Emotions and Digital Technologies.
The Effects Digital Technologies Will Have on our Way of Feeling Emotions According to Post-Phenomenology and Mediation Theory

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ABSTRACT

Digital technologies are pervasively used, and they are becoming part of our everyday actions by being designed to be connected to every aspect of our private life like emotions. However, it is not very clear how they are going to change who we are through their tight intertwinement. Especially in relation to emotions, it is not clear at all what happens when they become digitalized and visualized through these digital devices. Usually, the research focusses on the effect on the privacy of the intrusion of digital devices in our lives as if this process of digitalization leaves the meanings human beings give to their emotions untouched. This article does not focus on the privacy related to the personal information captured by the devices, but it aims to open an analysis of the effects of this digitalization on the emotions in order to highlight the fact the introduction of these digital technologies change what emotions are.

1. Introduction

Digital technologies are becoming pervasive, and they start to touch every single aspect of our life. We are getting used to thinking of them as devices following our activities. For example, they can track our movements and our locations during the entire day (Bell et al. 2003; Almeida 2015; Fredette et al. 2012), and they are even getting intimate by starting to collect information about our emotional life, our intimate activities, and our feelings (Kreps, Fletcher, and Griffiths 2016). This process has been so much evident, an entire field of research on empathic and intimate technologies is blooming (Blythe 2002), and companies are getting into the development of devices able to detect our emotions like in the case of Amazon which announced it is working on a wrist band activated through voice which can read users' emotions (Bernal 2019; Savov 2019).

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It is well known that our body reacts to how we feel. When we feel anger, we accelerate our heartbeat. When we are sexually aroused, our body reacts by changing the temperature of our skin (Mauss and Robinson 2009; Gauttier 2019). These are "merely" bodily reactions which are not enough to determine what kind of emotions one person is feeling. For example, the increase in the heartbeat might mean different things. However, it is clear there is a relation between bodily activities and what subjects are experiencing emotionally (Drummond 2017; Nummenmaa et al. 2014), and it is possible to design technologies that capture these bodily responses. Moreover, it is possible to have digital devices "mounted" on the users which constantly capture these bodily reactions and a digital system related to them which "uses" the data in different ways.

There is a rising trend in digital technologies relating to such "intimate" data and which uses such personal data to provide a perceptual output (Uğur 2013). The data related to the mood of one person thanks to the measure of the person's physical activities like the heartbeat can be visualized and turned into lights, 3D objects, visual images, and even interactive clothes. For example, these intimate data can be turned into physical pieces of furniture. An algorithm can be used to turn the data into 3D shapes, and these shapes can be 3D printed as physical objects to be placed in the surroundings (Taylor 2014; Syed 2017) like pieces of furniture.[1] The data can also be used to generate an object reacting in real-time with the person's mood. For example, the data can be used to generate a digital necklace projected directly on the skin of one person which pulses according to the emotions felt by the user (Derringer 2014; Rantala, Colley, and Häkkilä 2018). The way emotions are captured in real-time by the sensors on the body enables users to show the emotions to others directly through the use of the necklace.[2] Clothes can be used to show emotions by using lights mounted on them in order to lighten the user with different kinds of colors according to what they feel (Toeters and Marina 2016; Neidlinger et al. 2017).[3]

Even if this trend linking digital technologies to the emotional life of subjects is evident, it is not so clear what the effects of this digital intromission in our lives will be. Usually, the element analyzed by researchers and which raises

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[1] For example, such objects can be produced by the users in order to make even more "personal" the apartment by having the furniture shaped according to the subjects' emotions.

[2] Another example related to necklaces is the use of pendant to communicate with others through light (Ashford and Rain 2014).

[3] Smart clothes can even "disappear" by becoming transparent according to some specific mood of one person, such as in the case the person is sexually aroused (Studio Rooengaarde 2014).

many questions among the public is the privacy related to the data captured by the devices and the "sensible" nature of these data (Wiesner et al. 2018; Talebi, Hallam, and Zanella 2016; Motti and Caine 2015). Monitoring what a person feels can be dangerous for many perspectives, and it is important to understand who can have access to these data and for what purposes since these data are part of our intimate life, and they deeply define who we are (Elliott and Soifer 2010; Krämer and Haferkamp 2011).[4]

However, emotions are not merely passive entities that are felt by subjects as if they were meant to be "collected," but the way emotions are experienced by subjects structures their way of living and what subjects are. Thus, the ability to have a "complete" list of what a subject emotionally experienced is not the only important element related to the introduction of these technologies. It is important to focus the attention also on how subjects change what they are and their way of living because they experience emotions differently.

This paper will focus on how we might change the way we experience our emotions and the meanings we give to them. More specifically, the paper will focus on what happens to emotions when people will start to use these technologies following a phenomenological approach.

The paper will be divided into two main parts. The first part will focus on what emotions are following a phenomenological analysis. It will show how emotions structure what subjects are and how they relate with other people starting from how subjects experience them. The second part will focus on the introduction of new digital technologies following postphenomenology and mediation theory. This part will show how these technologies are not neutral by becoming part of the body of the subjects and how they deeply change what emotions are for the subjects.

2. Emotions and phenomenology

Emotions have been analyzed according to many different perspectives by focusing on different aspects. Even the definition of what we mean with the term "emotion" is problematic since emotions can be identified in different ways in relation to similar feelings like moods and sentiments (Desmet 2002). It has been studied their relations to body and mind by highlighting their interconnections with corporeal activities and mental processes (Picard 1997) and if they

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[4] Who has access to our data related to emotions can define a much more detailed profile of the subjects.

should be related to rationality or not.[5] Moreover, it has been proven that the emotions felt by one subject shape the way they perceive the world around them. For example, when one person is looking at an awesome waterfall, the perception of the waterfall would be lost if we exclude the "awe" felt in relation to it (Drummond and Rinofner-Kreidl 2017). Some authors highlighted even that emotions are not merely related to one single individual, but they are "collective" like in the case of grief in Scheler. The moment two people gather to mourn the death of a friend, the grief they feel is embedded into the group and not merely into one single individual (León and Zahavi 2016; Salice and Taipale 2015; Salice 2015; Scheler 1973).[6]

Without going into further details of these analyses, it is clear emotions have aspects which can be manifest to everybody around like facial expressions and gestures and others which are "hidden" and invisible to the eyes of other people because they are related to invisible bodily reactions like subjects' heartbeat (Picard 1997)[7]. For example, when one person feels fear, the body reacts in visible and invisible ways like facial expressions and by changing the heartbeat. These two aspects of emotions enable subjects to be affected in what they think of themselves and, at the same time, to express how they feel to the people around shaping how subjects relate among themselves. Phenomenology shows these two elements and their effects in a very clear way.

According to phenomenology, emotions are not merely part our perception like in the case of a waterfall where the perception of such an awesome object is pervasively embedded with the emotion of "awe" perceived with it. Emotions shape also the way subjects look at themselves and the way they relate to other human beings. Thus, they are not merely "felt" by one subject, but they shape subjects' identity and the way they are socially active in the world. For example, emotions like shame are not merely "felt" by one subject, but they directly shape the way people look at themselves and their own identity (Dolezal 2017; Draghi-Lorenz, Reddy, and Costall 2001).

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[5] Especially the relation to the body has been made because emotions seem "blind" and they are felt by users with their bodies (Magrì 2018). However, it is possible to relate them to mental processes and rationality since, according to Solomon (Solomon 2007), they "fit into a person's overall purposive behaviour" (Magrì 2018).

[6] More generally, especially in phenomenology, there have been many works related to how we feel emotions and what they mean for us (Magrì 2018; Venier 2016).

[7] Even the use of clothes can show the emotions felt by subjects (Eco 1986).

Maybe one of the most famous analyses of emotions in phenomenology is the one related to shame in Sartre (Sartre 2001; Gray 2016; Overgaard 2013). Sartre clearly shows how shame shapes the subjects by being part of what they are. He analyzed the case of a man looking through the keyhole of a closed door. Sartre highlighted how the emotions related to the action of looking through the keyhole are as important as what the subject perceives through the keyhole. The shame felt by a subject because of the presence of other people around make the person look at themselves in a different way and it shapes how the subject lives in the world with other people (Menesini and Camodeca 2008).[8] Shame is not the only emotion having such effects. We can find many other examples on how emotions triggered by the presence of other people shape how subjects think of themselves and how they act towards others like in the case of love, grief, jealousy, and trust in classic authors such as Merleau-Ponty (Merleau-Ponty 1964), Husserl (Ferrarello 2019; Husserl 1973, XIV:172–73; Hadreas 2012), Beauvoir (Beauvoir 1989), Stein (Painter 2007), and Scheler. For example, love does not merely "happen" without producing any effects. Subjects in love change how they look at themselves and how they are linked with other people allowing new discourses and relations among them (Merleau-Ponty 1964; Husserl 1973; Hadreas 2012; Hammock and Richardson 2011).

As previously shown, emotions have elements that are "hidden" from the eyes of other people. The way subjects look at themselves and the way they structure the relation with other subjects are directly related to the "hidden" elements as much as the "visible" ones. Thus, when subjects can use technologies that change what it is "hidden" and "visible" to other people, the way subjects look at themselves and the way they relate to others change accordingly. The paper will introduce postphenomenology and mediation theory in order to get into more details on the effects of such a technological introduction into our emotional life.

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[8] The reason why Sartre is interested in such an analysis is to introduce the "gaze of others" and so to open the constitution of the subject to the effects other people around might have (Lopato 2016), and this paper is not interested in this topic. However, it is still a clear example of how emotions directly affect the way people are constituted.

3. An application of postphenomenology and mediation theory

The postphenomenological approach helps to focus on the effects of having technologies "close" to the body of the user by showing how technologies[9] are not neutral and how they change what the body of the user is (Ihde 2009; Verbeek 2005; Rosenberger 2014).

The body of one subject can be extended through the use of technologies the moment the technologies are in an "embodiment relation" with the user (Ihde 1990; Liberati 2016).[10] According to postphenomenology, our body is not strictly defined, but it constantly changes according to our actions and what we use.[11] A subject can act through technology as if the technology were part of their body. A classic example is the use of glasses. A subject looking through the lenses does not perceive the glasses as a perceptual object. The subject perceives what is beyond the lenses by looking *through* them (Liberati 2013; Bray 2000; Ihde 1990). In the perception, the glasses "withdraw" allowing the intentional act of the subjects to be directed towards the objects around without forcing the subjects to look at the technologies used.

In order to clarify this idea, we can think of the phenomenological schema of perception as a "naked" subject "intentioned" towards the world (S→W). Now, with the introduction of a technology in an embodiment relation, the subject is turned into a nucleus composed of the subject and the technology ((S-T)→ W) (Liberati 2015).

Naked body: S→W

Technologies in embodiment relations: (S-T)→ W

In the first case, subjects look at the world using their "naked eyes." In the second case, subjects look at the world through the use of a technology like glasses. The glasses are not part of the world since they are not the perceptual objects

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[9] The term "technologies" is used in line with postphenomenological terminology as opposed to the term "Technology" with a capital "T." This choice highlights how technologies are different. Technologies cannot be analyzed in general, but they need to be taken into consideration by focussing on how each of them relates to the subjects in their different ways.

[10] For example, there are hermeneutic relations where a subject *reads* an instrument in order to understand the world. A classic example is the use of a thermometer. In this case, a subject looks at the scale on the thermometer to read the temperature of a certain object in the world without being directly exposed to that temperature.

[11] This conception of the body is directly related to the concept of the living body [*Leib*] we find in phenomenology (Liberati 2014).

the subjects focus the attention on, but, at the same time, they shape the perceptual capabilities of the subjects as if they were part of their naked eyes. The subject perceives the object with the addition of more details and distortions thanks to the lenses.[12] The technology, even if it is a tool used by the subject, has to be considered part of the body of the subject in terms of the intentionality the subjects have and of their perceptual capabilities.

Many different technologies can be in an embodiment relation with a user, and they have different effects on how the body of the user is shaped. For example, a cane or a feathered hat can be in an embodiment relation with a subject. The use of these technologies produces a change in the body schema of the subject by affecting how the subject moves in the environment (Merleau-Ponty 1945; Gallagher 1995; Poeck and Orgass 1971; Gallagher 2005; Watson 2007). In the case of the cane, even the image body and the perceptual capabilities of the subject are changed by the technology since the cane becomes an essential part of the idea of the body a person with disabilities has as if the cane were a "third arm." Moreover, through the use of the cane, the person can tactually perceive the surroundings and touch distant objects as if they were "close" (De Preester 2010; De Preester and Tsakiris 2009). Thus, many aspects of a person are modified by the presence of these tools, and they are shaped by the technologies used.

According to postphenomenology then, technologies in embodiment relations are not merely "used" by subjects as if the subjects were left "untouched" by the use of such tools, but the technologies deeply change what the subjects are through their use. When a technology is in an embodiment relation, the subject merges with the technology, and so the subject using a tool is not the same subject as before using it. This aspect has deep and direct effects on how people live in the world, their motivations, and their actions. A man walking with a cane is not the same of a man walking without the use of such a tool since the man with the cane has a different way of walking, a different way of perceiving the environment, and even a different idea of who he is since the cane is perceived as a third arm. The way of walking and the perceptions of the blind person are reconfigured through the presence of the technology.

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[12] Postphenomenology clearly states that the use of a technology does not "improve" the perception because every technology introduces magnifications and reductions. In the case of glasses, the subject perceives more details, but, at the same time, the use of lenses also introduces chromatic aberrations and distortions (Ihde 1990).

Moreover, the technologies in an embodiment relation cannot be easily separated by the subjects since they are tightly interconnected with their body. The new nucleus composed of the subject and the technology has to be considered as if it were composed of one element only. When a person uses a technology like a pair of glasses or a cane, the person changes, and it becomes impossible to think of the "naked subject" without also losing the new actions and perceptions made available by the technologies.

These effects of technologies become even more obvious in the case of other technologies like a gun. A person with a gun is not just the same person with the "addition" of the ability to shot, but the subject is reshaped according to the presence of this technology. For example, when a person has a gun, everyone around the gunman is turned into "shootable" beings. This effect does not add merely the ability to shoot to the subjects, but even the act of looking at other people is already framed by the presence of the gun which changes the way of looking at its very fundamental level.[13] The moment a technology is introduced, it is impossible to refer to the original subject since this introduction changes what the subject is.

This second way of tackling the topic by focusing on how the technologies enframe the subject in the very first place has been deeply analyzed by mediation theory (Bantwal Rao et al. 2015). According to mediation theory, technologies do not merely change how we perceive the world, but they also change what we think of the world (Kudina and Verbeek 2018).

The classic example used in mediation theory to show such effects is the obstetric ultrasound technologies needed to visualize fetuses (Verbeek 2008). Through these technologies, it is possible to perceive fetuses while they are in the womb of the mother. The ethical questions and the meaning of what to be a parent is are shaped by the use of the technologies (Verbeek 2011). When they have a technology that can show some "problems" in the pregnancy and the fetus, parents are forced to decide what to do and if to end the pregnancy. Thus,

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[13] This "simple" element enables postphenomenology to answer different questions related to the effects of technologies on the users. For example, in the case of the sentence "guns do not kill people, people kill people," postphenomenology states that this sentence does not recognize the fact people with guns are different because the gun modifies their own body. In line with Sartre, who analysed the presence of a gun in the hand of one person in one of his novel *Erostratus* (Sartre 1939) showing how one person changes the way of looking at other people just by having a gun in the pocket because other people are turned into "shootable beings", postphenomenology highlights how the person with a gun has a different way of looking at the world just because the possibilities of actions are different.

the ethical questions, the values, and the meanings related to being a parent change because a technology provides new information by forcing parents to make choices that before did not exist. It is not just a question of how parents perceive the fetus, but the introduction of such technologies changes also what to be parents is since to make such choices becomes part of being a parent the moment these technologies are used in society. Technologies directly shape the ethical questions, the meanings, and the values people live with (de Boer, Te Molder, and Verbeek 2018).

Thus, postphenomenological analysis and mediation theory show how technologies in an embodiment relation change the users in two main aspects through the introduction of the new nucleolus composed of the subject and the technology. The first one is related to how the actions, motivations, and perceptions of the subjects are generated. The simple fact there is a technology involved that becomes part of the body of the user means the actions, motivations, and perceptions of the subject are different from the usual actions a person might have without the technology. The second effect is related to how the subject merges with the technology so deeply that it is not possible to go back to the "naked subject" without losing the actions, motivations, and perceptions of the new technologically embedded subject.

The technologies related to emotions introduced in the first part of the paper are in embodiment relations with the subjects since people act through them without noticing their presence like in the case of the glasses. For example, in the case of clothes which change colors according to the mood of one person, the subject acts through them in the everyday life without focusing on the presence of their clothes even if they constantly show what the user feels to people around. When the user talks to other people, the talk is framed by the presence of clothes that shows what the user is feeling. In the case of the necklace, the heartbeat of the user becomes visible, and so the user acts in the world while showing the heartbeat through the technology. Therefore, these technologies are part of the users' body, and they shape the users in the same two different ways of the pair of glasses and the cane of a blind man.

Firstly, the actions of the subject are related to the presence of the technology as if they were part of their bodies: subjects will act and perceive through the presence of these technologies. For example, in the case of the clothes which becomes transparent the moment the subject feels sexually aroused, the simple fact of wearing such clothes allow other people to see how the subject feels directly making the user more "exposed" and more "naked" than in the case of

usual clothes. Thus, the technology makes the subject feel shame in new situations just because the smart clothes enable the other people around to access the emotions bodily felt, and because the clothes expose what was "hidden" before. As Sartre highlighted, emotions like shame deeply shape what a subject is and how they relate to others, and so the fact a person is more "exposed" to the eyes of other people through the use of certain technologies like these new clothes change also how a subject look at themselves and how they relate to others. A necklace showing how much one person loves another person allows a different way to relate to the other person by making visible aspects of the emotions which previously were "hidden." For example, a subject can show more visibly how happy they are of meeting a special someone. This different way of being "exposed" and being "visible" to others changes what subjects are according to phenomenology by directly shaping how subjects look at themselves and how they relate to others.

Secondly, it is not possible to go back to the "naked subject." Thus, the capability of expressing the emotions bodily felt visually is not something "added" to the usual emotions as if the emotions were left "untouched" by the introduction of technologies. These technologies change what emotions are like in the case of the gun where the technology does not "add" capabilities, but it enframes the subject differently by changing what to look at other people is. Thus, emotions expressed through these devices are not the same of the "unmediated" emotions which were able to be expressed without the devices because the technologies enframe what emotions are in a different way.

As we showed, emotions have manifest bodily reactions like facial expressions and gestures which can be perceived by other people (Ramos, Dadiz, and Santos 2020; Grynszpan, Martin, and Nadel 2005). The subjects can partially control these manifest aspects. For example, even if some facial expressions like the one produced by "disgust" are involuntary, the subject can train themselves to mask what they feel and partially hide their emotions (Iwasaki and Noguchi 2016). However, now, with the use of these new devices, emotions are linked to physical responses that were previously hidden and which cannot be trained so easily as the change in the heartbeat.

This simple change has the potentiality to shape the way people live their emotional life by allowing other people to access it in a much more direct way without the possibility to mask and hide it. What other people will perceive is not the usual manifest aspects of the emotions felt by one subject which can be controlled like facial expressions, but also the hidden aspects which usually are

out of the subjects' control like the heartbeat. Thus, the emotions can be lived in a much more "open" and "accessible" way by the entire community and with fewer possibilities to "hide" something from other people. The designer Neidlinger (Neidlinger et al. 2017) clearly shows this possibility by turning the word "intimacy" into "extimacy" highlighting how what is usually considered as "intimate" and "hidden" because "inside of us" might be turned into something "open" and visible from the "outside".

Another possible effect produced by the use of this kind of technology is linked to the way subjects relate to emotions more in general. The moment emotions are not merely something "felt" by subjects, but they are visible and perceptual objects, they can be used for different purposes related to this new aspect like to be pieces of furniture in an apartment. For example, emotions can be traded as objects, and they can become part of fashion. Thus, more in general, emotions are slightly changed since they become perceptual objects visible to others and enabling subjects to have different praxes and meanings related to them.

4. Conclusions

In conclusions, the paper showed how new digital technologies directly aims to be linked to subjects' intimate life. Usually, the attention is focused on the questions related to privacy since emotions are perceived as something intimate which should not be "readable" by everyone. The paper showed how there are different elements in the use of these technologies which are not related to privacy, but they are related to what emotions are for us and how they change through the use of these technologies.

In the first part, the paper showed how emotions are not merely something felt by subjects, but they define what the subjects are in how they look at themselves and how they relate to other human beings around. Thus, by changing how they are experienced by subjects through the introduction of new digital devices, it is possible to change also what the subject is and how they live in the world.

The second part focusses on such changes by showing how the technologies are not neutral. Technologies can become part of the subject by being intertwined with their body, and this intertwinement has two main consequences. Firstly, every experience of the subjects is shaped through the use of these tech-

nologies as if the subjects had a different body. Secondly, even the meanings related to emotions change with the use of these technologies because these technologies do not merely "add" the ability to show emotions in a different way, but they change what emotions are. The moment emotions become perceptual objects, they turn into something which cannot be "hidden" and which are always "manifest" to the others. Moreover, this new aspect allows people to link different praxes to them related to their new perceptual aspect.

Obviously, the privacy of the data and the way our emotions are captured and stored into a database is important, and these technologies can be seen as a way to erode our privacy by peeping into what is most intimate and private for us. However, at the same time, emotions, their meanings, how we feel and live with them change with the use of these technologies as well. It is not merely an attack to our privacy, but it is a way to reconfigure and redefine what emotions are for us.

We are not going to be the same subjects as before because these technologies will become part of us, and emotions will not be the same as well because they will embed new digital perceptual elements coming from the use of these technologies.

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