator of the sonograph will experience the interactivity of the screen, the other viewers will be taken on a ride with the device. This is to say that the device and screen will have a combined hermeneutic and embodied relation with the operator, whereas the mother and other observers will have a purer hermeneutic relation.

The intentionality, which is at the core of all of these relations, changes due to the interactive component of the screen. A physician's hand is transmuted to a visual control while the screen provides the feedback for the device. Usually when we want to look at something, we commonly use the muscles in our eyes to turn the focus of our eyes to the region of interest. However with these kind of device the control is managed using other mechanisms like the hand or joysticks.

The observer on the other hand is taken on a trip by the screen. For the observer the screens is not interactive, but dynamic and has therefore a different relation to it. However, this hermeneutic relation is of great importance, it completely changes how we perceive the human body and changes the way we deal with problems of our body.

What can we learn from looking at the interactive screen in medical practice? First, we see in practice that vision is not something static, our perception of the world change depending on the technology that we use. It shows that screens are not only a changing agent in the way we can have access to the world, our insides, etc., but that also changes the way we perceive.

This also shows the difference between the more classical conception of the previous chapter. Postphenomenology presupposes that experience and the types of relations that we can have in the world can change[46], the methodology of the previous chapter wanted to find an unchangeable idea behind screens.

What we have seen here is the Ihde's framework applied to two cases, one in urban screen, the other screens in medical practice. The increased ubiquity of interactive screens changes how we deal with them and the world on a day to day basis. The embodiment of screens that occurs in interactive screens create a different being that the observer of a screen because it changes our intentionality.

3.3. A Critical Reflection

This section will look critically at the postphenomenology of technology. It will present how the focus on intentionality of postphenomenology can give problems developing an understanding of interactive screens. It will then develop an argument concerning the scope of completeness of the Ihde's framework.

3.3.1. Intentionality as the focus of Postphenomenology

The phenomenological approach discussed in the previous chapter dates from the beginning of the twenty-first century, the *post*phenomenology of Ihde dates from the nineteen-seventies and onwards. How did these two perspectives come to a completely different, but at the same time not opposing, phenomenology of technology/screens?

We will see that two different concepts within philosophy play an important part in each theory and that arguing from these different concepts brings forth these two different phenomenologies of screens. In the phenomenology of screens of Introna and Ilharco we saw that Heidegger's notion of Dasein is important, as well as the broader foundation of existential phenomenology. In Ihde we see that a hermeneutical and an embodiment approach is added from Heidegger's phenomenology; also connected to the existential movement of phenomenology. Next to that Ihde focusses primarily on intentionality or the directed mind.

Intentionality plays an important role within the postphenomenology of screens of Ihde. Ihde focusses on uncovering how this structure works and comes to his framework in which he describes this structure in human technology interactions. Contrastingly Introna and Ilharco focus on the transcendental perspectives of Husserl, adhering to the ideas of essences of phenomena. This transcendental approach delivers a more detached product compared to insight the framework of Ihde provides.

Ihde wants, among other points, to describe how technology changes intentionality and comes up with a spectrum incorporating four types of relations where three of them are applicable to screens,

[46] Although be it through a set of fixed relations.

but the question arises whether these are all the intentionality changing relation that can be contemplated. Considering that interactive screens are becoming ubiquitous, and that we are still being amazed by all the applications designers come up with, it is not hard to realize that there could perhaps be other types of intentionality changing relation to screens possible that do not appear in Ihde's framework. In the following section I will explore this idea using two philosophers who studied and commented on Ihde.

3.3.2. Variations on Ihde's Framework

The 'I - technology - world' relations can have more variations that describe situations of technology interactions. Peter-Paul Verbeek[47] and Richard Heersmink, for example, developed four new schemes for very precise technology interactions. I will first briefly introduce Verbeek's alterations[48] whereafter I will elaborate on the significance of these variations.

We first need to realize an import difference between Ihde, and Verbeek and Heersmink. As we will later see that Ihde only describes human intentionality. However due to increasingly complex technologies Verbeek and Heersmink attributes intentionality to technology. That is to say that technology itself is directed at the world in a very specific way and that it conveys that intentionality to its user.

This has two advantages. First that these technologies can be ascribed a certain form of autonomy and we can therefore describe a morality of artifacts. Second, we can also state opinions about wanting or not wanting a specific kind of technological development from an ethical viewpoint using technological intentionality. Furthermore, adding technological intentionality describes not only the way humans act but also how technology acts. This last part is only possible if adhering to human intentionality is supported by the idea of technological intentionality.[49]

In Verbeek's article in Petran Kockelkoren's book *mediated vision,* Verbeek adds two novel models to Ihde's framework that are directed at posthumanist technologies. His first posthuman vision variety of Ihde's basic model looks like the following, both arrows indicate intentionality:

I -> (technology -> world)

We see that technology itself is directed at the world and that we are directed at the products of that technology. It differs from Ihde's hermeneutic relation, because in that relation the technology is in service of the user. In this postmodernist and posthuman variance the technology itself is directed at the world and develops its own perspective on the world.

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[47] Kockelkoren (2007), page 42.

[48] Heersmink (2008, unpublished)

[49] This of course gives a twist to the well know debate about guns killing people vs. people killing people. Where Ihde describes that the question whether guns kill people was the wrong question to ask. When also acknowledging technological intentionality it need not only be the (human - gun) -> world relation but the metaphorical gun can have its own intentionality.

In the second modification/addition Verbeek adds situations where the technology is directed at human-world relations. Schematized by:

Technology -> (I -> world)

Which can be incorporated by a relation that can by typified by:

I -> (technology -> (I -> world))

Technology experiences human experience of the world, which can be seen as a hybrid of both the alterity relations and background relations. Here it is the technology that directs its intentionality to how humans interact with the world.

Verbeek also adds a cyborg relation as a variation to the embodiment relation:

(I/technology) -> world

This relation fills the void that lies before the spectrum of embodiment to background relation on the embodiment side. Embodiment relations are used when technologies extend the body and senses in various ways, magnifying and reducing certain experiences. However, there are also technologies that do not quite match this model. Pacemakers, medicine in the form of pills, artificial limbs, etc are all examples of technologies which alter the physical body and mind in such a way that the human being itself changes, hence creates the inability to magnify and reduce that is necessary in an embodied relation.

So we have seen new 'I - technology - relation' that describe in very specialized technology interaction that, on first sight, could have been placed within Ihde's framework but would then fail to describe their specific relations to both the world and humans from the intentional mind perspective.

So does that mean that the previous analysis of different types of screen with Ihde's framework is incorrect or incomplete? As both Verbeek and Heersmink acknowledge that their models are refinements based next to or within one of Ihde's original models. The same idea is also valid when we discuss 'I - screen - world relations'.

How does this apply to screens? In the last chapter *already agreement* was applied to the interactive screen, but we realized that the notion of Dasein is not always completely applicable to interactive screens, because being already in the world does not hold for virtual worlds that can be unlocked through interactive screens. Although the embodiment relation of Ihde can explain how interactivity changes intentionality it is still an 'I - technology - world' whereas with virtual worlds or interactive screens without reverence to and external world we have a combination of an alterity relation and an embodied relation.

Thus even though Ihde provides new perspectives and explains that human intentionality is not as rigid as might be assumed, it is not always possible to completely describe how these technologies

have relations to the humans and the world they live in. If we want to develop a complete description of interactive screens using the traditions of phenomenology, we should keep in mind that we need to look beyond this framework.

A variation of Ihde's relation specified on the intriguing interactions that interactive screens have, being a combination of the hermeneutic, alterity, and embodiment relations should be based on the following schematic depictions of the involved relations:

Embodiment relations of screens: (I - Screen) -> World

Hermeneutic relations of screens: I -> (Screen - World)

Alterity relations of screens: I -> Screen (- World)

We need to note that in the embodiment relation the world is not necessarily the physical world as we have noted in the previous chapter, but rather an experienced world which does not even have to resemble the physical world. Should a new relation be added to Ihde's framework? By adding more variations to Ihde's framework we will weaken one of its major strengths. That is to be able to explain human - world relations using some simple and core operations. We should rather see interactive screens as a compound relation of all the above. Thus we should not add a new relation to the Ihde's framework but rather look at a wider scope how this became problematic and what else can be learned from this postphenomenological perspective.

3.3.3. Postphenomenology as an axiomatic-constructive theory

As seen in the concluding paragraphs of the previous section Ihde's framework can be seen as a set of rules by which we can analyze the different types of relations that we have with technology. Also how that changes our relation to the world. Are these rules sufficient to analyze interactive screens? Can postphenomenology be so simple that we can apply any given artifact to this framework and thereby understand how it appears to our consciousness? It appears that Ihde presents us with axioms by which we can explain the technological world around us.

However, in *Experimental Phenomenology*[50], Ihde warns us about axiomatic-constructive, theories in that they pay the price of their grounding in these axioms.

"A system that begins [a series of definitions and formal relations prior to investigation] must pay the price for its choice. Often the price is that, that which is not stipulated may not fall within the definition. [...] In contrast, phenomenology begins with a kind of empirical observation directed the whole field of possible experimental phenomena"[51]

Ihde's postphenomenological approach does not start with this axiomatic-constructive theory, but rather ends with it. Its product, Ihde's framework, is therefore just as subject to his own criticism

[50] Ihde (1986)

[51] Ihde(1986) page 31.

as other axiomatic-constructive theories. We must also note that what Ihde's framework produces, is itself not phenomenological, it is applied to cases as we see in the case descriptions above. Is Ihde's framework therefore useful as a postphenomenological approach to screens?

Through this argument the question arises whether we can use the product of Ihde's postphenomenology for our inquiry into interactive screens. The answer is that we can but it is highly limited to think in Ihde's manner without redoing his thought process but then bounded to our subject.

This is explanatory for what happened in the previous section, where we have seen that the two philosophers rapidly encountered the boundaries of Ihde's framework. We cannot understand the intentionality of humans and technology given some very precise technological products.

Why then did Ihde develop this in this specific manner? What is the choice Ihde made between traditional phenomenology and postphenomenology? Some hints are in his article *if phenomenology is an albatross, is postphenomenology possible?*[52] In the following excerpt of this article Ihde refers to the difference between classical phenomenology and his postphenomenology.

"Why post[phenomenology]? Because, while a pragmatically bonded phenomenology retains the emphasis upon experience, there is neither anything like a transcendental ego nor a restriction to consciousness. Because a pragmatically bonded phenomenology evokes something like an organism/environment notion of interactionism, a notion I have repeatedly used as well. Because, the relativity of pragmatist and phenomenological analyses (not relativism) is a dynamic style of analysis which does not and cannot claim absolutes, full universality, and which remains experimental and contingent. All this takes what was once (the bones and feathers) phenomenology in a postphenomenological direction." [53]

While Ihde's relation to the technology is useful to create a distinction between different types of technologies it is as we have seen not sufficient in itself. Ihde's postphenomenology looks more like an axiomatic-constructive theory and can alone not fully grasp what a technology is to consciousness and experience.

Ihde's work does not provide a complete set of tools when trying to do a phenomenological analysis of a technology. It does not address experience, but the structure consciousness. Ihde's framework is not complete in that structure and it is an axiomatic system that can never address the full scope of experience of technology. That is to say that Ihde analyzed technology using phenomenology, but that expecting the tools that came out of this analysis are of the same status as the original inquiry itself would be ill-considered.

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[52] Ihde(2007)

[53] Ihde(2007)

3.4. Conclusions

A postphenomenology approach is completely different from a traditional phenomenological approach as Ihde's illustrates in this chapter. By presenting us with a framework of understanding human-world relations Ihde explains that technologies actively co-constitute our perception of the world. By applying the trichotomy of screens to this framework we see that screens can be applied to almost all the types of technology relations that Ihde describes.

Most notably we see that interactive screens can engage with hermeneutic, alterity and embodied relations. However, examples of the embodied relation of interactive screens show us again that we need not engage with the physical world in which the screens lives. Other virtual worlds can now be enacted with through these screens.

In the cases we notices some of the strengths and weaknesses of this framework of thinking. We gain a deeper understanding of the strength of interactive screens when they are embodied. An embodied screen augments the way we perceive the world, as seen in the medical examples as well as in the car navigation case. It also showed the limits of its usability. Ihde's framework gives a very person oriented perception, it can therefore say little about screens that are collaborated upon, interactive screens in this sense are more easily discusses using Introna's framework.

The framework itself also has its drawbacks. Through the examples of philosophers Verbeek and Heersmink we saw that Ihde's framework is subject to possible variations, and that other types of relations with technology can be engaged in. We need to realize that the framework is only a basic steppingstone to develop our understanding of a particular technology more thoroughly. The framework is vulnerable to the criticism of Ihde himself, claiming that any axiomatic-constructive theory is bound by its own rules and can therefore not look behind those boundaries. This leads us to a necessary understanding of Ihde's framework. Ihde's framework of human - technology - world relations is a product of postphenomenological investigation, but applying that to technology is not a postphenomenological investigation, it is an axiomatic system with all its drawbacks.

For the following chapter we need to remember that the postphenomenological approach provides the tools to analyze the human-technology-world relations. Also, that interactive screens can engage into three of these relations. We also need to realize that we must force ourselves to look beyond the boundaries of what Ihde presents to us and look what else can be learned about screens next to this postphenomenological approach.

4. The Screens themselves

So far we have seen two phenomenological inquiries into interactive screens. The first method used a traditional phenomenological methodology. That method gave us the concept of *already agreement*. The second gave us a framework on how intentionality changes when we use different types of screens. The strengths and weaknesses of both methodologies were revealed by applying the products of these methodologies to two cases. This chapter will evaluate both these methods and their conclusions on a meta-level. That is to say it will contrast these methods, will see what the combined scope of their products are, and if there is a perspective missing on interactive screens that cannot be explained using these methods in their current forms only. This chapter will conclude with a way to understand interactive screens from a phenomenological perspective that relies heavy on the former two chapters, but combined and augmented to overcome the found shortcomings. It will start by summarizing the implications of these methodologies.

The second chapter presented the traditional Husserlian method of Introna and Ilharco. By using an existential foundation they arrived at an understanding of interactive screens that resembled transcendental essences. The difference in *Already agreement* as the essence of screens is that it is a temporal existential based essence and thus not universal. A further investigation is needed into this temporality of essences.

Also, a phenomenology of screens is not a phenomenology of interactive screens. Applying the product of their method did not proof completely fulfilling during the case studies. Interactive screens did have a quality to them that cannot be easily attributed to the other two types of the trichotomy of screens. That interactive screens *imply immersion* does not directly change the idea that the essence of screens is *already agreement*; it can even support this essence of screens from a certain vantage point. That is to say that we accept reality by our already being in the world, and when interactive screens are immersive they gain the same status as the world they reside in.

So, by adopting an existential philosophy in their methodology the relation between essences and world changes from the original transcendental phenomenological perspective of Husserl to a perspective where essences cannot be universal. This is typified by the existential philosopher Sartre with his famous statement that existence precedes essence. To a certain extend this explains the temporal nature of essences in screens. However, Sartre refers to humankind in his statement, that we shape ourselves only after we start experiencing the world. Can this be extended to essences of technology? If we do so than the essence of interactive screens is not only temporal but also personal: relativistic. This in turn creates a stronger link to Ihde's postphenomenological theory. Ihde describes that there is "no way to 'get out of' this relativistic situation'[54], rather it is crucial in phenomenology to acknowledge this relativistic position: it is inherit of a first-person inquiry.

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[54] Ihde (1990), page 23.

We also came to an understanding of the scope of this type of existential thinking. When we inquiry into interactive screens we found that these screens can present us a world that is unlike our own. We find these worlds in abstract software programs on our computers in the form of Microsoft Excel, or video games like Pong or Space invaders. When presented with these worlds we need to reacquire our existence in them, we need to reinvent and give ourselves shape in these virtual worlds. Researching the more pure existential arguments of, and perspectives on virtual worlds has been more extensively described in the previous chapter and is an entire research in itself, thus it will be left here as an interesting suggestion for further inquiry.

Does the developed understanding impede the usability of Introna and Ilharco's conclusions? How can we increase and solidify our understanding of interactive screens given these restrictions? Before the answer to these questions can be given, a summary of the limitations of a postphenomenological inquiry into interactive screens will provided to see if it is able to fill in the gaps of this traditional method.

The method of the previous chapter showed us that human perception, the human intentional mind, and technology are closely intertwined. The way we perceive the world changes depending on the technologies that we use. The example of ultrasonic scans of fetuses illustrate how the screen is actively shaping what we see an unborn child. This shows that screens are powerful technologies that can change perception of the world in a profound way. A postphenomenological inquiry into interactive screens could also aid in further explaining navigation systems in cars as was shown in the case studies of chapter 3.

However, Ihde's framework has some critiques. First, The framework seems to need further refinement when applied to very specific technologies. Second, the nature of the framework entails certain answers to the question what interactive screens are. The framework has difficulty to describe what screens are in themselves, as they more describe what the relation between user and screen is. That is to say that Ihde's framework so much focusses on the direct human technology relation that it is unable to describe how we arrived at such a relation.

These observations led to some challenges of a phenomenological approach to interactive screens. These challenges will have to be solved before a concluding description can be made of interactive screens in this thesis. The next section will discuss the just identified challenges and will meet them using work from medical anthropology.

Challenges of a phenomenological approach to interactive screens

We are faced with challenges to complete our understanding of interactive screens. The first challenge is that the phenomenological method is having problems with answering the question what screens are, an ontological question. This is because they have problems answering the question concerning the status of the concept essences in an existential oriented phenomenology.

The second challenge lies in the postphenomenological approach that does not bother with the question what screens are, it ask how our perception of the world changes by using interactive screens. They however, are unable to show us what interactive screens do in practice, instead they try to argue what screens do by illustrating how we experience the world when using them.

This becomes more evident when we place these methods in a spectrum: we discover a gap between them. Ihde argues from a materiality perspective, whereas Introna and Ilharco discuss screens from a transcendental perspective. This could be laid out in a micro and macro perspective. To tie these two together, and to give the products of phenomenological inquiries more rigidity I propose that we incorporate perspectives from anthropological research.

Annemarie Mol, José van Dijck and Maud Radstake[55] publish in medical anthropology and can help start filling these gaps. Work of each of them can contribute to overcome the difficulties of the phenomenological inquiries. This will be shown in the remainder of this chapter. First I will use the work of Mol to show how the problems concerning essentialistic thinking can be solved using contemporary empirical philosophy. After that I will show how we can use anthropological studies to give foundations to phenomenological inquiries by a more extended case study of screens in the medical world.

Using Mol we can tackle the problem of essentialistic thinking in a traditional, but existential, phenomenological methodology. In her empirical philosophy, that she calls a praxiography of the medical praxis that surrounds the treatment of atherosclerosis, she discovers that what is called atherosclerosis is enacted in various different ways. For the internist the illness can be described as the disability to walk for an extended amount of time without feeling pain in either of the legs, but for a pathologist it can mean seeing the thickness of the walls of a removed artery under a microscope. That is to say that there is no such thing as an objective view on atherosclerosis, but this does not imply that the human body is objectively plural for all parties involved, but rather multiple. Mol argues for a different conception of the nature of reality altogether: ontological multiplicity of a single object in socio-material practices.

That is to say that the experience of atherosclerosis depends on the practice that surrounds it. This has two implications: First, it says something about the essence of screens, and second it illustrates how practices co-shape what we do, and think of a certain technology when we it is in use. A key point here is that medical anthropologists differentiate between disease and illness. Where a disease refers to the objective state of the body that is not normal, an illness refers to the well-being of the human the way they perceive themselves. If we then compare the idea of illness and disease to screens, we can see that what is named a disease would be similar to a very abstract description of the screen, whereas an illness would be the experience of that screen.

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[55] Mol(2002), van Dijck(2005), and Radstake(2007).

This can then be transplanted on the idea of essences in the traditional phenomenological methodology. A description of a phenomenological essence of technology will need to have a conception of essences that is similar to the idea of the body multiple, or in our case the screen multiple. Although a description of screens can remain similar, it is in its enactment of this idea of screens that different ontological conceptions will surface. How this will apply in a phenomenological understanding of interactive screens will be shown later in this chapter.

José van Dijck also focusses on the temporality of the essence screens, albeit indirectly. In her book, *The Transparent Body: A Cultural Analysis of Medical Imaging*, she describes how technology furthered our curiosity of the human body, how medical imaging changes the way we perceives ourselves as well as the world, how morality changes due to this fascination and technological development to satisfy it. It shows a need to also include culture as a forming factor of how we use screens. Thereby a need to understand screens from a cultural perspective arises.

In her chapter on endoscopy she describes how this technology helps bringing the body as a subject of inquiry to a larger audience and therefore changing how an entire society sees the human body. The human body has become a body of manipulability as a side effect of using the interactive screen of an endoscope. Thus it is not only the direct interaction with screens that can alter the way we experience the world, it can give opportunities to alter the directly involved but also the general observer of screens.

This view is supported by German philosopher Vilém Flusser, who saw our obsession for visual imagery as symptomatic for the time we life in. In his book *Towards a Philosophy of Photography*[56] he states that we are being programmed by the technical image of photography. He goes on to make a case that we got used and bound in our society to the technical produced image, which means every type of screen that starts from the static screen of the photograph to the interactive screens of our cell phones. It entails that we are no longer independent of our screens: technical images force us their to synchronize with their perspective. He refers not only to the literal perspectives but also screens as transports for ideas. Instead of the conclusion of *already agreement* that Introna Ilharco make we could extrapolate that Flusser argues that we have gotten so used to the imagery that surround us that it could probably have *already agreement*, but that it has a negative influence on us.

The last anthropological perspective that can help us in tackling these challenges is found in a dissertation named *Visions of Illness: An endography of real-time medical imaging*, written by Maud Radstake. In this book Radstake developed a way to look at how the perception of illness and body change using theories from science and technology studies, phenomenology, and medical anthropology. In this work she opens up the perspective to very precisely describe how relations between the screens and the way the body is experience is formed. Her work is exemplary in how

[56] Flusser(2007)

screens can alter the way the body is perceived. The work of these anthropologists will be used in the next section.

Screens in the medical practice

This section will evaluate the differences between studying cases from phenomenology and the just described medical anthropologists. This is especially a matter of the direction of the question. The previous cases started at the theory, worked their way through them and then ended up with an understanding of interactive screens. The cases that will be used here start with an observations of a medical treatment of a patient, Mol, van Dijck, and Radstake use interviews with patients and physicians to base there ideas on. Researching screens this way yields a different insight into screens as we will see in three short examples from these books.

Mol, who researched the ontology of arteriosclerosis observer the following discussion:

"A senior surgeon addressing a junior, in front of a light box on which an angiogram is suspended, pointing at it: 'What, do you want to propose a PTA in this patient? Are you crazy? Come on, that won't be any good, it's almost occluded, here this bit. They never get a catheter through that.'"[57]

This observation is part of a wider argument of how arteriosclerosis is communicated and referred to. It partly shows how angiologists and surgical teams communicate their findings. However, for us it also shows the hermeneutic qualities of the angiogram. The angiogram on the light box serves as a means of communicating results and of teaching the junior surgeon the speciality of arteries. Pointing out the problematic part of the angiogram shows that imagery needs to be interpret. Starting from this point we could similarly argue what which we have found in the third chapter: screens need to be interpreted and that learning to interpret screens is a process.

Thus the addition of anthropological research gives us an extra perspective that is not from an understanding of screens *to* the world, but from a description of the world *to* an understanding of screens.

Another observation shows a different aspect of screens that is relates to the work of van Dijck.

"Mr Jonas also had an operation a few days ago. [..] he was fascinated: "I could see quite a bit of the last operation [..] yes, I thought it was quite interesting. After all it's your own body."[58]

Here Mol describes an observation of a patient that sees a monitor on which the operation on his leg is presemted. Mr Jonas is fascinated by what the screen presents him and even states that the screen presents his body. Here we can argue how screens are embodiment and that this forms a completely different view on the body. A view that is increasingly transparent as van Dijck argues.

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[57] Mol(2002) page 100.

[58] van Dijck(2005) page 18.

On using endoscopy in the human body van Dijck has the following to say (My translations):

"The evolution of an endoscopic perspective is both the result of medical-technological innovations as well as the media that helped distributing it. [..] The endoscopic perspective changed [over the years with technological innovations], but the underlying concept did not change. [..] making the body transparent, while leaving the body untouched. These instruments that made the body 'transparent' did have consequences of how we see that body"[59]

Van Dijck explains here how different screens are not in themselves, but have a wider cultural influence, this of course also holds for all other types of screens. Our need to make the body transparent holds for every incomprehensible complex system where we build screens for. We have seen this in the example of the car navigation devices: these devices changed the way we view our road systems, for good and bad.

Finally Radstake had the following interview with a patient:

"Mr. Theunissen has suffered from chronic bowel infection for almost twenty years. He regularly undergoes a colonoscopy to check his condition especially when he experiences pain or other symptoms.

MR[Maud Radstake]: Did you ever see those kinds of images, except for those of yourself, on television maybe?

MT[Mr. Theunissen]: Okay, byt then it is just an examination you would be watching, not your own.

MR: If you see those images, you know that: this is my body, this is me?

MT: Yes. You can feel that, you know? You feel that the tube is right in your guts. You can feel approximately where they are with that tube."[60]

The argumentation is here that embodied presence and that embodiment of screens is not as simple as it might appear in the theory. All kinds of different factor play different roles. In this case it is visual perception that is couples with Mr. Theunissen feeling the place of the camera.

These books alone have a multitude of other interesting observations of screens that would not easily be described starting from the theory of phenomenology. This case study showed us that the gap between a micro perspective of Ihde and a macro perspective Introna and Ilharco can be filled using anthropological case studies about the object of inquiry. It also confirmed how existential phenomenology could still justify talking about essences of technology, as long as these essences can be seen as multiple.

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[59] van Dijck(2005) page 81.

[60] Radstake(2007) page 123.

We now have a wide understanding of interactive screens from phenomenological perspectives. It has been shown how these perspectives sometimes fails to provide the right materials to be able to understand screens in use, this that has been filled with products of anthropological research. In the following section a final phenomenological understanding of interactive screens will be described as the concluding findings of this thesis.

A phenomenological understanding of interactive screens

It is time to complete and gather our understanding of the interactive screen, this will happen in two phases. First the two separate methodologies that were used in the previous chapters will be given an advice for an alteration of focus or scope. After that a phenomenological understanding will be discussed based on the breath of work in this chapter.

Phenomenological relations

It has become quite clear that a phenomenological approach in any guise lacks a sophisticated way of talking how the interactive screens actively shapes our perception of the world from a perspective of practice. Ihde's narrative concerning technology and the lifeworld implies a perspective that is visible in the framework he developed as we will see.

In his book *Technology and the lifeworld* Ihde uses a thought experiment where he tries to find out what technology is by imagining a world where there is none. He finds its unthinkable for human beings to live without technology after we left the biblical paradise. We then come to the realization that which is missed in the postphenomenology of technology is that Ihde does not return the lifeworld after this initial description. A perspective to the lifeworld is missing. We realize that after two exploded views of screens and 'human-screen-world' relations we also need to collapse this view again to fully appreciate the whole of the screen in the world.

That is to say that we should also investigate how technology appears to us as being part of the world, considering the Lifeworld and Dasein. We should not solely think of technology as an additive to our lifeworld, but also as constituting it. Also letting go of distinction between physical world and technology is in a phenomenological inquiry just as important as making that distinction in the first place. Instead that we research the technological side of the relation and presuppose the lifeworld, we should reverse this perspective and research the lifeworld presupposing an understanding of the technology.

I propose two alterations to the methodologies presented in the previous two chapters to clarify this extra type of inquiry. First, in the traditional approach I would like to add an additional step to the already existing steps of the phenomenological inquiry:

1. Describing a particular phenomenon
2. Analyzing its etymology
3. Performing the phenomenological reduction

4. Investigating essences
5. Apprehending essential relationships
6. Watching modes of appearance
   a. *Investigating practices*
7. Interpreting concealed meaning

This additional point placed between step 6 and 7 will investigate how the essence of a particular phenomenon is applied in our everyday live, returning to the world that we have bracketed in the first place. It needs to research how practices change the way screens are perceived. Step 6 traditionally is "to pay attention to the ways in which such phenomenon appear: the aspects, contexts, perspectives, and modes in which it shows itself"[61]. We need expand that step by investigating a phenomenon also from the perspective of being in the world.

Investigating practices, needs to take place *from* the practice to the phenomenon, not from a proto-essence as a preliminary product of the investigation. This will yield a very rich understanding of the way screens act in the world without arguing from the screen: it complements the methodology and verifies its results.

Second, Ihde describes our being in the world more lengthier than Introna and Ilharco. However, he does not inquire into the relation between the lifeworld and technology, instead he investigates the relation between technology and the lifeworld. Ihde's framework of I - Technology - World presupposes the lifeworld that shapes the initial setting. For a more complete understanding of interactive screens or technology itself we would need to make an addition to this framework to explicitly incorporate the Lifeworld:

(Lifeworld -) Human - Technology - World

This shows the co-constitution of the world through technology, but also points to the Lifeworld as a place of investigation.

If we look at the example of endoscopy in van Dijck's book we notice that the perception of the body only changed due to several factors that are not explicit in a phenomenological understanding of screens. Without an inquiry into the lifeworld itself, as in the work of the anthropologists of this chapter, we would be unable to fully understand the changes that these screens help to make possible.

The essence multiple

Secondly, We should appreciate the methodology of traditional phenomenology as well as the method of postphenomenology, seeing them not as contradicting but as complementing. It also reveals a gap between both these methods, a structural inquiry into either the lifeworld or the Dasein which serves as a fundaments in the previous approaches. The traditional

[61] Introna and Ilharco (2000) page 302.

phenomenological approach has one challenge left: the challenge of the status of essences in existential phenomenology.

Considering the made observations that in existentialism existence precedes essence, and that in empirical philosophy we are able to develop an ontology of a phenomenon that is multiple instead of singular. Then a status of essences can be developed which maintains the ability of phenomenology to talk directly about the phenomenon, not the inherit structure of human consciousness, but is not in conflict with the ideas of existentialism.

What impact does this have on the development of the concept of *already agreement*? It shows that already agreement can take on many forms if we apply them to screens and that what we think as the essence of screens, is mutable over time and per society. It gives the methodology the tools to uncover not only an idea of essences at this point in time, from a western perspective, but also gains the ability to transcend that and uses anthropological studies to see how the essences of screens vary per culture.

An Understanding Interactive Screens

All this finally leads to the question: what is the product of the analysis of interactive screens from phenomenological perspective? We went through the branch of philosophy called phenomenology. We have seen its foundational ideas of a first person perspective philosophy that has the goal to understand the structure of human consciousness. In two chapters we've encountered methodologies of phenomenology to screen, technology and interactive screens. We realized that an inquiry into the phenomenon of interactive screens does not entail only the phenomenon in experience, but that this phenomenon co-shapes the world that we are already in. The results of these inquiries amount to the understanding that will be presented in this section.

Interactive screens are, just as all screens, objects of experience that appear in the intentional mind, but simultaneously co-shape our way of experiencing the world. We can analyze screens as both objects of experience and as phenomenon giving structure to the intentional mind. Pursuing both these directions gives us complementary understanding of the interactive screen.

Interactive screens as objects of experience shows us that screens do not want to be noticed: they evade experience. They present their content of another world to their users. Interactive screens distinguish themselves by letting their users to be immersed into this content.

By interacting with the content of screens, the screen itself disappears even further as an object of experience. The worlds that the screens presents take over the screen as the object of experience. These worlds within the screens do not have to resemble any kind of realism to be understood: they require interaction to be understood. When we immerse ourselves in these other worlds we profoundly alter the structure of our conscious mind. It is not only possible to be aware of the physical world, but any world within an interactive screens can gain a similar status at the physical

world. In a sense we actively create new worlds that are lived in, simultaneously to the world these screens reside in.

Interactive screens will therefore play an increasingly important role in our everyday life. As we continue to engage into relations with the world that do not exist in the physical world but uses interactions on a more abstract level, think of chat messengers, rain radars, to electron microscopes. We will increasingly need to develop sophisticated worlds within interactive screens to be able to keep up with the increase of complexity of daily life. Addition interactive screen will probably further diversify the structure of human consciousness.

It is explained that we have different strategies to be able to fully engage with our surroundings. Our 'technology - world' interaction can be investigated using a framework of interpreting, communicating, and embodying with technology. Screens have grown in their capabilities to interact with the human mind.

A development has been identified where screens start as artifacts that need interpreting, to artifacts that are fully immersive worlds in themselves. Embodied interactive screens are a fairly recent development in our world and it has takes specific social settings to have screens as changing agent of human intentionality, a fact that we can read in van Dijck's work. Without a combination of a long time fascination of the human body as well as widespread media that was able to satisfy this fascination interactive screens would probably not be able to penetrate the medical world as much as it did.

Projecting this understanding of the interactive screen to our future use of screens we can assume that the penetration of interactive screens will become even more ubiquitous. That is if we extend the observations of the use of screens in the past and take into account how fast screens developed to interactive screens that were able to be embodied by their users. Screens will enter probably enter the last relation in Ihde's framework in the near future: a background relation. This will entail that interactive screens will be so intertwined in our world that they completely co-constitute it.[62]

Conclusions

After answering the question in the introduction why screens should be researched, the main question of this thesis was raised: how can we research interactive screens using phenomenology? How did I answer this question? I followed two distinguishable works in phenomenology, I criticizes them, and I added to them using anthropological inquiries.

A phenomenological inquiry as the on Introna and Ilharco did still suffered from a vocabulary that dates from the original research by Edmund Husserl, it had problems developing a clear scope of

[62] Evidence of this can already be seen at Philips research where screens are used to help to soothe the patients by being able to change the room into a room with a view on the beach, underwater, among the stars, etc. See Philip's research technology magazine Password (2009, issue 34).

essences in their methodology. Using contemporary empirical philosophy I showed that although transcendental essences are a dated concept, existential essence can still exist and are to be considered multiple. That to say that theoretically we can develop an essence of interactive screens, although in praxis these ideas of what the essence of phenomenon is can differ greatly. Adding the praxis surrounding screens changes the scope of what we mean with the phenomenon of interactive screens.

Ihde gives a good vocabulary to discuss different aspects of how we can understand technological interactions. Interactive screens can fall in three of the four categories of Ihde's framework. Interactive screens are the only one that can be embodied, which becomes problematic on an existential level.

Ihde, Introna and Ilharco separate technology from the worlds they live in, this important to understand that the thing in itself, the motto of phenomenology, a phenomenon is part of multiple phenomena that interact on a highly complex level. Using medical anthropology we have seen how we can deal with phenomenon which interacts with other phenomenon without needing a holistic view of all technology and technological interactions.

To conclude, interactive screens are vast and interesting subject. This thesis provides a basis to research interactive screens in their many forms the now take. I believe interactive screens will evolve greatly in the next 20 years and I am curious how this will change the way we life experiences our lives.

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