Exploring the Non-Medical Ultrasound Scan

A postphenomenological study of maternal effects

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Abstract

The non-medical ultrasound scan has become a common part of present-day pregnancies in Denmark. However, the actual effects and implications of these scans on expecting mothers remain uncovered. This master thesis therefore sets out to explore how non-medical ultrasound scans affect expecting mothers during low-risk pregnancy. It does so with an exploratory *postphenomenological* approach to the research field, employing semi-structured interviews with expecting women, as well as field observations in clinical practices, where non-medical scans are carried out.

Five main themes are identified in the fieldwork material. These themes are analyzed and unfolded by the use of the theoretical concept, *mediation theory*, which is founded in the postphenomenological tradition. Through the analysis several perspectives on the relationship between the non-medical ultrasound and the expecting women is explored. Concluding, it shows that this relationship results in a variety of effects for the women, and that these effects are generally related to better coping and management with pregnancy. Finally, it is found that discussing the implications of these findings, points to several perspectives of relevance to study further in order to secure and form responsible practices surrounding the non-medical ultrasound scans.

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1.0 Introduction

Fetal ultrasound has become a common and conventional part of present-day pregnancies in Western cultures (Kroløkke 2010). In Denmark, 97 pct. of pregnant women accept the public offer regarding prenatal diagnostics, which includes two ultrasound scans. Prenatal diagnostics has been an offer for all pregnant women in Denmark since 2004. The program consists of a blood sample from the mother between 8th and 13th week of pregnancy, a so-called double test that combined with a nuchal scan between week 11 to 13, and the maternal age gives a risk evaluation of chromosomal aberrations such as downs syndrome and other malformations. The nuchal scan and the blood sample can be performed separately, but gives the most accurate evaluation in combination. If the total risk evaluation from these tests turns out high (smaller than 1:300) the woman will be offered further tests. The offer of prenatal diagnostics in Denmark has recently been revised, and from March 2017 women with a risk evaluation following the prenatal diagnostics of 1:300 or more, or with other risk factors (e.g. age over 45) will be offered a new non-invasive test called, NIPT[1], before using an invasive test. The invasive tests are either a biopsy from the placenta or a test of the amniotic fluid. These tests are more intrusive and carry a risk of miscarriage. Another addition to the previous guidelines is, that the chromosomal examination of the tissue from the invasive tests is to be extended with a so called chromosome microarray, which is a very detailed chromosomal investigation that in comparison to the earlier test is more precise and can trace even more abnormalities and imbalances.

The nuchal scan, also referred to as the first trimester scan, is also offered to those women, who choose not to get a risk assessment. This is in order to confirm that the fetus is alive, the number of fetuses and to determine the due date.

The prenatal diagnostics program also features an ultrasound scan between weeks 18 and 20 of pregnancy. This is a thorough scan of the fetus' organs to check for malformations, fetal growth and placental location.

(Sundhedsstyrelsen 2013, Sundhedsstyrelsen 2017, Kjeldset 2017).

Besides the prenatal diagnostics, ultrasound scans are used for a variety of obstetrical reasons and medical indications.

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[1] An abbreviation for Non-Invasive Prenatal Test (Sundhedsstyrelsen 2017)

Ultrasound scans has evidently become a technology frequently used in antenatal care, but not only in the public hospitals and maternity clinics. Since the beginning of the 2000's we have seen a growing tendency of future parents seeking non-medical ultrasound scans[2] (n-US) in private clinics that are beyond the public offer and recommendation[3]. There are no public records of how many expectant parents purchase extra scans (Thorup & Zingenberg 2014). Even without these statistics the tendency seems clear both in the public and professional debate, and accounts from private clinics support this claim. A private ultrasound clinic in Odense estimated that they increased their profits with 30 pct. over just a couple of years (Politiken 2010), and another Danish clinic in Aalborg recounts an annual increase in ultrasound scans at 16 pct. since they opened in 2006 (DR Nordjylland 2016). A study including 645 pregnant women from the area of Copenhagen, performed at Herlev Hospital, showed that 24 pct. of these women had bought n-USs before week 20, and 29 pct. of the women who hadn't already purchased an extra scan were considering doing so (Thorup & Zingenberg 2014).

The tendency is quite obvious - increasing numbers of expecting parents in Denmark turn to private clinics wanting n-USs. But why do they turn to this option? There are a variety of possible answers, but in overall terms it has to do with the immense development and the availability of the technology.

Multiple scientists and professionals from different disciplines and professions such as sociology, anthropology, feminist scholars, and health sciences have investigated the increasing demand for scans. They have all contributed to illuminate this inquiry in various ways that form an important outset for the relevance of my thesis, why I will investigate some of the most relevant in the following.

Apart from a bonding effect, we know little about Danish expecting parents' motivations for seeking n-USs. A study at Herlev Hospital showed that women bought additional scans in order to check fetal health and development, to find out the gender

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[2] This term, when used in this thesis, is defined as ultrasound scans performed for no medical or obstetrical indications and that are paid for privately, also referred to as commercial scans.

[3] In a public letter to expecting parents the Danish Health Authority states that prenatal ultrasound scans, beyond the ones included in the public antenatal program, are considered unnecessary. They urge parents to be cautious in regards to scans that are not medically indicated, and that parents should be aware that the person conducting these private scans is qualified and experienced (Sundhedsstyrelsen 2015).

and/or for other non-specified reasons (ibid). Similarly, and adding to this report, a British study by Roberts et al. defined five main reasons for buying commercial scans: 1) finding out the sex of the baby, 2) reassurance, 3) seeing the baby, 4) acquiring keepsakes and 5) facilitating bonding (Roberts et al. 2015). Roberts et al. base their study on a need for more research within particular local contexts, to fully grasp women's motivations for engaging with commercial ultrasound services. This need is argued on the basis of a literature review of current and relevant research made in this area of focus (ibid).

In their study, Roberts et al. also found that commercial scans offers an alternative to the scans offered by the public routine care, since it allows expecting parents to seek both information and pleasure, and with a more adequate amount of time for the session, which is in demand. Likewise, they point to the fact that the partial domestication of the ultrasound technology that commercialization has brought along, grants women more choice over when and how they use ultrasound scans (ibid). Finally, Roberts et al. demonstrate in their study that there are many discourses at play, when looking into, why expecting parents seek commercial scans. On one hand, they find that there might be a general acceptance of pregnancy as risky, which results in a greater need for surveillance medicine. At the same time they found discourses around the use of the technology as part of what is perceived as 'good parenting', since it amongst others facilitates bonding and appropriate preparation for the baby (ibid). Charlotte Kroløkke[4] has researched ultrasound technologies within the notion of "biotourism"[5]. In her prizewinning research study *Biotourist Performances: Doing Parenting during the Ultrasound* (2011)[6], Kroløkke finds that ultrasound sessions are material as well as discursive and social (Kroløkke 2011). The event is material since many materialities are involved, and they create different haptic sensations: from the gel

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[4] Charlotte Kroløkke is professor at University of Southern Denmark, Department for the Study of Culture and has a PhD in communication and gender studies.

[5] A notion that is still in its infancy, and that is founded in feminist scholarship of visual culture and medicine. Kim Sawchuk originally defined the term "biotourism". It frames the notion of 'travelling in the inner body' by the help of technologies (e.g. 3D fetal imaging) (Kroløkke 2010). *"... a characteristic of biotourism is the ability to transform inner space into a type of landscape, or, more precisely, a bioscape that can be mapped. In this mapping of the interior body, the biotourist metaphor invokes a 'rhetoric of pilgrimage' in which the technological experience is somehow 'sacred'. We travel to never-before-seen space only to return with an awe-inspiring experience, transformed by it."* (ibid:142)

[6] In April 2011 Charlotte Kroløkke was awarded the Kraka prize for this study (Information 2011)

on the pregnant belly, to the photos printed and the ultrasound apparatus used. Like Roberts et al., Kroløkke also finds that the sessions are highly discursive: *"The narration personifies the fetus, transposes the uterus into a home, and transforms individuals into parents and families"* (ibid:33). Finally, it is often a collective experience, where family and friends are invited to participate, making it a social event that also makes otherwise private experiences semipublic. Furthermore, Kroløkke argues that 3D/4D ultrasound sessions (since these are the scans involved in her field studies) are *biotourist performances*[7], and that viewing them as such creates a productive metaphor for understanding the dynamic aspects of these experiences. Kroløkke elaborates: "*The ultrasound session is a highly mediated event that mobilizes and reconfigures inner space while simultaneously positioning clients as coperformers or spect-actors"* (ibid:33). It becomes a tour into the womb, which offers an opportunity to explore new identities and engage in them, and the session is both embodied and performed. Furthermore, her observations from respectively a clinic in Copenhagen and a clinic in New Mexico (US) show a cultural significance to how fetal visualization is addressed, by the use of culturally recognizable metaphors. Concluding, Kroløkke states that the data from her study raises questions related to the performance of gender and parenting as it takes place in an experience-driven pregnancy culture (ibid), and thereby prepares a ground for a discussion about the implications of these ultrasound scans. In an earlier study from 2010, *On a Trip to the Womb: Biotourist Metaphors in Fetal Ultrasound Imaging*, Kroløkke also touches upon these potential effects of non-diagnostic ultrasound sessions. In this study, she analyzes the interplay between pregnancy and visualization technologies by analyzing web sites from ultrasound clinics in Denmark and the US. Here it is amongst others found that: *'The non-diagnostic 3D/4D ultrasound transforms pregnant women to mothers, in the process casting the technology as a "natural" part of the pregnancy experience'*, but

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[7] This is a constructed concept that bridges the work on *biotourism* with tourism and performance studies. Kroløkke explains that her hope is that this concept will contribute in further developing *biotourism*. Touristic performances are defined as social, collective events that unfold during touristic events. Combining this with *biotourism* strengthens it as an analytical concept (Kroløkke 2011). Kroløkke elaborates: *"When the ultrasound session is viewed as a biotourist performance, focus rests on the staging and scripting of the ultrasound session as well as on the prospective parents and sonographers who become coperformers or spect-actors and jointly participate in the performative nature of the session."* (ibid: 20)

also that there is a need for research on women's own stories and encounter, and on their performances (Kroløkke 2010).

Summing up the above, it shows that there are multiple reasons and motivations for expecting parents to seek n-USs during pregnancy. Here Roberts et al. points to five main reasons, that also backs motivations found in the Danish study by Thorup & Zingenberg. Furthermore Kroløkke's studies teach us more about the actual experience of the n-USs, by viewing it as a material, discursive and social event, and framing it with the notion of '*biotourism*'. Simultaneously, it is clearly implied that these scans have an effect on the pregnant women, partners and families that seek the scans, stating that they transform women into mothers. It therefore leads to a questioning of the actual effects and implications of n-USs in pregnancy. It raises questions such as whether it promotes the feeling of wellbeing and safety, and therefore has a positive effect on individual performance during pregnancy? Or can it in fact be the root of even greater concerns? Not many studies specifically handle or focus on the effects and outcomes for the women and families that have undergone one or more n-USs, even though a few, as we have seen, touches upon it. Grit Niklasson, a Danish researcher and associate professor[8], focused her Ph.D. on how, and to what extent new knowledge and new technological and societal-provided opportunities, that has become available in recent years, are employed and thus affect the phase of life that pregnancy represents (Niklasson 2014). Niklasson does not specifically investigate the ultrasound technology, but different technologies used prenatally, with a special attention to the antenatal risk evaluation offered in Denmark. There were women in her study that bought commercial scans. Niklasson finds that technology[9] is the theme in her empirical data with most variation concerning maternal opinions, and that evokes the most ambivalence towards its justification. Nevertheless, paradoxical the theme had the most aligned practice connected to it: almost all women accept the diagnostic opportunities that the technology offers them (ibid).

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[8] Grit Niklasson's CV encompasses several academic achievements. Grit began her professional career as a midwife in 1984, but later on she became a social worker, and advanced this degree with a Masters in social work in 2003. On top of these degrees Grit also completed a bachelor degree in social education in 2010 and just four years later finished her Ph.d from Institute for Sociology and Social Work at Aalborg University (Niklasson 2017).

[9] Technology refers to physical tools that are used for examinational and diagnostic purposes, and more specifically the antenatal risk evaluation and the associated examinations (Niklasson 2014).

In Niklasson's research the notion of safety/security is balanced on a razor's edge, when discussed in relations to ultrasound technology used in otherwise low risk pregnancies (whether medical or non-medical scans). Some find scans joyful and reassuring, while others find that it can be a promoter of insecurity, concerns and alienation (ibid). Furthermore, it is problematized in Niklasson's study that a technology, such as ultrasound, which use is developed for monitoring pathological conditions is now a common used tool in normal pregnancies. The relocation of the technology into the domain of low risk pregnancy has lead to a new status, new consequences and problems. This is elaborated and exemplified by Niklasson: *"A restraint of bonding to ones unborn child before the technology has ensured, that the fetus is normal – an uncertainty about the detection of something that might be abnormal, and maybe not – a realization, that you are in a position of choice-making, that you had rather been without."*[10] (ibid). This relocation might be the result of a strong media focus on high risk pregnancies and medical interventions in births, that cause otherwise healthy and low risk pregnant women to see their pregnancy as potentially problem- and risk filled, which leads to a stronger dependency of medical knowledge and access to interventions. Whatever the reasons are for the increased use, Niklasson states that the very existence of the technology has resulted in the use of it becoming a matter of course (ibid). Concluding, Niklasson finds that there is a need for a more reflected use of technology in low risk pregnancy. The consequences of its use and how it is discursively constructed needs to be considered in order to justify and legitimize its use (ibid).

From reviewing the current research field, we see that the use of the ultrasound technology, in relations to normal pregnancy might evoke both the feeling of safety and insecurity. It seems that there is a tendency of women trusting the technology over their own intuition and feeling of wellbeing, which might be the result of a more risk-focused society. This is also detected from debates on several social media sites, e.g. one user posts out this concern on a social-site for expecting parents:

"Hi. Today I am 4^{+6}, and from this site I see that all of my concerns and thoughts are normal. My doctor won't do a blood test until 19/2 and a medical at the beginning of March. I'm considering buying a 'reassurance scan' in order to eliminate the fear of

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[10] This quote is originally in Danish and has been translated by the author of this thesis.

i.a. pregnancy outside the uterus. Does anybody have experience with this? Does it

dampen your worries or is it 'adding fuel to the fire'?" (User, Min-Mave.dk 2015).

The quote is illustrative of some of the discourses surrounding n-USs, and indicates a present-day need for visual proof and factual knowledge, even when there is no medical indication or reason. In addition, it seems that it is presumed that knowledge equals safety, as another user pinpoints:

"We have booked an early scan in week 8. We have chosen this, because we really want

to see the heart blink, so that we can feel safer. We have to pay 400 kr. + 50 kr. to get to

take home all of the pictures on a USB key. And I will gladly give that amount of money

for the reassurance" (User, Min-Mave.dk 2017).

Eventually, what we see is a high number of expecting parents purchasing n-USs for different reasons, but what the possible effects and implications are of this tendency in relations to factors such as maternal wellbeing and performance[11] during pregnancy are unclear. Does it in fact promote performance, by e.g. leading to a feeling of bonding and reassurance, or might it lead to an even higher dependency on ultrasound imaging (and perhaps other technologies e.g. fetal heart rate monitoring) in order to feel safe. Furthermore, investigating the implications of n-USs leads to questions about the normativity and morality surrounding the use of ultrasound scans. If it e.g. leads to a parental empowerment, then maybe it should be included in the public offer, since it is a technology that not all parents can afford. On the other hand, if consequences are that it leads to a worse performance, then it is important to discuss how commercial scans are used, including the discursive construction, so that parental performance can be ensured.

After outlining the current research field and with this the missing knowledge base, I can now outline the problem area for this master thesis; the maternal implications of n-USs during low-risk pregnancy. The delimitation of this problem area will be elaborated upon in the paragraph: 1.2 *Delimitations*.

When exploring this field, I will obtain a postphenomenological approach, and thereby pertain to a sociotechnical perspective on the inquiry. Drawing on the

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[11] I here use the term performance, as a unifying concept for the way that pregnancy is managed and coped with. The term, when used here, is not bound to a specific theoretical concept.

postphenomenological framework, contrived by Don Ihde, and the theoretical concept of *technological mediation*, or *mediation theory*, composed and developed from the postphenomenological tradition, I wish to explore expecting mothers' experiences with n-USs in private clinics. A postphenomenological approach is in this context evident, since it in various ways seeks to study human experience in relations to technologies (Rosenberger & Verbeek 2015). In fact, postphenomenological studies concerning the ultrasound technology have already been conducted. Peter-Paul Verbeek, a main character within the postphenomenological tradition, has studied the relation formed between the obstetrical ultrasound and its users, with special attention to how moral actions are shaped by this relation (Verbeek 2011). The postphenomenological tradition and the theoretical framework will be further elaborated upon in the following chapters (cf. 2.0 *Methodology* and 3.0 *Theoretical Framework*).

This research study will furthermore be of exploratory character, meaning that it with a rather open-ended approach to the field pursues a curiosity and wonder about the effects of the technology in question. An exploratory approach allows me to pertain an open mind regarding the inquiry, instead of attending to what might be wrongful and unjustified presumptions about hypothetical implications and consequences.

Summing up, this introduction opened up by laying the grounds for understanding the use and the original purpose of the ultrasound technology during pregnancy in the public sector. Afterwards current-day practices were explored, where we find that there is a clear tendency of more prospect parents seeking n-USs in private clinics. Current research conducted within this area was reviewed, which amongst others led to a deeper understanding of parental motivations for seeking these scans, from studies like the one carried out by Roberts et al. Furthermore, Kroløkke's work enlightened us on the actual experience of the ultrasound, more specifically the 3D scans, and the materiality and discourses involved in this experience, when investigating it as '*biotourism*'. Finally, Grit Niklasson's research touches upon the potential effects that the use of the technology might have, when relocated to an arena where it wasn't initially intended. Niklasson finds that there is a need for a more reflected use of the ultrasound technology in low risk pregnancy in order to justify its use, since its consequences and implications are uncertain and unpredictable.

A dependency on the technology, but with unforeseeable implications was also strongly

indicated on social media sites that were subsequently explored.

The exploration of the research field finally led me to outline the problem area for this master thesis: the maternal implications of n-USs during low-risk pregnancy. Concluding the chosen theoretical approach for the exploration of this problem area, postphenomenology, was briefly elaborated upon.

This exposition leads me to the following problem statement.

1.1 Problem Statement

How does non-medical ultrasound scans affect women during low risk pregnancy?

1.2 Delimitations

To focus the research I have chosen to include low risk nulliparous[12] and primigravida[13] women, and therefore deselecting multiparous and women with complicated pregnancies. This selection criterion was obtained for different reasons that will be elaborated upon in the methodology section, but generally, these women might come with other needs, personal as well as obstetrically, for surveillance during pregnancy that might be deciding for their choice regarding n-USs. Regardless of these interesting and yet relevant perspectives, I prioritize a more focused approach, which is necessary in regards to the limitations and extent of this master thesis.

As briefly touched upon in the introduction, the tendency of increasing numbers of prospect parents seeking n-USs, is not limited to Denmark. It seems that it is generally seen across western cultures, as Kroløkke states (Kroløkke 2010). In consideration of the thesis' limitations and focus, I choose to focus on Danish conditions. Likewise, it is considered that when studying human experiences the local context will most likely play an active role, meaning that it would be unjustified to study a given phenomenon in a local context and then generalizing it to Western or even global setting. Kroløkke also emphasizes this, as she identifies that culture clearly has an effect on the staging and the performances involved in the private ultrasound session (Kroløkke 2011). Even when

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[12] A nullipara is defined: *"a woman who has never given birth to a viable child. She may, however, have been pregnant previously, but had either a miscarriage or termination of pregnancy."* (Tiran 2003:175).
[13] Women that are first time pregnant are primigravida, this means that they have no prior abortions (Tiran 2003). This is mainly relevant if it is spontaneous abortions, or medical abortions due to complications.

studying this phenomenon in a Danish setting, there might be local differences to be aware of.

Finally, by limiting my research to the pregnant women's experiences, it also means implicit to exclude the women's partners' and the professionals' perceptions. These deselected groups are without a doubt also very interesting and relevant to explore in regards to this phenomenon. For example, it seems from my initial research that n-USs provide an opportunity for the expecting partners to bond with their unborn child in ways not previously possible. The perspective of fatherhood potentially starting earlier because of these ultrasound scans could definitely be an interesting inquiry to pursue. Nevertheless, this will not be explored in this thesis in respect for a focused and targeted purpose. Even though, these perspectives will still to some degree be accounted for when relevant, since they potentially inflict and affect the women's experiences and performance. Furthermore, these perspectives also enter in the fieldwork, though they are not the primary objective, which will be elaborated upon in the paragraph 2.2 *Semi-structured Interviews*.

1.3 Composition

By briefly presenting the contents of the following chapters this section is meant to serve as an overview and guide for the reader of the thesis.

In the following chapter, 2.0 *Methodology*, the methodological approach is elaborated upon. The chapter opens with a presentation of the scientific theoretical approach to the thesis, *postphenomenology*, since it is a prerequisite for an understanding of the methodical choices made. Subsequently the applied methods are accounted for in the following subsections, 2.2 and 2.3. Finally the coding process is explained, which results in five themes that will be further explored in the analysis.

Chapter 3.0 *Theoretical Framework* covers the theoretical background to the thesis. In four subsections main features of the theoretical concept *mediation theory*, founded in the postphenomenological tradition, are reviewed in order to utilize them in the following analysis.

The analysis, chapter 4.0, explores and unfolds the fieldwork material with the help of the theoretical framework of *mediation theory*. It is structured in five sub-analyses that explore the main themes identified in the coding process, and hereby investigates

various affects of the n-US on expecting mothers. A last subsection summarizes the main findings of the analysis.

In the fifth chapter, *Discussion*, main findings from the previous analysis are discussed, focusing on how expecting mothers are affected by the n-US, and the possible implications of these effects. The discussion takes place in three subsections that each pertains to significant findings, these sub-discussions are summed up in a final section, 5.4.

The last chapter is the *Conclusion*, which will outline the findings and results of this master thesis, and thereby gives answers to the problem statement.

2.0 Methodology

In this chapter I wish to account for the methodological approach to this master thesis. Being carried out as a postphenomenological (PP) research study I wish to open this exposition by elaborating on the PP framework, the scientific theoretical approach of this project. Having an understanding of this specific philosophical tradition is fundamental for explaining and elaborating upon the methodical choices made for this thesis[14]. Therefore, I wish to open this chapter with an introduction to the PP tradition. This introductory passage will lead into subsections accounting for the applied methods: semi-structured interviews and ethnographic field observations. Finally, a paragraph will elaborate upon the coding process of the generated field data, and how this data will be used in the upcoming analysis.

2.1 Postphenomenology

"And while a postphenomenology clearly owes its roots to phenomenology, it is a deliberate adaption or change in phenomenology that reflects historical changes in the twenty-first century." (Ihde 2009:1)

This is how Don Ihde, the founder of PP, briefly introduces PP in the introduction to his book from 2009, *Postphenomenology and Technoscience: The Peking University Lectures*. The historical changes that Ihde refers to are the changes to philosophy, science and technology caused by *the science wars*[15] of the twentieth century. Ihde frames these wars, as *wars of interpretation*, meaning that the controversies evolved around questions such as: *"What is the most adequate interpretation of science? Who has the right to make such interpretations?"* (Ihde 2009:2). Many of the best-known interpreters of science in the early twentieth century were philosophers trained in science, and strongly influenced by fields such as mathematics and physics. From this time two variants of philosophy of science emerged; the Vienna Circle and the Gottinge

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[14] It illustrates that the methodological and theoretical approach to this thesis cannot sharply be separated, because they are intertwining and co-constitutive entities.

[15] Ihde outlines two versions of *the science wars*: a British and an American version. But in common, they both dealt with, if science was to be understood as *"acultural, ahistorical, universal, and absolute in its knowledge, or whether it is embedded in human history and culture and inclusive of the usual human fallibilities of other practices"* (Ihde 2009:2).

School, to which Edmund Husserl belonged, the founding father of phenomenology[16].
Phenomenology is therefore perceived by Ihde to be one of the active parties in the
early day *science wars* (ibid). Through the twentieth century, philosophy of science that
originally was characterized by a rather positivist influence, was challenged by different
movements and *science warriors*, and at the end of the century the result was: *"… that
science was now seen as fully acculturated, historical, contingent, fallible, and social,
and whatever its results, its knowledge is produced out of practices"* (ibid:4). A further
result of this development was also a more diverse group of science interpreters.

A final, but definitely very important change, that Ihde points to as decisive for his
appropriation of phenomenology into PP, is the massive change and development in
science and technology that took place during the twentieth century. Amongst others he
points to *the Manhattan Project[17]*, as an example of the major scientific advancements
being made at that time, and describes the technological developments as follows: *"…
in 1990, there were no airplanes, no nuclear energy, no computers or Internet, and so
on, whereas today these constitute the texture of our very lifeworld."* (ibid:4). Ihde's
move is to refine classical phenomenology to fit this new scene. By investigating
different changed interpretations of phenomenology that has occurred in the period
1900-2006, parallel to the changes in the interpretation of science and technology, he
pushes classical phenomenology into a contemporary setting, which he calls
postphenomenology.

2.1.1 From Phenomenology to Postphenomenology

The transaction of phenomenology into PP is by Ihde explained in three steps:

First step: Pragmatism and Phenomenology

Second step: Phenomenology and Pragmatism

Third step: "The Empirical Turn"

These steps mark how phenomenology is modified into PP (ibid). In regards to this
being an introduction to the framework of PP, I will not go into a detailed account of
these steps, but strive to make a sufficient presentation to their individual contributions,

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[16] Edmund Husserl was the first to develop a theoretical approach to the study of human experience and
consciousness, why he is perceived as the founder of phenomenology (Birkler 2007).
[17] In August 1942, during World War 2, The US initiated this project under the leadership of general
Leslie R. Groves. The aim was to develop nuclear weapons (Den Store Danske 2017).

since I find this necessary for a satisfactory introduction.

With the first two steps, Ihde elaborates upon how pragmatism enriches phenomenology, and vice versa. First, Ihde claims that if phenomenology had moved with the same deconstruction of early modern epistemology as pragmatism did, it could have prevented allegations of it being a "subjective" style of philosophy. Whereas the pragmatist chose to apply a vocabulary of *practices* and thereby distancing itself from early modern epistemology, phenomenology took its outset in representations from the very same. Even though Husserl tried to invert the meanings and usage of this vocabulary, Ihde deems that this led to it being interpreted as 'subjectivist', and sometimes even antiscientific. Furthermore, Ihde finds that the pragmatists, represented by the work of John Dewey, also 'cuts to the core' more quickly than phenomenology concerning the notion of *experience*, and because of this, is quicker and more direct to arrive at something that resembles a *lifeworld analysis* (which is the objective of phenomenological analysis). The enrichment from pragmatism to PP here lies in:

"… its recognition that 'consciousness' is an abstraction, that experience in its deeper and broader sense entails its embeddedness in both the physical or material world and its cultural-social dimensions" (ibid:16).

In this first step, Ihde thus sees classical pragmatism as a means to avoid the misunderstandings of phenomenology.

The second step revolves around the reverse enrichment, from phenomenology to pragmatism. Ihde finds that through its history, phenomenology has developed a more rigorous style of analysis, drawing especially on three elements[18] that enrich the analysis of the experiential.

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[18] The three elements are: *variational theory*, *embodiment* and the notion of *lifeworld*. Through several examples Ihde shows how *variational theory* applied, shows that observed phenomenon have multiple distinct perceptual variations (*multistability*). Furthermore it is demonstrated that some variations are caused by *embodiment*, also referred to as *perspectival perception*, which means that it is caused by the viewer's point of view (position), and therefore is situated and perspectival of nature. *Variational theory* demonstrates that perception is not passive, but active, and that it is interactive with the environment. With a final example, Ihde shows how the notion of *lifeworld* comes in play, since it illustrates how phenomena are located in a *lifeworld* that is particular to historical cultures and environments. (Ihde 2009)

Ihde's third and last step is *"The Empirical Turn"*, and here he turns to the realm of the philosophy of technology[19]. *"The Empirical Turn"* is a phrase to describe the contemporary philosophy of technology, and Ihde elaborates on this, by reviewing the most important differences between classical and contemporary philosophy of technology. In overall terms, Ihde describes the turn:

> *"It is the step away from generalizations about technology uberhaupt and a step into the examination of technologies in their particularities. It is the step away from a high altitude or transcendental perspective and an appreciation of the multidimensionality of technologies as material cultures within a lifeworld. And it is a step into the style of much 'science studies,' which deals with case studies"* (ibid:18).

Ihde furthermore states that this step reflects a broad front shared by most new interpreters of the field that he calls, *technoscience*. An important aspect of Ihde's third step is that with the arrival of philosophy of technology came the thematization of human experience in relation to technology. This thematization might be the biggest modification to phenomenology according to Ihde. Classic phenomenology deals with an interrelational ontology, meaning that the human is ontologically related to an environment, and in this relation both human and environment are transformed[20]. But Ihde contends that by introducing technology into this relation, it becomes something quite different: *"Technologies can be the means by which 'consciousness itself' is mediated"* (ibid:19). The contribution of the third step to PP is that it is a way to attribute attention to the important role of technologies in social, personal and cultural life - *technoscience*. (Ihde 2009)

The three steps constitute Ihde's modification of phenomenology, transforming it into PP. In the following, I wish to turn the attention to the overall framework of PP, in order to elaborate upon the focus and work of PP researchers.

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[19] This philosophical branch emanated from the praxis oriented traditions of philosophy, such as pragmatism and phenomenology. Heidegger is considered as one of the major thinkers of original philosophy of technology (Ihde 2009).

[20] In Husserlian context, this is the notion of *intentionality* (Ihde 2009). *Intentionality* is a way of looking into the directedness of the consciousness. Consciousness is always directed at something, meaning that as a human you are never conscious of nothing, but always of something. The consciousness exists in a relation between 'the experiencer' and 'the experienced'. The notion of *intentionality* therefore eliminates the dichotomy between the subject ('the experiencer') and object ('the experienced'), since they are always interrelated. (Birkler 2007)

2.1.2 Postphenomenology in a broader sense

Today, the philosophical school of PP brings together an international group of researcher from different disciplines, such as anthropology, sociology and media studies. All these scholars work within, refine and expand on Don Ihde's framework (cf. subsection 2.1.1 *From Phenomenology to Postphenomenology*), and puts it to use in a variety of practical cases (Rosenberger & Verbeek 2015).

Postphenomenologists study the relationships that develops between users and technology, the human-technology relations, working with questions like:

"How do technologies shape our choices, our actions, and our experience of the world? How are technologies at once objects that we use for our own purposes, and at the same time objects that have an influence on us? How do technologies inform our politics, ethics, and our understandings of the basic features of our everyday experience?" (Rosenberger & Verbeek 2015:1)

PP research builds, as accounted for in the previous subsection, on the phenomenological tradition, and therefore takes its outset in *deep descriptions* of human experience. The combination of traditions from which it arose (cf. the previous subsection 2.1.1) constitutes PP claims as *"… posed from an embodied and situated perspective, refer to practical problems, and are empirically oriented"* (ibid).

In *'A Field Guide to Postphenomenology'* (Rosenberger & Verbeek 2015:Chapter 1)*,* Peter-Paul Verbeek and Robert Rosenberger, two main characters in PP, reviews some of the main characteristics of the PP framework. I will briefly touch upon some of these characteristics, since I find them to be important constituents for the basic understanding of PP that I am pursuing here.

Rosenberger & Verbeek's objective with their field guide is to give an insight to central concepts and elements in PP, hereunder discuss the common features and characteristics that exist in a field that is otherwise very *flavored. "Postphenomenology comes in just as many flavors as there are scholars in the field."* (ibid:10). Their point is that even though there is no strict PP methodology to follow, the PP work most often proceeds through application of these commonalities and shared concepts.

Rosenberger & Verbeek points to two factors that all PP studies have in common: 1) *"… they all investigate technology in terms of the relations between human beings and technological artifacts, focusing on the various ways in which technologies help to*

shape relations between human beings and the world" and 2) *"…they all combine philosophical analysis with empirical investigation."* (ibid: 9).

In connection to the first factor, a central notion is *technological mediation*, which is a key concept within PP. This concept accounts for technology's active role in shaping the human being's relations to the world (ibid). Put in other words by Verbeek: *"Technology mediates our behavior and our perception, and thereby actively shapes subjectivity and objectivity: the way in which we are present in the world and the world is present to us"* (Mitcham & Waelbers 2009:378). Viewing technology as *mediating* instead of *alienating*[21] is an important move away from classical phenomenology that is derived from a reinterpretation of the foundations of phenomenology. Reconceptualizing phenomenology makes a way for understanding the relations between humans and their world, and how technology mediates this relation. I will later, in the chapter 3.0 *Theoretical Framework*, return to this key concept of *technological mediation*, since it will be a central component of my theoretical approach to this project. I will therefore not go into further detail with it here. But a closely related term that needs to be accounted for is *intentionality*, which was also briefly touched upon in the last subsection, when discussing the interrelational ontology of phenomenology (cf. subsection 2.1.1). Classic phenomenology broke with the modernistic subject-object dichotomy by introducing the concept of *intentionality*. They argued that the subject and object could never be separated, since subjects (humans) are always directed at objects. We for example never just see, but always see *something*. It simply does not make sense to look at them separately, since they exist in an *intentional relation*. PP further expands on *intentionality* in two ways[22]. Firstly, it explores the technologically mediated relation between the human and the world. This is where the close relation to *mediation* and *intentionality* becomes apparent, since PP argues that the *intentional relation* between subject and object is often mediated by technology. Second, the mediated character of this relation is also decisive for the shape of the human subjectivity and the objectivity

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[21] When classical phenomenology engaged in analyses of technology (e.g. seen in the work of Heidegger) it was often abstract and romantic in its descriptions, and with a special attention to the alienating effect of technology on the human, in relations to themselves and their environment (Rosenberger & Verbeek 2015).

[22] Rosenberger & Verbeek describes this move as a revelation of PP's remote relation to *postmodernism*, even though PP isn't considered postmodern, because of the further distancing to the modernist separation of the subject and object (Rosenberger & Verbeek 2015).

of the world, meaning that they are mutually constituted by the mediation. *"Intentionality is not a bridge between subject and object but a fountain from which the two of them emerge"* (Rosenberger & Verbeek 2015:12).[23]

Two distinct focuses are drawn from this expansion of *intentionality*: 1) mediation and 2) mutual constitution. These focal points are a demarcation from phenomenology, and they cultivate the idea of technologies as a source that shapes subjectivity and objectivity, rather than being an alienating power. Furthermore, these focuses lead to a material and practical orientation, because *"The materiality of technology can be studied best in concrete, practical situations of use."* (ibid:12). This relates well to the second common factor of PP studies, namely that they always include empirical investigations. In addition, this practical focus explains why Rosenberger & Verbeek calls PP an *empirical philosophy*. Elaborating on this notion they explain as follows:

> *"As 'empirical philosophy,' postphenomenology does not base itself on the philosophical tradition and on conceptual analysis only, but also on the study of actual technological practices and artifacts. In doing so, it does not merely 'apply' philosophical analyses to science and technology, but it investigates the implications of such practices and artifacts for philosophical conceptualizations."* (ibid:30)

They describe how the empirical work is a leading force in PP work, and that these empirical investigations are the foundation for the following philosophical reflection. They point to three other characteristics in relations to the empirical work of PP: 1) Focus on understanding the roles of technology in human-world relations, and analyzing the relational implications, 2) They study how subject and object is shaped by the technology, and 3) A conceptual analysis of implications (e.g. epistemological, political, ethical etc.) is made (ibid).

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[23] In this context it is relevant to mention that this, relational ontology that PP works with, distances it from the approach of Actor-Network-Theory (ANT), that otherwise is seen as closely related to PP. The very difference lies in how the actants (human as well as non-human) are approached. ANT approaches all actants as 'symmetrical', meaning that there is no distinction between types of actants. Contrary to this PP distinguishes between human and non-human entities. This distinction, PP argues, is important in order to do justice to human experience, and in order to articulate these experiences 'from within' (first-person perspective). Instead ANT studies a network of relations 'from outside' (third-person perspective). (Rosenberger & Verbeek 2015)

In the above, I have outlined some of the most important and general characteristics of PP. I believe that this forms a satisfactory basis that allows me to elaborate further upon the methodological approach to this master thesis.

In the introduction, I stated that my approach to this research field was rather 'exploratory' or 'open-ended'. Now, after having gone through this introduction to the PP framework, my chosen epistemological approach, I argue that this exploratory approach fits well in line with the PP framework, since it encourages an outset in the empirical investigations. Furthermore, I believe that my chosen methods suit the study of the typical focal points for a FF study: mediation, mutual constitution and implications. This will be further justified in the upcoming subsections, where I wish to present and elaborate upon the use of the methods: semi-structured interviews and field observations.

2.2 Semi-structured Interviews

The purpose of a semi-structured interview is to gain an insight to specific themes of the lifeworld from the perspective of the human experiencer. This type of interview is inspired by the phenomenological tradition, seen by the attention paid to understanding phenomena of the human lifeworld (Kvale & Brinkmann 2015). The phenomenological approach has influenced much qualitative research, and is generally understood to be: *"… an interest in understanding social phenomena from the actors' own perspective and describe the world, as it is experienced by the subjects, on the premise, that the important reality is as humans perceive it"*[24] (ibid:48). As the aim of my study is to gain an insight to how n-USs affect women, I find that a given and natural way of doing this is to explore this phenomenon with an outset in their own experiences and perspective, why I argue that this method is suiting for my inquiry. Likewise, the semi-structured interview allows for an exploratory approach, because of its flexible nature, which I will elaborate upon in the following.

A characteristic of the semi-structured interview is that it is suppose to resemble an everyday conversation, meaning that it should not be limited by a one-way dialog and a strict structure, but instead be a 'co-creation' of knowledge and understanding between the interviewer and the subject. However, it is important for the interviewer to retain a

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[24] This quote is translated from Danish to English by the undersigned author of this thesis.

focus on the relevant themes, by leading the informant to these themes (with open questions), and from here let the informant elaborate on what they find meaningful in relations to those themes (ibid.). In my interviews, I pursued this 'semi-structured' nature by composing an interview guide that contained five main themes, which we were to explore during the interview (see Annex 1, *Interview guide*). Within each theme I had created a list of inspirational questions – questions that could be brought up if relevant or if I needed to guide/'trigger' the informant, but the intention was not that all of these questions needed to be completed during the interview. Furthermore, I was very aware of encouraging the informant to speak as freely as possible by e.g. pursuing and following up on experiences that seemed especially important to them, or by trying to remain silently focused during or after they had elaborated upon a topic, and thereby hopefully 'forcing' them to dig even deeper into this experience. I found that this was a special advantage of applying the semi-structured interview form, because when my approach to the research field was rather open, it allowed me to follow leads given to me on important topics (also from previous interviews) instead of coercing me to comply with a list of questions.

A prerequisite for a successful qualitative interview is of course that the informants willingly and openly share their experiences, and grants 'access' to their lifeworld. It is therefore essential that they feel safe in sharing, and here the first minutes of the interview become crucial – this is when the informant needs to get a good impression of the interviewer, in order for them to open up and expose their thoughts, feelings and experiences to an otherwise stranger (ibid). In order for my informants to feel safe and comfortable, I opened up the interview with a briefing, which is an acknowledged tool for setting up the interview (ibid), where I briefed them on the overall topic, practicalities (anonymization and recordings) and once again obtained their consent[25]. Anonymization is of course a very important part of ensuring a safe and confidential environment for the informants, and should always be considered as one of the ethical principals[26] for the researcher, when conducting a qualitative research study (ibid). All

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[25] In the invitation to the interview all informants were informed on the purpose and topic, and also ensured anonymization. The briefing was a repetition, but also an opportunity for the informants to have clarification on potential unanswered questions or doubts etc.

[26] Kvale & Brinkmann states that there are traditionally four areas of ethical relevance to discuss when conducting interviews: 1) Informed consent, 2) Confidentiality, 3) Consequences and 4) The role of the researcher. But they also point out that these ethical guidelines might be thought of as tools for reflection,

of the participants in my interviews were promised and ensured anonymization, meaning that no personal data is used, and the names used in this thesis are aliases. Another important perspective to touch upon here is also of ethical character, and does not just apply to the semi-structured interviews, but in general to my methodical approach – my role as researcher. The role of the interviewer is decisive for the quality of the knowledge that is produced in the interview, because it might be affected by the moral integrity (empathy, sensitivity and involvement) of the researcher. A reason for the outcome of the interview being sensitive to such factors is due to the asymmetrical power-relation between the informant and the researcher. The interview is simply not an entirely open and free dialogue between two equals, but it is founded in a specific professional relation, creating an asymmetrical relation in regards to power. The question is not how to eliminate this asymmetry, since it is a natural prerequisite, but instead to be aware of how it affects the outcome. Besides being an ethical matter, it also relates to the *objectivity* of the generated knowledge, and has to do with the *validity* and *reliability* of the study[27]. *Objectivity* is a term with several meanings attached to it, but some of these connect to the role of the interviewer, one e.g. turns attention to the asymmetrical power-relation[28], as already discussed. Furthermore, Kvale & Brinkmann states that being aware of and reflecting upon one's own (inescapable) personal opinions, prejudices and contributions as a researcher are pivotal for the *objectivity* of the knowledge production (ibid). For all these reasons, I find that it is necessary to touch upon some perspectives, in my role as a researcher that might be influential for the study.

2.2.1 My role as Researcher

Besides my master degree, in progress, in Techno-Anthropology, I have previously completed a bachelor degree in midwifery (January 2013). Between my completion of my midwifery education and initiating my master degree, I worked as a certified midwife for just over 2.5 years, mostly in different Danish labor and antenatal wards,

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when in doubt of the ethical justification, rather than as absolute morale authorities (Kvale & Brinkmann 2015).

[27] *Objectivity*, *validity* and *reliability* are all terms that relate to how the social sciences discuss the credibility, strength and transferability of a research study (Kvale & Brinkmann 2015).

[28] It is here noted that being aware of this asymmetrical power-relation grants more objectivity to the study, because the interview becomes an obvious negotiation about meaning between the interviewer and the informant. This is also referred to as *dialogic inter-subjectivity* (Kvale & Brinkman 2015).

but also short-term temp positions in Norway. Also during my current studies, I have continuously worked shifts as a midwife. This means that I have worked as a professional midwife in different settings for approximately 4.5 years, where the ultrasound technology (the objective of this study) is applied regularly and for a variety of diagnostic purposes. I am not a certified sonographer[29], but I have assisted in or managed many consults and deliveries, where obstetricians or colleagues, with a medical/diagnostic aim, used the technology. Furthermore, my obstetrical knowledge base and experience is a prerequisite for understanding the diagnostic purposes and outcomes. I thus have a basic understanding and experience with the ultrasound technology that exceeds the one of a person without any contact or relation to the obstetrical world. My professional background might be an influencer in my role as a researcher conducting this study, more or less willfully and intentionally. First, it is definitely decisive for my interest in this field of inquiry, since the wonder that is the catalyst of this study, is founded in my professional background. In the course of the "few" years that I have been a midwife, I have experienced a boom in the use of n-USs among the women that I have met. It seems, it has become more of a common matter that the women rely on the technology and the visualization, which amongst others manifests itself in a greater demand of ultrasound when/if they need a consult in the hospital, even if not medically indicated. Sometimes it seems that the visual proof of the ultrasound is more valuable to them, even when other more simple methods provides the same knowledge. Experiences such as these has without a doubt triggered my curiosity for this research field, but has likewise provided me with a pre-understanding that is important to be aware of, since it can be both beneficial and unfavorable, when performing a study as objectively as possible. I believe that my awareness of these pre-understanding has lead me to be more open-minded, and actually utilizing it to an advantage on several perspective e.g. a greater reflexivity and awareness of the many nuances of the field (also/especially to the critical perspective on the public offer). Furthermore, I believe that in some sense my midwifery background granted the study a higher degree of legitimacy to some of the informants and might have been a motivator for participation. I know that my professional background and professional network was

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[29] Many of the sonographers conducting the antenatal ultrasound scans are certified midwives as well, but with an extra education in fetal ultrasound that takes approximately six months (UddannelsesGuiden 2016).

decisive in granting me access to the field observations that will be elaborated upon later. Two owners of different clinics stated that it was a positive factor for them, when considering if I was allowed to observe at their clinics (one of these was the place that I ended up cooperating with).

I am aware that there are many more factors including unconscious and more personal ones that might influence my position as a researcher in this study – a last one that I find necessary to mention here though is that I, myself, am an expecting first-time mother. Personal feelings and thoughts connected to my pregnancy (that also are affected by my expertise) have undoubtedly also influenced my role as a researcher. Amongst others that one I cannot help but compare my own process and experiences with the ones that was shared with me in this study. Again, I need to underline that the influence is not necessarily negative regarding objectivity, but it is crucial to be aware and reflect upon it as a researcher, which I feel that I have done continuously through my work.

In the coming subsection, I wish to continue in the methodological exposition of this research study by elaborating upon the initial stages of my interview process.

2.2.2 Selection Criteria and Recruiting

As stated, the aim with the interviews was to explore women's experiences with n-USs first-hand, and especially with attention to the implications and effects of these scans. I knew that I wanted to interview pregnant women that already had, or where going to have a n-US performed. However, needless to say, pregnant women are nearly as a diverse group as women in general, regarding demographic factors, as well as social, professional, personal, etc. In recruiting from this very diverse group, I chose to appoint some selection criteria for the women that I wanted to include in the interviews. My intention with the selection criteria was to obtain an increased focus in the knowledge production. When working with a qualitative and humanistic approach the focus is on unique phenomena and the individual, and the knowledge outcome is therefore contextual and heterogenic – it does not aspire to generalizing knowledge, but to *contextualization*. Social knowledge and science are: *"… socially and historically contextualized ways of understanding and acting in the world."*[30] (ibid:333). Nevertheless, in studying a specific social phenomenon and context, I argue that

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[30] This quote is translated from Danish to English by the undersigned author of this thesis.

selection criteria can assist in providing a favorable focus[31]. I will clarify this when reviewing and reflecting upon the selected criteria in the following (also briefly touched upon in subsection 1.2 *Delimitations*). My selection criteria were thus:

1. *Low-risk / uncomplicated pregnancies*: One criterion was that the women, who were interviewed had to be low-risk pregnant. The reason for this was that if pregnancy involves complications, there might be other concerns and emotional needs from the woman's perspective to take into account, and therefore potentially also another focus when/if seeking scans in a private clinic. Likewise, there are other medical reasons and indications for medically monitoring the woman more closely, why other procedures are evident.

2. *Nulliparous (primigravida) women[32]*: As discussed above nulliparous, who have experienced previous unwanted abortions, or nulliparous who have undergone fertility treatment, might have other needs for monitoring and reassurance during pregnancy. Furthermore, it can be discussed, whether fertility-treated pregnant women can be perceived as low-risk pregnant. Danish Society of Obstetrics and Gynaecology (DSOG)[33] describe a higher risk of perinatal mortality for fertility treated women, and also a marginal higher risk of fetal growth retardation[34] (DSOG 2014), and on this background argues that it can be considered to obtain other precautions for fertility-treated, e.g. induce labor earlier than with spontaneous pregnancies (DSOG 2011). This indicates that fertility treated women are not considered low-risk, but on the other hand I find that there are very different practices from hospital to hospital to how and if they are monitored differently from low-risk pregnant women. It is obviously a debatable topic.

    Initially my attention, as stated, was to exclude fertility-treated women. However, when recruiting I had a very limited number of women to choose from. In fact, I ended up having four, which was, I felt, the bare minimum for

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[31] I might add, that the 'deselected' perspectives are definitely also relevant and interesting in connection to the overall research field, but in regards to the limitations of this study, I prioritize a more focused study.

[32] Definition can be found in the footnotes belonging to subsection *1.2 Delimitations*.

[33] The purpose of this society is to promote the professional and scientific fields of obstetrics and gynecology in Denmark (DSOG 2017).

[34] This means that the fetus has not reached its genetic growth potential (DSOG 2014).

this study. One of these four interested women was ICSI-pregnant[35], which is why I had to reconsider this selection criteria[36]. I chose to include her to the study, for several reasons, but amongst others because, she herself considered her pregnancy as medically uncomplicated (and had no extra check-ups due to this), and furthermore she had become pregnant in the first ICSI attempt, which I believed might also have had an influence on her viewing herself as *uncomplicated*. During my third interview, I found that this informant was in fact also pregnant after ICSI treatment (also first attempt). Once again it seemed that to her, her pregnancy was just as uncomplicated and low-risk as other pregnancies, which is why she had not mentioned it to me before. So it seems that it is not just a debatable topic amongst professionals, whether fertility-treated women are low-risk, but also amongst the women themselves. A last reason for choosing to focus on nulliparous women, were that multiparae[37] naturally come with experiences from previous pregnancies and births, which therefore also potentially is linked with different needs for extra ultrasound scans during the current pregnancy.

Besides the above reviewed criteria, it was, self-evidently, necessary that the potential informants had sought, or were going to seek[38], a n-US.

As briefly mentioned I had also reflected upon how many informants I wished to include for interviews. Initially I wanted 4-6 interviews, which was based on an assessment of the time and resources I had available during this process, and also how many was needed to find answers to my inquiry. There are no rules for exactly how many participants you need in a qualitative study – you need to interview as many, as necessary to find out what you want to know (ibid). Some sources refer to a rule that studies, based on interviews, should include 15 +/- 10 participants, but reality is not as

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[35] Refers to a specific type of insemination, where the fertilization is performed outside the body, more specifically in a test tube, why it in Danish is referred to as the test-tube-treatment (reagensglasbehandling). There are two different types of artificial insemination, one is ICSI and the other is IVF, the difference between them lies in the laboratory process. (Nordsjællands Hospital 2017)

[36] In the invitation to the interview I had only written that I sought women with uncomplicated pregnancies, and had not specified regarding fertility-treated women, why this might have been unclear to the women (see Annex 2 – *Invitation to Interview (From Min-Mave)*).

[37] Multiparae are women who have given birth to more than one viable child (Tiran 2003).

[38] In this case, I additionally inquired, in the invitation, if I could accompany them to the booked scan before having the interview. Thereby the ultrasound session would be more of a common scene of reference for the subsequent interview.

simple as that. It is a quantitative misunderstanding that a higher number of interviews result in more knowledge. The amount of informants has to depend on the time and resources, the purpose and the law about decreasing profit[39] (ibid). This thesis takes its outset in individual experiences, as discussed previously, and these do not rely on a specific quantity, why I argue that the four women that was included is an adequate amount for the purpose and in regards to the time/resources of this study. As shortly mentioned, I also did not have a wide group of women responding to the invitation, in fact, only seven women answered in total. However, one gave birth the day before the planned interview, and two others never responded after the initial contact. I therefore ended up with a selection of four women, and chose to include all of them. These interviews will be supplemented by field observations that I performed, which will be elaborated upon in a later subsection. Therefore, it was also a question of prioritizing my available time and resources between the interviews and observations.

The recruitment was carried out on different parental websites and Facebook, by posting an invitation. After obtaining permission from the rights owner of the website, I posted my invitation on parental debate forums on the following web sites: *Min-mave.dk* and *Gravid.dk*[40]. The posted invitation on *Min-mave.dk* can be found in Annex 2 (only in Danish). On Facebook I tried contacting administrators of several relevant 'Due-date'-Groups[41], but only a few came back to me, and those who did, would not post my invitation in their group, since they did not find it suiting for the purpose of the group. I was therefore limited to share my invitation in my own network, with a call for my network to share amongst theirs (cf. Annex 3 – *"Invitation Facebook"* to see the Facebook post). After posting it here I was encouraged by the administrator of another group (public), *Hjemmefødselsordning Sjælland* (translated: *The Homebirth*

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[39] *"An increased number of respondents will beyond a specific point result in less and less new knowledge"* (Kvale & Brinkmann 2015:167).

[40] I wrote to a third website (babyklar.dk), but they never returned to me.

[41] A 'Due-date'-Group is a Facebook Group for expecting mothers (and fathers) with due dates within the same period of time, e.g. March 2017. The purpose of such groups is to provide a space for discussing different topics related to their pregnancies, sharing experiences etc. Most, if not all, of these groups are 'closed' groups, meaning that you have to apply for membership.

Organisation Zealand), to post it on this group as well. From Facebook I recruited three of the four women[42], and the last replied to my post on Min-Mave.dk.

Retrospectively, I have considered that my invitations might have been somewhat unclear on a couple of points. For example, as previously commented on, the term '*uncomplicated pregnancy*' is arguably debatable and subjective. Also, I find, that my invitations seek the viewpoint of the partner, and might actually be considered inviting for the partner's participation. Here, an important point is, the dynamic process of a research study – as it takes place, things evolve. From the outset, this study was characterized by an open, exploratory and empirical-driven approach, and as it evolved, certain things became clearer, and especially regarding methodological choices and delimitations. The invitations were sent out in the prime phases of this study that were characterized by much more uncertainty, namely regarding the partners' role and to what extend this was to be included. Along the way, I have become more aware and clear in, that my main attention and focus was on the women's experiences. So when one of my informants wrote me a couple of days before her interview that they would both (she and her husband) be attending, I was a bit surprised, because in my process I was now a step further, and focusing mostly on the woman's perspective. I chose to conduct the interview with both of them, since I wanted to pertain an open-mind, and see what this would bring. My hope was that the husband might be a good partner for discussion, for the woman, and thereby positively affecting the unfolding of the phenomena. Unexpectedly, another of the women turned up with her partner as well, on the day of the interview, why he was also included in the interview. Retrospectively, I find that in general the involvement of the partners functioned well, with a positive way of helping to unfold the experiences with private ultrasound scan. However, the knowledge production was also that much larger at these interviews, since it of course involved the partners' personal viewpoints and feelings, that were additional to the women's perspective. These perspectives were very relevant and interesting, but as discussed several times, amongst others in the *Delimitations*, I here choose to prioritize a more focused study, which is why I will pertain a focus on the expecting mother.

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[42] One of these three women offered me to accompany them to a 3D scan. This will be described under the subsection regarding field observations.

Therefore, the knowledge included from the partners that participated in the interviews is that of which contributes in unfolding the women's perspectives and experiences.

At the end of the recruitment process, I ended up with four primary informants and two secondary (the partners of two of the women). The table below contains some main characteristics of the informants, for a more detailed description see Annex 4 for the *'Informants Catalogue'*. Notice that the names are aliases, due to the anonymization of the participants.

Name	Age	Occupation	Type(s) of private scans
Mette	26	Masters Student (Law)	Gender scan
Line & Jan	31	Internal Control Manager	Reassurance scans, gender scan and 3D scans
	31	Lawyer	
Nanna	29	HR Business Partner	Reassurance scan
Signe & Erik	37	Visual Consultant	3D scans
	42	Industrial Engineer	

Figure 1: Main characteristics of the informants

After reflecting upon the recruitment process I now turn to elaborate upon the subsequent process of conducting the interviews.

2.2.3 The Four Interviews

The four interviews were individually scheduled and planned with the informants. All informants were offered the chance to decide, where the interview was to take place, by providing them several opportunities – me visiting them at home or another place of their choice, or a meeting room on campus. I was aware of being open on this matter for them to feel as safe as possible when coming into the interview. Two interviews took place on campus, one in a café chosen by the informant and the last interview had to be conducted over Skype[43]. The interviews took place in March and April 2017. They were all conducted in Danish, and lasted between 51 minutes and just over 2 hours. The interviews were recorded and afterwards transcribed (cf. Annex 5-8). Just as the interviews were conducted in Danish, they are also transcribed in Danish, so when used

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[43] The informant Nanna lives in the northern part of Jutland. Originally we planned for me to visit her in Jutland, while being in the area for other reasons. But unfortunately Nanna had to cancel this appointment, why our only chance for carrying through with the interview was through Skype.

(quotations etc.) in the thesis they are translated into English, which presents the risk of loosing some of the linguistic nuances.

I have now accounted for my methodological approach to the interviews performed for this thesis. I now move on to elaborating upon the last method used in investigating the research field of this study.

2.3 Ethnographic Field Observations

For the purposes of this study, I found it beneficial to combine methods, because it had the potential to enrich the knowledge production. I chose, in addition to interviewing, also to perform field observations, given that observations could provide me with other important insights than interviews – and that was to observe the actual practice[44]. Combining these methods was a way for me to make a more '*thick description*'[45] of the phenomena in focus. Essentially these '*thick descriptions*' are about *contextualizing*, since it is a way of describing the phenomena from different perspectives, and thereby making a fuller account of the context, where it takes place (ibid).

Observing the actual practices, where the technology is used, was also a way for me to *see* the interrelations between the woman and the technology in play. This serves as an important and relevant insight, when exploring the *mediating* character of the n-US and how it affects women. Likewise, it also highlights the techno-anthropological character of this master thesis, since it applies and combines ethnographic methods in a pursuit of a deeper understanding of the relations between humans, culture and technology.

In planning my field observations, I contacted five private ultrasound clinics in the greater Copenhagen area (cf. Annex 9 – *Contact to Clinics (Template)*, for more information on my approach). Two clinics came back interested, and the rest respectively declined. After talking with owners from both clinics, I chose to go with one clinic, where I was presented with the opportunity of observing one day in their clinic in Copenhagen, and a second day in the clinic in Aarhus. I found this opportunity

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[44] It is often seen that interviews are combined with other methods in ethnographic studies (Kvale & Brinkmann 2015).

[45] The notion *'thick description'* was originally named by the philosopher Gilbert Ryle, and further developed by the anthropologist Clifford Geertz (Kvale & Brinkmann 2015). *'Thick descriptions'* are especially known from ethnography, and refers to: *"... highly detailed, specific descriptions of cultural life"* (SAGE Research Methods 2005). Geertz himself illustrated such a 'thick description' in his accounts of Balinese cockfights (Geertz 2005).

to be very exciting, since it was a chance of following two different midwives in two different settings, and therefore potentially witnessing different practices and discourses in scanning sessions. Furthermore, it was a chance to experience women in different geographic areas, and potentially reveal local differences. Annex 10 (*Overview of Field Observation Sites*) provides further information about the observations in the two clinics. During the observation days, I made field notes containing: the types of ultrasound scans observed, practices involved, textual and material observations, discourses being used etc. These can be seen in Annex 11 and 12. Furthermore, I took some photos of the locations and different artifacts used (cf. Annex 13).

My role during the observations was solely a 'silent observer', meaning that I did not engage further with the expecting mothers, partners and/or families coming for a scan at the clinic[46]. The couples were informed about my study and asked for their permission at their arrival at the clinic. I provided them with a leaflet (cf. Annex 14, *Information Leaflet*) with further information on the study, and contact details if they had any further questions or wanted to withdraw their participation. They were of course also promised anonymization.

As with the perspectives of the partners discussed in subsection '*Selection Criteria and Recruiting*', I will include perspectives from my observations (hereunder opinions and viewpoints shared by the midwives) that will assist in unfolding the phenomena in focus.

Finally, as briefly stated, one of my informants, Signe, invited me to accompany them to a 3D-scan in a private clinic. This was a re-scan, since the first turned out poor of quality due to the baby's position[47]. I accompanied them to this scan before conducting the interview, to make sure that experiences from the scan would become a common reference to discuss at the interview. As with the other observations, I made field notes and took some pictures (cf. Annex 15). The ultrasound session took place at a private clinic in Zealand. Unfortunately, the session was very short since the baby's position

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[46] Amongst others out of respect for them not knowing of my study beforehand, and coming as paying customers, expecting a specific service. Also the planned schedule of the day did not pay regards to extra time spent on this.

[47] A goal for a 3D-scan is to get a nice portrait photo. This requires that the baby's position is ideal for this, meaning that it is not 'hidden' behind hands, feet, placenta etc. Many clinics offers a guarantee, so if the fetal position is not ideal, then the couple can come back for a re-scan another day.

turned out to be more or less the same, and good portraits was therefore not possible, so they scheduled for a new re-scan.

I have now accounted and elaborated upon all of the applied methods for this research project. I will thus turn to how I processed and coded all of this data in order to use it in a subsequent analysis.

2.4 Coding the data

Coding is a method to prepare your generated data to be analyzed. It is a tool, early recognized by social sciences, to get an overview of the material[48]. Coding is an *inductive*[49] approach, a common characteristic of most qualitative research, and through a systematic investigation of the material it searches to identify patterns in order to infer ideas, concepts etc. about a phenomena or research objective. When coding, the researcher reads through the transcripts and codes the relevant sections. More specifically, a code means to mark a passage, so that it can be easily identified later on. However, these markings can mean different things depending on the chosen approach, e.g. they can be either *term-driven* or *data-driven*. With *term-driven* codes, the researcher applies pre-defined codes, whereas the *data-driven* coding develops throughout the data collection and coding process. The coding process most often leads to categorizations that 'boils down' the meaning of long interview transcripts into few, but substantial categories (ibid).

My approach to the coding process of my material was *inductive* and *data-driven*, in a way inspired by a *Grounded-Theory-coding* (GT), in the way that the data governed the process of conceptualizing patterns across the material. But different from a 'typical' GT study, my coding did not lead to further sampling, and I furthermore refrain from claiming that I, on behalf of my rather small study, would be able to infer new theories. In my coding process, I color-marked passages with similar characteristics, and attached code-memos, with my notes and reflections regarding the specific code. Note that by

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[48] Coding is an essential part of the process in the Grounded Theory (GT) approach (Kvale & Brinkmann 2015). GT is formulated by Barney Glaser and Anselm Strauss. They argue against applying the logical-deductive work approach in empirical studies, where empirical knowledge is subjected to theories. Instead GT aims at letting the empirical data govern the work process, and let new theories arise from the data (Bruun Jensen et al. 2007).

[49] *Inductive* approach or reasoning is to observe a series of cases in order to state something general about this group. In contrast to this we find *deduction*, which refers to a reversed reasoning, where testable hypothesis are developed from preexisting theories (Kvale & Brinkmann 2015).

'similar characteristics' I do not necessarily mean 'agreements', but rather categories that touch upon the same topic. These topics can still contain many differences and (self-)contradictions, and entail many nuances. I applied this principle of coding to all of my generated material – interview transcripts as well as field notes. The aim was to bring out the main plots enclosed in the many stories told in the extensive material generated.
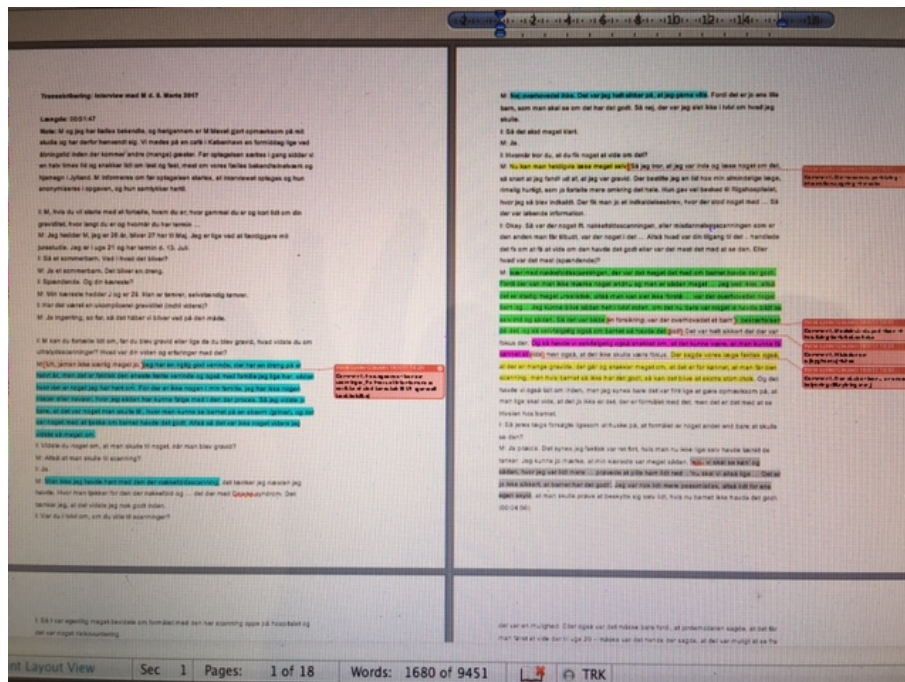
*Picture 1:
Illustrating
the color-
coding
process.*

Throughout the coding process, I continuously plotted in relevant/illustrative text passages into a data sheet, divided into the identified color codes. After coding all of the transcripts and field notes, I reviewed this data sheet, where all of the codes appeared, and from this sheet, I made a summary that outlined the plot behind each code. When summarizing, I also revised the codes a bit, amongst others naming them a bit different and merging two categories (cf. figure 2 below).

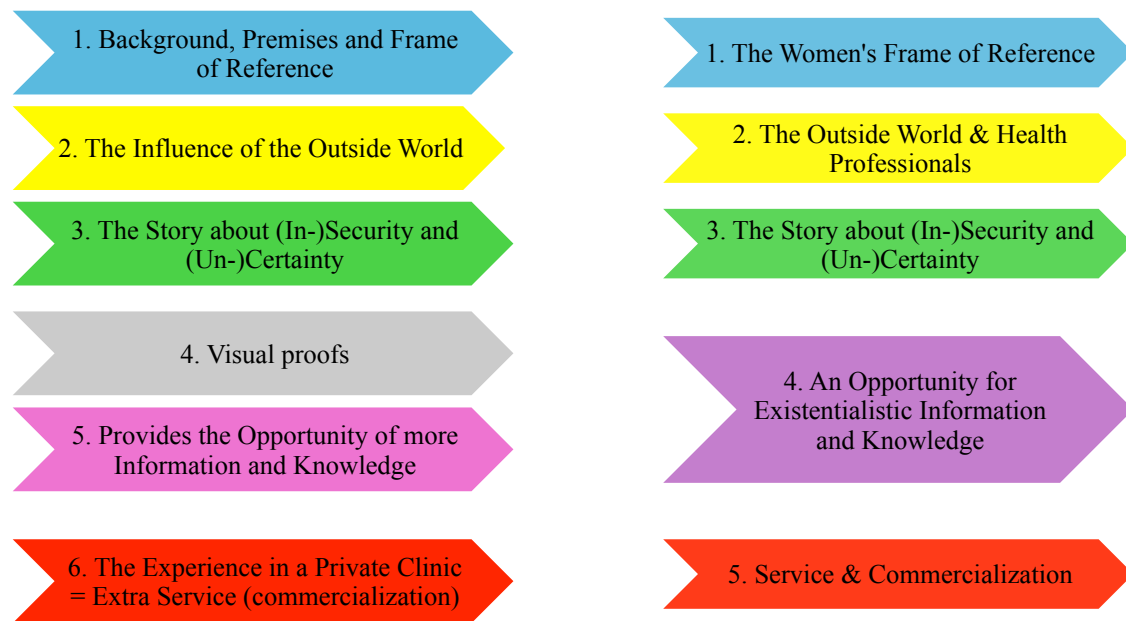|	
1. Background, Premises and Frame of Reference	1. The Women's Frame of Reference
2. The Influence of the Outside World	2. The Outside World & Health Professionals
3. The Story about (In-)Security and (Un-)Certainty	3. The Story about (In-)Security and (Un-)Certainty
4. Visual proofs	4. An Opportunity for Existentialistic Information and Knowledge
5. Provides the Opportunity of more Information and Knowledge	
6. The Experience in a Private Clinic = Extra Service (commercialization)	5. Service & Commercialization

Figure 2: Illustrates the process from six initial categories, before revising them in the summarizing process, into five. In this process category names were revised and categories 4 and 5 were merged into the new purple category (4).

As seen from the figure above, my overall coding process led me to five main coding categories:

1. The Women's Frame of Reference
2. The Outside World & Health Professionals
3. The Story about (In-)Security and (Un-)Certainty
4. An Opportunity for Existentialistic Information and Knowledge
5. Service & Commercialization

It is with outset in these five categories that my analysis will depart. The analysis will draw on selected theories surrounding *mediation theory*. The purpose of this is to substantiate and unfold these categories, and explore how the n-US, as a mediating technology, affects women during low-risk pregnancies. I believe that drawing on a theoretical foundation in my analysis will increase the *validity*[50] of my study, as *"A*

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[50] *Validity* is a concept that investigates the strength and validity of a qualitative study. It refers to the question, whether the applied method of a study actually investigates what it claims to investigate. This question does not just relate to one specific step in the process, but is present in all steps. (Kvale & Brinkmann 2015)

valid[51] *conclusion is correctly inferred from its terms. A valid argument is sensible, well-founded, just, strong and convincing."* (Kvale & Brinkmann 2015:318).

This chapter has reviewed the methodological approach of this master thesis. First by elaborating upon the scientific theoretical approach, the PP framework, and hereafter going through all of the applied methodological steps, and critically reflecting upon their use. Finally, I have expanded on the use of coding, as an approach to preparing my generated data for analysis. From this process, I inferred five categories. These categories will be subjected to analysis, which will draw on *mediation theory* to substantiate and unfold the women's experiences of the affects and implications of the n-US. Having arrived at this point, the next step is to cover the theoretical framework that is to be used in the analysis.

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[51] The original Danish quote uses two words for valid in this sentence: *valid* and *gyldig*. I find that these two words only translate into one English word – *valid*.

3.0 Theoretical Framework

From my fieldwork, I have identified five themes that are central to the way that women, in my study, experience n-USs during their pregnancies. In order to explore these topics more thoroughly and comprehensively, I will draw on selected theoretical material. As elaborated upon in the previous chapter my overall theoretical approach in this thesis is postphenomenological. Within this framework I have chosen to draw on the theoretical concept of *technological mediation*, or *mediation theory* (MT), since it *"offers a framework to analyze the roles technologies play in human existence and society"* (Verbeek 2017). In this chapter, I will elaborate upon the main features of MT in order to utilize these concepts in my subsequent analysis. It should be noted that MT in a sense can be seen as a theory in its prime phases, since it, in spite of its importance to PP, has become more of a 'patchwork' of different researchers' efforts and adaptations. As Verbeek states in his newer work:

"The phenomenon of technological mediation deserves to be studied in a more comprehensive and systematic way, covering the full depth of the various dimensions of the relations between human beings and reality" (Verbeek 2016:3)

However, because of this rather 'patched' theoretical framework, my exposition of the main features of MT will draw on different sources in order to provide a satisfactory overview on which to build my further work in this thesis.

3.1 Mediated Intentionality

The concept of *intentionality* from the phenomenological tradition is a prerequisite for understanding MT. *Intentionality* in phenomenology is a way of understanding the relationship between humans and their world. In the previous chapter *Methodology* (cf. 2.1.2 *Postphenomenology in a broader sense*), I have already outlined the concept of *intentionality*, so I will not elaborate upon it here. A main point to keep in mind though is that *intentionality* constitutes an amalgamate connection between humans and their world, meaning that the subject and object are mutually constituted. To the phenomenological understanding of *intentionality* Don Ihde introduces a technological dimension, arguing that in our culture many of the human-world relations are mediated by technology. This is referred to as *mediated intentionality,* and is the first version of

cyborg intentionality[52] (Verbeek 2008). Ihde's move of introducing a technological dimension to *intentionality* is also elaborated upon in the previous chapter, in connection to the two-step re-conceptualization of *intentionality* accounted for by Rosenberger & Verbeek (cf. subsection 2.1.2). The two main outcomes of this re-conceptualization are that it grants special attention to *technological mediation*, implying that most *intentional* relations between humans and their world are mediated by technology. Furthermore, it entails that the *technological mediation* in these relations are decisive for the mutual constitution of the human subjectivity and the objectivity of the world (Rosenberger & Verbeek 2015). However, these mediated intentional relations come in different forms, which I will elaborate upon in the following subsections.

3.2 Ihde's Human-Technology Relations

Based on *mediated intentionality* and *technological mediation*, Ihde has inferred four different forms of relations between humans and technology[53], which might be Ihde's most influential contribution to the philosophy of technology. These four relations outline different ways in which users can establish bodily-perceptual relations with technology, and this is useful in several ways. Amongst others, it is of practical value, when studying users' relationship to technologies, and furthermore, it shows how different and context-dependent user experiences can be, and declines a 'one-size-fits-all' approach (ibid).

Since these forms of relations can prove valuable in the upcoming analysis, I will summarize them below.

1. *Embodiment Relations*: In these types of relations the technology is embodied or united with the human. The human's experiences are shaped *through* the technology, a so-called *transformative mediation* (Rosenberger & Verbeek 2015, Verbeek 2015). A classical example is eyeglasses: *"As they are worn, the*

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[52] In his article from 2008, Verbeek uses the figure of the cyborg in order to reconceptualize *intentionality* in new ways (Verbeek 2008), this I will return to later on. A cyborg can be defined as follows: *"A cyborg is a border-blurring entity, uniting both human and nonhuman elements"* (ibid:387). Verbeek then explains *cyborg intentionality* as intentionality that is not entirely human, but partly constituted by technology (ibid).

[53] This is a result of Ihde elaborating upon Martin Heidegger's tool-analysis. Here Heidegger accounts for the roles of tools as connections between humans and reality, and how these tools can be more or less present to the human using them, by distinguishing between the notion *ready-to-hand* and *present-at-hand* (Verbeek 2011).

glasses themselves are not simply one among the many things in the world the user may perceive. Instead, a user looks through the glasses upon a transformed world, and the glasses can be conceived as a part of the user's perceptual experience" (Rosenberger & Verbeek 2015:14).

The notion of *transparency* is relevant to touch upon here, since it concerns the extent to which a technology blends into human awareness. As a technology is embodied, it gradually takes on transparency (ibid).

2. *Hermeneutic Relations*: Named after the hermeneutic tradition that deals with language interpretation and translation, it refers to relations where humans read or interpret how technologies represent the world. Here, the user's experience of the world is formed by the interpretation of the technology itself. An example is the MRI scan, which represents brain activity. However, a pivotal aspect is then, to what degree the user is able to read and interpret the 'language' of the technological representation. Therefore, the *transparency* of the hermeneutic relations depends on the degree of familiarity with the specific kind of output. (Rosenberger & Verbeek 2015, Verbeek 2015).

3. *Alterity Relations*: *Alterity* is normally used in phenomenology, as a term that describes the special experience of interacting with another human being. In this context, Ihde uses the term to describe the types of relations to technologies that sometimes can display this quality of *alterity*. In *alterity relations* the interaction between human and technology resembles the one of a person-to-person, but not that we mistake them to be actual personal encounters. Examples are computer interface schemes and human-robot interactions. (Rosenberger & Verbeek 2015, Verbeek 2015).

4. *Background Relations*: This is the final of Ihde's human-technology relations. In these relations the technology is not directly used, but instead forms a context for human existence and indirectly shapes the experiential surroundings. Rosenberger & Verbeek elaborates: *"They shape our experiences, protecting us from the elements or keeping our food safely chilled, but do so in ways that do not require direct interaction"* (Rosenberger & Verbeek 2015:19). Air conditioning and heating systems are examples of such technologies (Rosenberger & Verbeek 2015, Verbeek 2015).

The four reviewed relations show that technological mediation transforms what we perceive. These perceptual transformations, especially within the category of *embodiment relations*, always have a structure of amplification/magnification and reduction (Rosenberger & Verbeek 2015, Verbeek 2011). Asle Kiran explains this dual structure: *"the manner in which we deal with the world is mediated in many ways ... and all these forms of mediation make something stand out and come into focus, while other things disappear or fade from view. The latter 'movement' is necessary for the first movement to take place"* (Rosenberger & Verbeek 2015:125). Kiran further elaborates that this two-sidedness, that is found in all technological mediations does not concern a positive and negative side, and should not be interpreted as dilemmas or paradoxes. Rather it should be understood as a fundamental manner of our being in a technological lifeworld (ibid).

The abovementioned transformation capacities entailed in technology is also referred to as *technological intentionality*, which implies that technologies have intentions and are not mere neutral instruments. However, it is important to note that *technological intentionality* is shaped in the relation with humans. In different relations, technologies obtain different *identities* or *stabilities*. This phenomenon is what Ihde named *multistability.* The specific *stability* that the technology assumes is decisive for its intentionality (Verbeek 2011).

The perceptual transformation capacities inferred by Ihde has important hermeneutic implications, since it shows that technologies mediate and shape how humans perceive and interpret reality. This also implies that technologies play an active role in moral decisions, and therefore technological mediation becomes of high ethical relevance. Verbeek exemplifies the ethical importance by looking into medical imaging technologies: *"Such technologies make visible aspects or parts of the human body, or of a living fetus in the womb, which cannot be seen without them. But the specific way in which these technologies represent what they "see" helps to shape how the body or a fetus is perceived and interpreted, and what decisions are made"* (ibid:9). In Verbeek's

book from 2011, *Moralizing Technologies*, he further explores how technologies mediate moral action and infers his notion of *moral mediation*[54] (ibid).

3.3 Verbeek's Cyborg Relations

Due to rapid and massive technological development many present-day technologies do not fit into Ihde's four forms of human-technology relations. Today more radical configurations between human and technologies are in play, and where Ihde's relations are seen to be more suiting for configurations, where technologies are *used*, we now need forms that address configurations, where technologies begin to *merge* with either humans or environments. In such relations, the technological mediated character of intentionality takes on new shapes (Verbeek 2008, Rosenberger & Verbeek 2015). With this outset, Verbeek argues in his article, *Cyborg Intentionality: Rethinking the phenomenology of human-technology relations* (2008) that there is a need for more radical elaborations of *cyborg intentionality* (cf. footnote 52, under subsection 3.1). On this basis he defines two forms of intentionality: 1) *Hybrid Intentionality* and 2) *Composite Intentionality*. In *hybrid intentionality*, human and technology are merged, rather than interrelated. *Composite intentionality* refers to situations where both human and technologies have intentionality (Verbeek 2008). With these new forms of intentionality, Verbeek augments and expands on Ihde's relational forms, and deduces three additional forms of human-technology relations, *cyborg relations*, namely:

1. *The Fusion or Cyborg Relation*: In this relation, the technology merges with the human body, and becomes a new hybrid form. This relation is even more intimate than *the embodiment relation*, and there can be made no clear distinction between the human and nonhuman elements. A good example of such a relation is the cochlear implants that enable deaf people to hear again. (Verbeek 2015, Rosenberger & Verbeek 2015)

2. *The Immersion Relation*: In this case technologies merge with the environment to become *smart environments*. Here technologies form an interactive context with the environment, rather than just a background relation. For example, there are 'smart beds' in hospitals that detect when

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[54] This term is defined by Verbeek: *"… moral mediation is not only about the mediated character of moral ideas but mostly about the technological mediation of actions, and of perceptions and interpretations on the basis of which we make moral decisions"* (Verbeek 2011:54).

patients step out or maybe fall out. This relation is more bi-directional, since humans and technologies are mutually directed at each other (ibid).

3. *The Augmentation Relation*: This last relation combines an *embodiment relation* and a *hermeneutic relation*, and thus adds a second layer to the human world (ibid). Verbeek uses the example of Google Glasses: *"They result in a bifurcation of the human-world relation: On the one hand, smart glasses can be embodied to give an experience of the world, while, on the other hand, they give a representation of the world in a parallel screen"* (Verbeek 2015:30). It is here illustrated, that the *augmented relation* actually provides two parallel relations to the world.

The above exposition of *technological mediation* provides a comprehensive framework for understanding how technologies help shape human experiences and practices. But before applying this to my empirical data, I find it important to elaborate upon Verbeek's latest work, on establishing a systematic theory of mediation (Verbeek 2016). I find that key points from this article are relevant to incorporate into my theoretical framework.

3.4 Toward a Theory of Technological Mediation

Verbeek engages in a pursuit of establishing a comprehensive and systematized *mediation theory* in his newer work. This MT sought to build on Ihde's human-technology relations, and in his article, Verbeek lays down the components of a program to develop such a theory. In order to deduce these components, Verbeek goes through several steps, and within these steps, different lines of argument, composing a rather complex work (Verbeek 2016). I will thus only attend to the perspectives that I find are of relevance for this thesis.

Verbeek argues that in order to arrive at an actual MT, there needs to be a developed framework that accommodates an empirical-philosophical conceptualization of technological mediation. Verbeek finds that this is not available at present with the approaches deployed now (Science and Technology Studies (STS) and PP[55]) (ibid).

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[55] Verbeek states that in STS the phenomenon of technological mediation is too underdeveloped, and PP lacks methodology and further expansion (Verbeek 2016)

Regarding this need for development, especially one crucial aspect is brought into attention several times. Verbeek elaborates that in connection to the mediating role of technology, the process of appropriating these mediations is generally an unstudied perspective, which he finds critical.

"In order to develop a full understanding of processes of mediation, we should not only study 'what things do' but also how humans give meaning to these mediations – both empirically and conceptually" (ibid:3).

Verbeek refers to this, as a turn after '*the material turn*'[56], which indicates a move of attention to the technologically mediated human, instead of just focusing on the technology. It adds a new layer of focus, where it is asked in what ways humans give meaning to technology's mediating roles, and this can be in different aspects such as epistemologically and morally (ibid).

I find that this perspective is especially interesting for my thesis, since it fits well in line with the aim of my study. Focus is not merely on how n-US mediates women's experiences, but also how the women makes use of it and gives meaning to it.

However, when dealing with the question about how to empirically study *appropriation*, and in general MT, Verbeek points to *Conversation Analysis* (CA)[57]. Like PP, CA has its roots in phenomenology, but brings attention to the mediated subject, which has been downplayed by PP. Furthermore, Verbeek states, that CA has the ability to bridge the 'missing link' between STS and philosophy of technology (which was elaborated upon initially in this subsection) (ibid). Yet Verbeek mentions no other possible methods that might work as well as CA. In fact, he does not engage in any discussion about methodological possibilities. It is thus hard to comment on his arguments for going with CA, and not other methods. However, this study will use other methods, and I argue that these are just as useful. As an example, I find that semi-structured interviews provide the same attention to the mediated subject (cf. subsection 2.2 *Semi-structured Interviews*). This is why I maintain that my empirical approach will provide a perspective on the mediated subject.

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[56] *The material turn* is a central idea in PP. It implies a shift of attention from studying humans only, to also study things (Verbeek 2016).

[57] CA studies interactions between humans and their environment. These interactions are naturally occurring, implying that they are not arranged or initiated by a researcher, as with an interview. The aim is to study how a meaningful reality is constructed in this interaction. (Verbeek 2016, Have 2012)

A final perspective that I would like to address is Verbeek's elaboration on how technologies also shape metaphysical frameworks, and the dimension of *transcendence* that all humans have. Verbeek frames the notion of *transcendence*:

> *"part of their being escapes interpretive frameworks and technological interventions. Human existence, for instance, has a transcendent dimension, because it happens to us, rather than being the product of our own intervention; we find ourselves in our own existence, just like we find ourselves in the world in which we live"* (ibid:16)[58].

Verbeek argues that technologies play an important role in how humans experience *transcendence* – technologies might even provide explicit answers to it and constitute ways of dealing with it. Here, MT becomes a helpful tool, since it offers a way to investigate how transcendental experiences have a technological mediated character, and how this mediation shapes our relations to that beyond our limits of experience (ibid). I find this perspective relevant to include in the theoretical frame of this thesis, because my research field might contain practices and experiences involving *transcendence*.

I have through this exposition elaborated upon main characteristics and perspectives of MT. This constitutes the theoretical framework that will be applied to unfold and substantiate the empirical data in the upcoming analysis.

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[58] Put in other words, *transcendence* refers to that of which exceed the limits of experience. Opposite is *immanence*, which refers to that within the limits of experience (Politiken 2010b).

4.0 Analysis

In the upcoming analysis I will explore and unfold the material from my fieldwork with the help of the theoretical framework that I accounted for in the previous chapter, 3.0 *Theoretical Framework*. The identified themes (cf. figure below) will form the structure of the analysis, which will thus be carried out in five sub-analyses named by the given theme.

Figure 3: The five themes

The themes will be elaborated upon and analyzed within each subsection. However, they should not be understood as absolute or independent entities; it is simply not possible to organize experiences of humans' lifeworld in such a manner. Instead they are mutually constituted, intertwined and dynamic, why some overlaps can occur. The thematization serves as a mean for transparency, comprehensibility and structure. My hope is that this analysis will bring me one step closer in answering the problem statement – to come closer an understanding of how women are affected by n-USs.

4.1 The Women's Frame of Reference

This theme mostly arose from the initial phases of the interviews. It explores the informants' background knowledge concerning the ultrasound technology in general, meaning that it did not necessarily have to be in relations to prenatal scans. In the interviews, the informants were asked openly about their knowledge of ultrasound scans before becoming pregnant, and thereafter gradually increase focus on the n-US, and

how they became acquainted with the private offer. The theme is important, because it provides an understanding of, when, how and why the relation between the woman and the n-US was established, which is significant for understanding the type of relationship that it becomes.

"Hmm, well not that much … I think that I might have heard about the nuchal scan"

(Mette, Annex 5)

"Nothing. Generally speaking nothing. … I knew about 3D scans, because those you had seen, and of course you had also seen in movies those black and white pictures, but that was about it." (Line, Annex 6)

As the quotes above bears witness to, the women's background knowledge about ultrasound scans was generally very limited, at least referring to themselves. When questioned a bit more, all of them had heard something about ultrasound, and what was referred to was mainly prenatal scans of some sort, but it was very varied knowledge (also in regards to who the sources of this information were). None of the women referred to the technology used elsewhere, not even the two women, who had undergone fertility treatment, where the ultrasound technology also is used, did at first mention these scans. It should be noted though that the informants knew that the primary topic was prenatal ultrasound scans with focus on those in private clinics before the interviews. They might thus have been affected by this focus, and consequently not associating it with other settings. However, it is an interesting perspective, since it illustrates the multiple *stabilities* (cf. subsection 3.2) that the technology might assume depending on the relation and context. In its relation to fertility treatment its identity or *stability* is different from the one it obtains in pregnancy. Jan, Line's husband (one of the couples who had undergone fertility treatment) underlines this when talking about a difference between the scans before and after pregnancy: *"Yes, well so some sort of knowledge we had about scans, just not in that sense"* (Annex 6). Nanna (the second informant that had undergone fertility treatment), also accentuates this difference in the role of the technology that varies from the fertility process and after:

"… Also from seeing how the eggs are dividing. On the ultrasound screen, you can also see the eggs in the laboratory, how they become multicellular and so on. Whereas others might see it the first time, when it actually looks like a baby, our looked like a spot of water" (Annex 7).

It seems from the above that before pregnancy occurs, there is not a very broad background knowledge of or special acquaintance with the ultrasound scan. They might know and have tried an ultrasound scan in another setting, e.g. fertility treatment, but this is perceived as a specific *stability*, that is different from the one that emerges in pregnancy. From the starting point the relation to the ultrasound scan is therefore not very intimate, and the pregnancy is a catalyst for these relations to develop.

Like with the women's background knowledge, the way in which they became aware of the opportunity of n-US in private clinics differed. Nanna knew about it from her sister (Annex 7) and Mette heard it from the sonographer at her nuchal scan (Annex 5). Interestingly, it seemed that to some of the women, Nanna and Line for example (Annex 6 and 7), it was a rather intuitive thing to seek a private consult, meaning that it appeared to be a common matter that a private alternative always exists, which can oblige to needs not met in other settings.

Motivations for seeking a private scan were also all different, but in common they all had a need (or various needs) that was not complied with by the public offer. The motivations can be summed up as follows:

1. For reassurance, primarily in the first half of the pregnancy
2. Knowing the gender
3. For enjoyment
4. Providing an experience for family and friends[59]

For all of the informants multiple motivations were in play, even though one might be a main-motivator for seeking a scan[60]. For example, for Signe it was mainly about providing an experience for their family, and especially for Erik's children, since they were not allowed to take part in the scans at the hospital. But at the same time they found that it also gave them enjoyment and reassurance (Annex 8). The different motivations testify that the expecting mothers in various ways *appropriate* (cf. subsection 3.4) the n-US depending on a need. Put in other words; the meaning attached to the specific mediation varies individually.

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[59] These motivations are not that surprising and they are very much in line with what I found in my initial research on the area of focus (cf. Chapter 1.0 *'Introduction'*).
[60] The type of scan purchased by the informant (this is specified in the *Informants Catalogue* - Annex 4) also implies what the primary motivation was.

Furthermore, the different needs can be viewed as the women's encounters with the *transcendent dimension*. As previously accounted for, the *transcendent dimension* has to do with things or experiences that lay beyond our framework of interpretation, and here technologies can help in coping with this (cf. subsection 3.4). Verbeek explains:

> *"Mediation theory can offer an additional way to study the relations between technology and religion, by investigating how experiences of transcendence always have a technologically mediated character, and how technological interventions can be seen as mediators in our relation to what is beyond the grasp of human understanding or manipulation"*[61] (Verbeek 2016:17)

The needs or motivations portrait by the women can be seen as experiences of *transcendence*, whereto they find that the n-US can help them deal with this, by providing them with a clarifying knowledge/information/understanding that is otherwise out of their reach and comprehension. This also implies that there is a *hermeneutic relation* in play, since it relies on the technology's representation of the world, but this relation will be analyzed more in-depth later.

The nature of the knowledge that they seek for (and gain) from the n-US is as stated individual. However, generally it seemed to become decisive for how they managed and acted in their pregnancies on different levels, which will be explored further in the following subsections. Just to clarify, it is seen from the previous example with Signe and Eric that their primary need was to provide their families with an experience. Simply put, they felt that the ultrasound could provide Erik's children with a realization of the pregnancy, which they found was important. This realization became possible because of the technology, and the technology might have helped the children in dealing with something that was otherwise out of their interpretive frame – an experience of *transcendence*.

The next subsection will process a theme that also deals with the underlying causalities and influencers that give rise for the women to seek a n-US.

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[61] Verbeek uses the relation between religion and technology as an example of a metaphysical dimension of relevance to MT (Verbeek 2016).

4.2 The Outside World & Health Professionals

From the fieldwork data I found that different contact points from the outside world had various effects on the women in my study, which is what this theme deals with. These contacts and effects are relevant to look into, because it can give an insight to what causes the need for n-USs, which moreover is decisive for the characteristics of the relationship that is formed between the woman and the technology. This theme can be viewed as a part of the etiology of the human-technology relation that is formed.

From the interviews it is strongly indicated that there is a present-day tendency of information search, especially online. All the women in my study perform online searches for information and knowledge, but some, for example Nanna and Signe, state that they try to limit it (Annex 7 and 8). The searches are a way for them to become informed and gain clarification on different matters that will provide reassurance. However, unfortunately some experience an adverse effect. Mette exemplifies this:

"Again, because I don't gain as much weight for example. And especially around the time of the 20 week scan, where I was a bit like, it says that you should gain so and so much weight ... and I read somewhere else that at this time many had gained half of what they would gain in total. I had gained less than two kilos and I was just like, no no no, this can't be true" (Mette, Annex 5).

Similarly Line states:

"Again, you should not google something like that, because you can find positive and negative things about everything. And it took me a while to learn not to google every time I felt discomfort, because then ... well then it ended up bad every time" (Line, Annex 6).

From the above, it is seen that information searches do not necessarily result in the reassurance that is longed for, on the contrary. Furthermore, sorting all of the available information can be difficult, when you do not posses the relevant expertise. It emphasizes the importance of having a professional 'translator' and communicator available to pregnant women, which several of the women in my study unluckily did not feel they had. Line and her husband furthermore stated that they felt uninformed by the public offer, which is why they considered it necessary to search for the information themselves (Annex 6). I will return to the issue concerning the healthcare professionals' role later in this section.

Insecurity is a main theme in my research, and it will be further analyzed in the next coming sub-analysis. However in this context it is an outcome of the women's interaction with their surroundings. Not only is insecurity a result of intentional information searches, but also from the more unconscious interactions through news- and social media, and in interaction with the women's personal network. In these interactions the women are faced with bad stories as well as the 'picture perfect' image. Jan, Line's husband, tells a story about a colleague, who lost his child in the last weeks of pregnancy (Annex 6), and Signe had read articles about the overly busy Danish labor wards (Annex 8). Both are examples of bad stories that lead to insecurity. Furthermore Signe elaborates upon how medias also portrait and cultivates the 'ideal':

"… I am left with all of these awful Facebook-groups, 'The nursery' (the name of a group)*, and all sorts of things, where people exhibit one thing after the other that they have bought for their children … well that is my perception. Nobody ever posts that everything is chaos and somebody vomited, and it is a mess. Everything is the mothers' fantasy of what it should look like …"* (Signe, Annex 8)

Nanna also touches upon this ideal picture of pregnancy and motherhood. She describes that for her, it led to a kind of disappointment in herself, when she was not able to live up to the pictured ideal standards e.g. regarding physical activity.

"I thought for sure that I was going to be one of those really cool pregnant women in the gym that just continued with all sorts of things. And now my pelvis hurts and I have become… I feel that you become such a cry-baby …" (Nanna, Annex 7).

Besides these negative aspects, it is also important to say that in Line's case, for example, online interactions with a 'due-date' Facebook-group also provided her with a positive support that she did not get elsewhere (Line, Annex 6).

The above shows how the outside world in different ways affected the informants' perceptions. Mainly emphasized in a negative manner, where it led to feelings of insecurity and inadequacy. Besides well illustrating how technologies (e.g. social media) shapes perceptions and relations with the outside world, it most importantly, for the purposes of this study, provides an understanding for parts of the etiology leading up to the choice of seeking a n-US. The background story, leading up to the scan, might moreover be decisive for the type of relation established with the ultrasound, and the specific *stability* formed. For instance, if the primary need is for reassurance based on a

high degree of insecurity, this might be reflected in the type of relation, and how the specific mediation is given meaning (the *appropriation*). This is yet to be exemplified, and will be further analyzed in the following sections.

A very important contact in the outside world, as mentioned, is the public healthcare system (the healthcare professionals), which provides antenatal care. However, most of my informants express a rather skeptical attitude towards the public system, and described it as unstructured and of poor quality (Annex 6, 7 and 8). Feelings towards the public system are rather ambiguous, and in some instances emerged from a lack of understanding of how the system works (Line & Jan, Annex 6) and prejudices, as here exemplified by Nanna:

"I might also have rather low expectations to the hospital service and the public system, unfortunately, after having moved up here and with the experiences that I have gained, which actually isn't fair, because when I had the nuchal scan, it was perfect and she was so nice and she was just like the private-employed midwife" (Nanna, Annex 7)

Patricia, one of the midwives I observed during my fieldwork also stated that many expecting parents come to her for a private consult, because they feel that the public system is rigid and bureaucratic, which leaves them insecure (Annex 11). The contrast to this unstructured, low quality, bureaucratic and rigid system is the private clinics. This difference will be analyzed further in subsection 4.5.

What stands out clearly in the interviews is that having a contact to a relevant health professional is pivotal in many perspectives, especially regarding ones feeling of security, and as stated, this was not all that felt they had this. Particularly first half of the pregnancy is described by informants and observed women, as difficult and critical, and is associated with a great deal of insecurity and uncertainty (this will be further analyzed in the next section), and during this time a health professional contact person can be of great significance. Three of my informants had dissatisfactory experiences with health professionals. For instance, Nanna had no assigned general practitioner (GP)[62], because there is a shortage of doctors in her local area (Annex 7). To take another example, Signe was sent into an intern doctor who, she felt, knew nothing

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[62] The GP is the primary healthcare provider for women during early pregnancy, until she is assigned a midwife, which for most is not until 16th week of pregnancy. The GP remains a continuous contact person throughout pregnancy, also after the midwife is introduced.

(Annex 8). All in all it is seen several times in my data that the women's need for a relevant contact person is not met, and this leads to insecurity. In regards to insecurity, the ultrasound scans become essential, since they provide some sort of affirmation that can help deal with insecurity, and in a way be a 'stand-in' for a absent health professional.

"I think, and can see that a lot of other pregnant women feel the same way … the first part of pregnancy is lengthy, and you feel very alone. And I think that scans at that point can act a bit like, and not meant negatively, but they become a bit like a security blanket in regards to having something to hold on to." (Nanna, Annex 7)

Opposite to the encounters of not having a health professional contact, it is clearly seen that those of my informants who actually find themselves having a satisfactory relation to a health professional, also benefit from these with regards to security. Mette refers to her GP as a good source of information, and furthermore she states feeling safe in having health professionals to call (both her GP and midwives) in case she needs them (Annex 5). Signe also described having a good relationship with her midwife, whom she refers to several times and clearly puts her faith in. Signe's need for a n-US is not due to insecurity in the public healthcare system, since she feels that her midwife provides her with this (Annex 8).

My research found that it is not enough just having contact to a healthcare professional, but the quality of this relation is just as important. Parameters such as the level of experience, qualifications and education, are mentioned as significant in order for the health professional to be considered credible and trustworthy. Moreover, the manner in which the health professionals present information is also under careful scrutiny by the expecting mothers. Under my observations, I heard several parents expressing concern with the information they were given (or the manner in which it was given) for example at the hospital, which in turn led to concern, and for some also the need for an extra consult. For instance one couple came for a n-US just a couple of days before they where planned for one in the hospital. At their first scan they had encountered a sonographer that caused them a lot of worries. Thus they felt safer having an extra scan at the private clinic prior to the one at the hospital, so they could feel safe and certain going into the one at the hospital (Annex 12).

The above shows the importance of having a good and competent healthcare provider that is able to communicate and 'translate' the necessary information. Maybe especially, in relations to ultrasound scans, since the professional sonographer acts as a translator and interpreter of the scan, which moreover is decisive for the women's experiences. This is an important point, when searching for insight into the relation between the ultrasound technology and the women, since it here becomes evident that the relation is dependent on an ultrasound specialist. Without the specialist, it is simply not possible to gain the same knowledge, and they can for this reason be viewed as a prerequisite in the *hermeneutic relation* between the women and the ultrasound. If a non-specialist did an ultrasound it would be at the cost of *transparency*, since this is determined by the degree of familiarity with the technology. Remarkably, I observed some scanning sessions where I got a strong feeling that laymen, without formal training and expertise, are becoming more acquainted with the technology. For example I witnessed a session, where an expecting father pointed out and explained the screen picture to his older kids, who also attended the scan, without the midwife interfering or guiding. It was not just the simpler details, he actually pointed out the gender, which is not simple (Annex 12). It indicates that this father had become rather confidential with the outputs presented by the ultrasound.

The next sub-analysis will explore the issue concerning the women's feelings of security, which has been touched upon in this section as well. Instead of focusing on the more etiological side of the relation between women and the n-US it looks further into the actual relation formed, and the effects of this.

4.3 The Story about (In-) Security and (Un-) Certainty

Security and certainty are notions that reappear several times in my research. They cast a substantial role in the women's experiences with n-USs, and inflict on several perspectives, why this theme reoccurs various times in the analysis.

Early part of pregnancy is by several women perceived as particularly critical and difficult, and it is associated with great insecurity and uncertainty. It is difficult for them to relate to the changes occurring and the transaction it is to become a mother, and especially being a first-time mother. Moreover, several of them feel that they are left alone by the healthcare system (cf. 4.2), which is unsettling, because they had expected

to have one, or even more professionals that monitored them from the beginning (Annex 5, 6 and 7).

The physical changes happening in the first part of pregnancy are furthermore not visible and neither are there any noticeable signs of fetal life yet, which makes this stage even more inconceivable to the women. To many, informants as well as observed women, it led to the feeling of insecurity and uncertainty, and moreover a need for confirmation, reassurance and visual proof, which the n-US can be the mediator of. Nanna describes the 'critical' phases of early pregnancy:

"I read on so many occasions that the first trimester was the most critical, and 80 % of abortions happen here, and all such things, so now I feel that I rest more in that things are as they should be … it is a bit easier trusting ones own evaluation, when you feel, and that is with four minutes apart during the day, if you just stand still or lay down and feel, that there is something kicking you, and it is becoming stronger and stronger, and then you lower your shoulders …" (Nanna, Annex 7)

According to Nanna, a shift happens when fetal life becomes perceivable, which is also stated by other women in the study.

The midwives from the private clinics also verified from their practice that women seek visual proof to gain reassurance in early pregnancy. Women come as early as week 7 to see a fetal heart blink (Annex 11 and 12). Patricia (midwife) also attended to the need for confirmation, by informing the clients about reassuring statistics[63] (Annex 11).

From the previous subsection it became clear how the outside world in different ways also affected women's feelings of security (cf. *4.2 The Outside World & Health Professionals*), which is especially evident in early pregnancy.

Physical signs of pregnancy and bodily intuitions are not means for affirmation. Most of the informants (Nanna, Line and Mette) indicated that pregnancy symptoms (signs or discomforts) are not perceived as reliable or adequate proofs that can assert certainty, they simply do not provide enough knowledge. When asked about the body's signals and whether or not to they could be trusted over the scan, Mette explains:

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[63] Patricia explained to the couples that if fetal heart blink is seen in gestational age (GA) 8 then chances of a successful pregnancy are 97 %, and that in 95 % of the cases, where women miscarry before week 12, there has never been a heart blink. This story constitutes fetal heart blink as a very reassuring parameter (Annex 11).

"Your body only shows, if it at all shows, if you are pregnant or not, but it doesn't show whether the baby is fine. And that is what the scan shows, so no I don't think so. Even if I had suffered a lot from nausea, well then I still wanted a scan. Then I might not have doubted whether I was pregnant, but I still would have wanted it to see that everything was fine." (Mette, Annex 5)

Mette had previously told me that she had felt so well and unaffected in the first months of pregnancy, that she had in fact been worried if she was pregnant at all. Contrary to this Nanna explains that she felt so poor that she was concerned if the baby could survive in her body, and this made her seek a n-US (Annex 7). Thus it seems that the bodily signals, whether 'good' or 'bad' are not sufficient in providing a needed certainty.

Because of the uncertainty that marks the first part of pregnancy, several of the women in the study also described that they became to some extent skeptic or pessimistic, in trying to restrain their expectations and joy, and thus prevent disappointment in case things went wrong (encounter with *transcendence*). In connection to this, an ultrasound was perceived as a mean to obtain an actual proof and a clearance for being on the 'safe-side', as to give yourself permission to be excited and happy. Line exemplifies:

"I found it hard to actually give in and say: 'Okay, now I am pregnant'. And at that point I began to think that scans were interesting, because then you could actually see him. And when you visualized it then it became easier, 'yes he is there, and I might not see it or feel it or anything, but he is there'" (Line, Annex 6)

The ultrasound scan mediates a way of dealing with skepticism and creates a sense of security. However, in the public system you are only offered two ultrasound scans, and to many women this is simply not enough, when they put so much value into feeling certainty and security.

In several ways the above bears witness to a tendency, which was also expressed by Patricia (the private employed midwife) (Annex 11), of humans being more visually grounded. The visual representation helps the women feel met in their need for security, and it can furthermore have positive effects in regards to bonding and realization, which will be further analyzed in subsection 4.4.

The visualizations are so highly regarded by some women that other exams, such as the midwife appointments, fade in credibility. For instance Jan, Line's husband, expresses

that he is very skeptical about the precision of the midwife's weight estimation (done with her hands):

"We are just a bit like, they estimated him to be 3400 at the last 3D scan, if he was to be born to term, and then you visit the midwife, who feels a bit, and well, guesses ... How could they ever be able to estimate the weight" (Jan, Annex 6)

Jan states that in his opinion it would be very positive if every examination room at the midwives consult, were equipped with an ultrasound scanner, so that the midwife could scan instead (Annex 6). It seems as if Jan is unaware that not all midwives are certified sonographers, and thus would not be able to scan.

From the above it can be inferred that the n-US can provide women with a feeling of security and affirmation that is of high importance and moreover is decisive for how they cope with the pregnancy. For instance, Line elaborates on how the scans has made it easier for her to manage her pregnancy:

"In a way I manage better by being confirmed in that he is there, and everything is okay, and that I can act, as I need to act to cope with the pregnancy" (Line, Annex 6)

Both Signe and Nanna also addresses the fact that scans provided them with security and certainty that was necessary in order for them not to worry all the time and live their lives as usual (Annex 8 and 7). Furthermore, Nanna states that it was important for her relationship:

"It also means something for me and C (her partner)*, because it is also tough that one of you is worried all the time. So, that we together could see, with the same eyes on the same screen, that everything was fine, and that a professional told us that it was fine, that too means something for us"* (Nanna, Annex 7)

This is also described by Jan, who tells that he can sense that Line gets stressed, when feeling insecure, and after being scanned she becomes relaxed again (Annex 6).

All in all, the n-US can provide women with information that is necessary to cope better in pregnancy and make them feel like they regain control. In this context, the ultrasound technology assumes a *stability,* where it is the mediator of security and certainty. And the women appropriate this mediation (grants meaning to it, cf. 3.4) in regards to its capabilities to provide this necessary affirmation. Moreover, this appropriation is decisive for how they cope with pregnancy and regains control over their situation. Thus it can be connected to the dimension of *transcendence* (also touched upon in

subsection 4.1), since the technology here becomes a way for the women to feel that they attain control in a situation that is otherwise out of their grasp. Nanna explains that to her a schism arises between on one side having the need for being monitored and gaining control, and on the other side having faith in the course of nature and inherent abilities:

> *"In the beginning, I caught myself being in the schism between 'I really just want somebody to be here, this is just so huge, why doesn't anybody have me under control?'; and then on the other hand thinking, 'listen up, this is the only thing women have been doing since forever so that maybe why'. Well because it isn't necessary and it would be a waste of resources, if all women were constantly supervised in the beginning."* (Nanna, Annex 7)

For Nanna it seems that there is a paradox between accepting *transcendence* and controlling it by seeking n-USs. This schism will be further discussed in chapter 5.0 *Discussion*.

In this subsection the relations formed between the women and the ultrasound are *hermeneutic* (cf. 3.2 *Ihde's Human-Technology Relations*), because they are relations, where the women's perceptions of security and certainty are formed by the representations made by the ultrasound technology. Different from other human-technology relations of this kind though, is that it is contingent on a professional translator, who's role in this relation is quite significant, for example with regards to *transparency* (cf. *4.2*). When reflecting about this 'special' condition, it might also be the reason why the relation between the pregnant woman and the n-US (as well as other types of ultrasounds) is difficult to consider in more 'intimate' terms. For instance it is difficult to imagine an *embodiment relation* (or an even more intimate relation such as the *fusion relation*) between the two, because the *embodiment* of the ultrasound seems difficult if not impossible, when the relation is dependent on a professional. Moreover, it can seem rather odd in terms of physical conditions (the ultrasound apparatus is rather big) at least it would not be very *transparent*. The *embodiment relation* might be more relevant if looking into the relation between the sonographer and the ultrasound technology.

The 'special' condition, constituted by the sonographer, differentiate the *hermeneutic relation* between women and n-US from other more 'classic' examples. In the examples

of *hermeneutic relations* (the MRI, a metal detector, the wristwatch) delivered by postphenomenologists (Rosenberger & Verbeek 2015, Verbeek 2015), they use more direct user-technology relations. The wristwatch case, for instance, deals with users, who interpret the technology themselves (Rosenberger & Verbeek 2015), whereas in the case of the n-US's relation to the woman, most of the interpretation[64] is passed through the sonographer before reaching the woman, making women more 'indirect' users of the technology.

Overall it can be stated that in the context of this chapter a special *stability* is formed between the women and the n-US, which is characterized by *hermeneutic intentionalities*. However, this *hermeneutic relation* has unique characteristics that differentiate it from classical examples.

This subsection has explored different perspectives on how women's feelings of security and certainty are mediated by the n-US. Furthermore, the implication of the *hermeneutic relation* in regards to coping and managing in pregnancy was analyzed. The following analysis will investigate other affects mediated by the n-US.

4.4 An Opportunity for Existentialistic Information and Knowledge

The first subsection of this chapter, *4.1 The Women's Frame of Reference*, amongst others explores different motivations for seeking a n-US. These different needs indicate that n-USs are able to mediate and constitute different human-world relations, and that women appropriate these mediations in different manners. The previous sub-analysis explored one such appropriation. It addressed how women in different ways appropriated the *technological mediation* of the n-US in regards to feelings of security and certainty, and furthermore showed how it constituted them in a world that to them was perceived more secure (regarding their pregnancy), and thus allowed them to cope better. As briefly mentioned in subsection 4.3, the *technological mediations* of the n-US can infer other perceptual outcomes than affirmation, which is what this section will explore.

My fieldwork shows that the n-US can be the mediator of knowledge and information that is different from and additional to the more physiological and medical parameters

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[64] To some extend, women might be able to interpret some things from the ultrasound images. However using it themselves and interpreting the full meaning of the imageries is not possible.

that are assessed, when looking for reassurance about fetal wellbeing. Instead this type of knowledge adds an extra layer and turns focus to the more human and personal characteristics of the fetus – the knowledge generated is so to speak more *existentialistic*[65]. The *existentialistic* knowledge is associated with a higher degree of realization and bonding that is important in pregnancy and preparatory for parenthood. In this context, the n-US shapes perceptions of a reality[66], where the pregnancy and fetus become more comprehensible, which would otherwise be more *transcendent*. This will be further analyzed in the following.

In the public healthcare system the *existentialistic* type of information is not available to the women, which is why it is sought in private clinics. The public scans have a diagnostic purpose (cf. 1.0 *Introduction*) and do not attend to the *existentialistic* knowledge, besides offering to tell the gender at the 20-weeks scan, if possible. Yet it should be noted that both Nanna and Mette state that amongst expecting mothers/parents the scan in week 20 is not perceived just as medical as the nuchal scan. Instead, it is more about seeing the baby again, so from the women's perspective this scan approaches the more *existentialistic* perspectives of the fetus (Annex 5 and 7).

> *"I don't know why, I think that we might have convinced ourselves that it was more about checking if there was a club foot our cleft palate. I didn't see it as a decisive-factor. It was not a 'should we have the baby or not' scan. Of course you are excited about it, but it was more like, 'it is going to be nice to see him again'"* (Mette, Annex 5)

Nanna says that the 20-week scan in an everyday setting is referred to as the gender-scan (Annex 7), indicating, like Mette, that it is about something more personal for the expecting parents.

Contrary to the public system, the private clinics focus on providing the more *existentialistic* kind of information. Amongst others this is seen from the selection of scans offered, where scans such as gender- and 3D/4D scans[67] especially attends to this

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[65] *Existentialism* covers different philosophical positions (Politiken 2010b). However, I do not wish to go into a further exposition of these various positions, since my use of the term does not rest on one specific philosophical position. My use of the term is more broad and should be understood as knowledge and factors that lay beyond the physiological, and which focuses on the more personal and human parameters of existence.

[66] In this context the woman still relies on the n-US's representations of reality why it is still a *hermeneutic relation* (cf. subsection 3.2).

[67] In most private clinics they offer gender-scans as early as GA 14. Moreover, 3D/4D is special to the private clinics and this technology is not used at the public offered scans.

focus. Also, in their marketing material you find a more human-centered and personal approach (see pictures below).
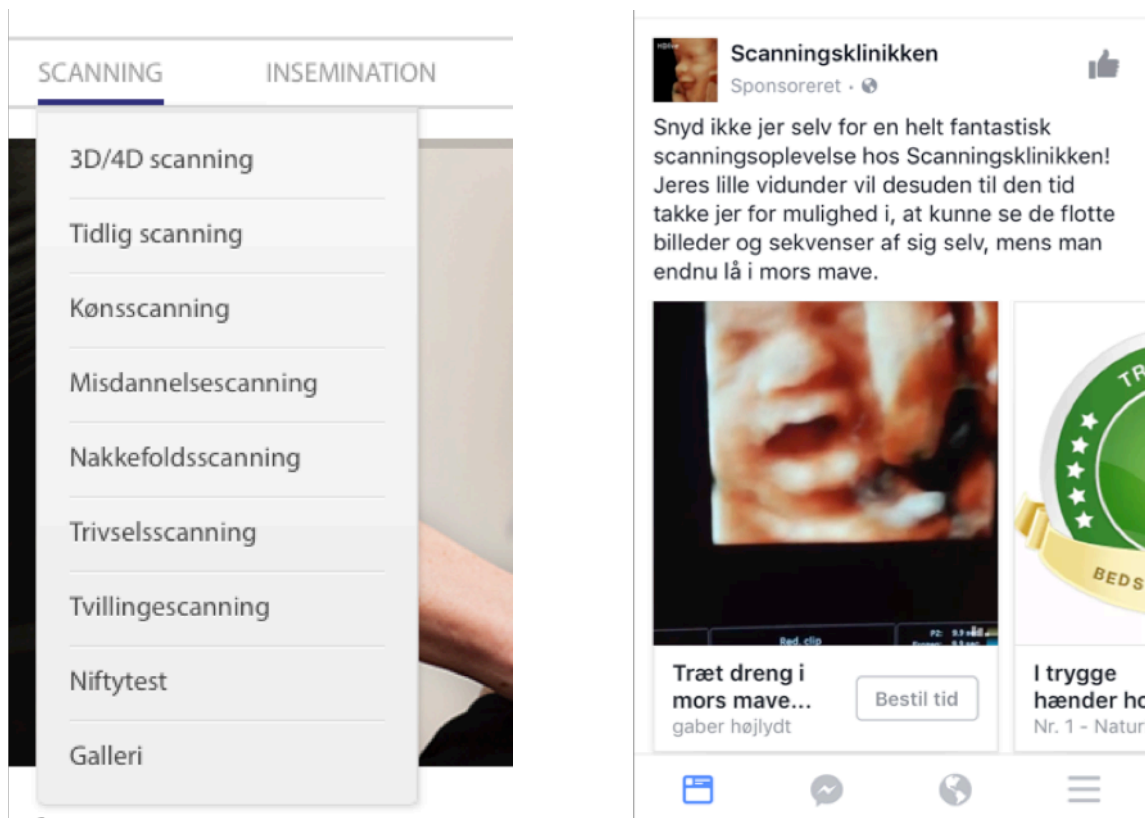
Picture 2 and 3: The picture on the left is an example of the selection of different scans to choose from offered in a private clinic.
The picture on the right is a Facebook-ad for a private clinic that I stumbled upon during my initial field research. The interesting thing to notice is the very personalized language used (both in the ad and in the caption to the picture) which indicates a more existentialistic perspective rather than a medical/physiological.

The different focal points mark a clear difference between the public and private offer.

Mette's main motivation for seeking a n-US was to learn the gender of the baby before the 20-week scan. To her, knowing the gender was important in order for her to better relate to her pregnancy and make it more real.

"It made it much more real to know the gender. That you were able to imagine this boy, in some sense." (Mette, Annex 5)

Both Signe and Line also believe that knowing the baby's gender entailed a realization effect, and both Line and Mette furthermore described that it also prepped them better for parenthood (Annex 5 and 6). Signe repeatedly returned to a story about how she was actually misinformed about the gender the first time:

" in week 13, he (the sonographer) *had told us that it was a boy, so that was what I had counted on. So when she said that it was a girl, I completely ... (Erik adds: blacked out) Yes! ... it was a punch in the face that it wasn't one with spiky hair, but one with a tu tu"* (Signe, Annex 8)

The quotation implies how conclusive the knowledge of gender can be, since it forms an image of the baby to come, on which thoughts and feelings rely. In Signe's case, it meant that she had to recalibrate her perception of the baby and the reality formed around it. It underlines the profound *technological mediation* that takes place in this context.

However, it is not only knowledge of gender that induces the sensation of realization and bonding. It seems to be a general outcome of the visualization capacity of the n-US, mentioned by several in the study (also mentioned in 4.3). Nanna elaborates on the visualization properties:

"Our baby is named Blop, like many others ... It is a face that you can put on it, we like to do that in all sorts of situations, to put a face to people ... So just to be able to see that it was our little person, human-thing, that means a lot" (Nanna, Annex 7)

As also implied in this quote, the visualization leads to a personification of the fetus. Due to the visual imageries, the fetus can be ascribed personal characteristics, which also promotes realization and bonding. This personification was seen both from my informants as well as in my observations. Line exemplifies:

"And there are just as many unknown variables (after knowing the gender)*, but still you could put him in the boy-labeled-box. And I think that we also just wanted to see him. Did he look like you, did he look like me, did he look like my mother, did he look like your mother ... that last relation to him, when you imagined him and thought about how our life will be. That was a bit easier if he started to have a face"* (Line, Annex 6)

I found that the midwives in the clinics where I observed promoted these personifying stories. For instance, Patricia told one couple that if their baby would follow in his father's footsteps (professional handball player) then he should become a goalkeeper, because of his long legs (Annex 11).

Likewise, Verbeek identifies this personification of the fetus in his article from 2008,
Obstetric Ultrasound and the Technological Mediation of Morality: A
Postphenomenological Analysis[68]. Verbeek writes:

"All of these technological mediations generate a new ontological status of the fetus.
Ultrasound imaging constitutes the fetus as an individual person; it is made present as
a separate living being, rather than forming a unity with its mother, in whose body it is
growing" (Verbeek 2008b:16)

Verbeek names this phenomena *fetal personhood*, which refers to the unborn
increasingly, being perceived as a person (ibid). During my field observations this was
quite apparent. Here, I experienced several sessions, where such personal stories formed
during the session. For instance, one woman's first reaction to knowing the gender was;
'yeaahh it's an Anna'. She immediately gave the baby a name, and the father added that
because it was a girl she would be better at keeping still when she came hunting with
him (Annex 12), and thus ascribing the fetus personality.

From the above it is seen that the visualization capacities of the n-US is significant in
making pregnancy and parenthood more real and comprehensible to the women. The
technological mediations taking place assists in managing what would otherwise be
transcendent to the women, again making the case, argued by Verbeek, that MT can
make clear how technologies mediate our relation to what is beyond the grasp of human
experience (Verbeek 2016, cf. subsection 3.4). Furthermore, it is seen that in these
mediations a reality is constituted, where the fetus becomes more real and acquires a
personhood.

The meanings ascribed to (cf. *appropriation* in 3.4) the mediating role of the n-US in
this context, is significant concerning how women cope and manage in their pregnancy.
For instance it is related to being more prepared, like Mette here describes:

"And again yes, it has contributed to the realization. And the realization might have
affected how I manage it ... Now it is just more real and in that sense it probably helps
in the way that you cope ... It has meant that you could prepare ... I just find it really

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[68] In this article Verbeek studies the technological mediation of the obstetrical ultrasound with focus on
how it shapes morality (Verbeek 2008b). This line of study he carries on with in his later work from
2011, *Moralizing Technologies* (Verbeek 2011).

nice that I can go out and buy some blue boys-wear. Things like that, and discuss names, and all of those things that follow" (Mette, Annex 5)

Moreover, my study indicates that these types of mediating effects (realization and bonding) do not exclusively relate to the pregnant women. Several times it is highlighted that n-US, focusing more on the *existentialistic* perspectives, provides a special opportunity for the expecting fathers/partners. They naturally do not have the same bodily sensations as the women, so the visualization becomes an important means to realization and bonding. This point was brought up by all of my informants, and the two participating men, Jan and Erik, both stated that the ultrasound offers a way for them to engage in the pregnancy that would otherwise not be possible (Annex 6 and 8). Jan furthermore says that the realization and bonding that resulted from the ultrasound sessions is so important to him and for how he manages with being an expectant father that he feels that the two scans offered by the public healthcare are inadequate (Annex 6).

Not only is the realization and bonding effect applicable to the expecting parents, but also to family and friends. Signe and Erik's main motivation for seeking an n-US was to provide Erik's children with this experience (and also their parents), who then could become more 'prepared' and engaged (Annex 8). Jan and Line, likewise, had family attending some of their scans, and felt it enjoyable to involve others (Annex 6). In this connection, the n-US mediates a human-world relation, where family roles can be established before the baby is born.

My focus for this thesis is on the expectant mothers and I will therefore not go into further detail with how the n-US affected the partner, family and friends. Yet, I find it important to keep in mind, since it might be speculated, whether the engaging and realizing effect on the partner and family has an additional impact on the women. Possibly the involvement could be perceived as a positive thing for women since the pregnancy becomes more of a shared experience, and moreover making it easier to cope with challenges in pregnancy. However, this is just hypothetical reflections that call for further discussion and exploration of these mediating relations (cf. 5.0 *Discussion*).

Interestingly, despite all of the positive effects depicted above, there are ambiguities detected in the expecting mothers' accounts concerning the n-US. Most of them clearly distinguishes between 'necessary' ultrasounds and 'the extra', where the 'extra' are

scans that attend to something, which is beyond assuring fetal wellbeing, and therefore relates to the more *existentialistic* information and knowledge discussed in this chapter. Several times, Nanna refers to the extra scans as '*sprinkles on the top*', meaning that it is something additional, but not necessary, and it is about doing something nice for you, similar to wellness (Annex 7). Others use notions such as *for fun*, *an experience*, *enjoyment* and *pleasure*. Line and Jan describes it as *self-satisfactory* or even an *egoistic need*:

> "*In some sense it was egoism. We wanted him to be pretty* (laughs) ... *To us it was like a 'for fun'* (scan)*, we wanted to see if we thought that he was ugly*" (Line, Annex 6)

It is thus implied that these types of mediations lie beyond the necessary, why several also find it acceptable to pay for the n-USs (defining its commercial character). The mediations, centering on *existentialistic* information therefore also seem to constitute a more commercial relationship between the women and their world, which is more service-centered and experience-driven. This relation will be explored in the following sub-analysis.

4.5 Service & Commercialization

As described above (and also touched upon in 4.2) there is, according to the informants, a clear difference between the ultrasound experience provided in the public and in private clinics. Nanna's description below captures this described difference well:

> "*It is definitely an extra thing, that is truthfully how I see it. It is indeed 'the sprinkles on the top of the cake'. With all that it involves – feelings and expectations and relations and the way that you address each other, and down to the way the waiting area looks and how you are received upon arrival, and things like that. So it is the whole way through*" (Nanna, Annex 7)

Something 'extra' is offered in the private clinics, and not just in relations to the 'extra' (*existentialistic*) knowledge that is explored in the previous chapter, it is about the overall experience. Nanna additionally describes the difference as between a 4-star hotel (the private clinic) and a hostel (the hospital) (Annex 7).

The relation between the n-US and the woman is clearly commercialized in this context. The commercialization is expressed and observed in different ways as also portrayed by Nanna. Just to name a few examples, there are booking-menus with choices for a variety of n-USs (cf. picture 2 in subsection 4.4) and different add-ons such as color

pictures or package deals. There are a variety of choices for the women depending on needs and desires. It becomes possible to customize the n-US to the individual woman, which also underlines the variety of ways that expecting mothers can appropriate the n-USs mediations. Mette states that the customization provides her with a sense of liberty and choice in her pregnancy (Annex 5). If the n-US indeed leads to an increased sense of liberty, then it prepares the grounds for an ethical discussion about its accessibility regarding customer fees. Signe also accentuates this point by describing n-US as 'snobbish' because not all might have the economic latitude to seek them (Annex 8). It here becomes clear that the n-US also influence and shape normative perceptions (cf. 3.2).

Yet another debatable perspective in this connection is that the commercialization of the ultrasound exemplifies how the technology has been placed in a different setting from its original purpose (medical/obstetrical), which is also discussed by Grit Niklasson (cf. 1.0 *Introduction*). The relocation of the technology, including the commercialization, might bring along unforeseen implications and consequences for expecting mothers, e.g. the ethical dilemmas about payment/accessibility. This will be further discussed in the upcoming chapter.

In the following I will explore different aspects that show where and how the commercialization became apparent in my study. It should be noticed that it is not as much the direct relation to the technology that affects the women, but rather it is the overall experience and commercial relation formed around and constituted by the n-US.

A very distinct example of this commercialized relation, which was noticed both by informants and in my observations, is the offered keepsakes. Keepsakes are physical artifacts, such as ultrasound pictures[69], that are offered to the expectant parents as souvenirs from the n-US. From the obstetrical scans at the hospital the parents might be offered a few pictures, some places for a fee. However, at the n-USs it is a standard part of the experience, and for some even the motivation for seeking the scan (especially

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[69] The keepsakes offered vary from clinic to clinic, regarding amount, prizes, package deals, products etc. At the clinic where I conducted my observation they offered physical pictures (color, black/white, 2D and 3D), pictures in digital format, DVD of the recorded scanning session with sound (conversation and recorded fetal heartbeat) and 4D sequences of the baby. Furthermore, they had designed their own product, a heartbeat-teddy bear, where a sequence of the baby's heartbeat was recorded into a player and put into a teddy bear (see Annex 13 for pictures and further description).

3D/4D scans). At the clinic, where I observed, all couples were provided with pictures (physical and digital files), and the midwives were very generous with them (one couple were given about 50 pictures), they were neatly wrapped for the couple to bring home, similar to a nice product purchased at a store (Annex 11, 12 and 13).

Amongst the informants the keepsakes did not stand out as much, even though all described getting them. The physical artifacts were described as fun souvenirs, also for the child in the future (Annex 5, 6 and 8), but it was not ascribed same importance as the visualization during the session (explored in the previous sub-analysis). In this relation, the application of the 3D technology (not applied at the obstetrical/public scans) was considered a boon and as an extra service, since it makes the imagery more real and transparent.

Another, but more accentuated, perspective of the commercialization is the 'customer care', meaning the interaction between the woman (the couple) and the sonographer. Several describe this different from the one in the public healthcare (also touched upon in 4.2). Nanna for example described that she found the interaction with the midwife more personal and that there was a sense of a surplus energy that she did not sense in the public (Annex 7). However this customer care was found to be special, it differed, whether it actually was of significance to the women. It was also implied that the difference experienced was expected, since it was a service that was paid for, also making the difference more acceptable.

The physical surroundings of the n-US are also quite different from the ones in the public sector. All three of the clinics, where I have observed during this study, had obviously prioritized to create a warm and welcoming atmosphere, by choosing a more homely interior design (Annex 11, 12, 13 (pictures) and 15 (pictures)). The women also noticed this. Even though it was not perceived of immediate significance for their choice regarding n-US, they still felt an effect of it, amongst others that it made the overall experience more informal, nice and relaxing (Annex 5 and 8). Nanna elaborates that she finds it odd that the public healthcare do not think in these terms of physical surroundings, since it to her aligns more with the thought of health, security and wellbeing, which pregnancy and childbirth should be about, rather than clinical rooms and sickness (Annex 7). Below is a picture from one of my clinical observations that exemplifies the more homely décor of a clinic.

*Picture 4: This is a photo of the waiting area from the clinic
where I observed an n-US with Signe and Erik (Annex 15).*

A final example of the commercial relationship constituted by the n-US is the shift of focus from diagnostic purposes to that of experiences. Some n-USs seem more experience-driven than others, e.g. 3D scans, which is also touched upon previously. Line describes them as entertaining and good pastime (Annex 5). In this context, the technology is appropriated with regards to pleasure and fun time. Charlotte Kroløkke also explores this experience perspective, where she frames n-USs as *biotourist performances* (cf. 1.0 *Introduction*).

Concluding, this paragraph shows that women coming to a n-US are provided with a series of extra services, but this is also anticipated being a paying customer. In this specific context it is not so much the direct relation with the technology that is in focus, but instead the commercial relation that it is co-constituter of. It is here shown that this commercial relation to some extend affect the women, e.g. by feeling more relaxed in the session or cheerful from an experience-driven UL, but it is not intentionally sought for or described as being decisive for their choice of n-US, it is more seen as a beneficial good.

4.6 Summing up and the next step

This analysis has explored several perspectives of expecting mothers' relation to the n-US. The first two sub-analyses explored more etiological perspectives, whereas section 4.3, 4.4 and 4.5 duck into authentic relations established.

Overall, it is shown that the women's different motivations for seeking a n-US result from different needs. It was furthermore elaborated how these different needs can be seen as the women's encounters with *transcendence*. In this relation the n-US offers a way of dealing with *transcendence*, and the mediation is *appropriated* in the manner that suits the individuals understandings and needs. The n-US is therefore seen to mediate and constitute various human-world relations (*stabilities*) that depend on the given *appropriation*. Sharply put, the analysis found two overall *appropriations* of the n-US[70], which were dealt with in section 4.3 (*The Story about (In-) Security and (Un-) Certainty*) and 4.4 (*An Opportunity for Existentialistic Information and Knowledge*)[71]. In the first mentioned, the n-US is the mediator of security and certainty in different aspects. The second deals with a mediation of *existentialistic* knowledge, which leads to realization and bonding. Both affect the expecting mothers positively regarding how they cope with their pregnancy. The aforementioned seems higher regarded and is seen to reduce insecurity and uncertainty, and therefore making the women able to go on with life more normally. The latter is related with more ambiguity, because despite of the positive effects the necessity of the stability is doubtful to the informants. This is partly caused by the commercial relation that is formed in this context (explored in section 4.5), where there is found to be many beneficial goods, however not considered as necessities or decisive for the n-US. The commercialization of the n-US evoked several points for discussion, which will be brought up in the upcoming discussion. Finally, it should be noted that regardless of the multiple *stabilities* and *appropriations* identified and explored in the relation between the n-US and the expecting mothers, the only theoretical human-technology relation to be attached to this was a *hermeneutic relation*. It might not be that surprising considering the nature of the ultrasound technology (it produces representations of reality); however in this context it is

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[70] However very important keeping in mind that there are individual varieties, intertwinement and heterogeneity between these appropriations.
[71] Partly also in 4.5, but the commercial relation dealt with here can be seen as caused by the appropriation explored in 4.4.

emphasized that in relations to the ultrasound technology, there are different users. The woman might be considered an 'indirect' user of the technology, since they rely on an 'interpreter', the sonographer, to conduct and translate the representations, which is why the sonographers can be seen as the 'direct' users. As elaborated upon in subsection 4.3, this user-distinction, or 'special condition' as it is called in this section, affirms why the human-technology relation between the expecting mothers and the n-US do not become more intimate (like in *embodiment relations*) or merging (cf. Verbeek's *Cyborg Relations*, subsection 3.3).

The analysis brings forth several main findings regarding the expecting mothers' relation to the n-US, and how it affects them, that calls for further discussion, which will be pursued in the upcoming chapter.

5.0 Discussion

In this chapter, I wish to discuss main findings from the previous analysis centering on how expecting mothers are affected by the n-US, and the possible implications of these effects. The discussion will take place in three parts, where each part pertains to an analytical finding. The three parts are:

1. *Battling Transcendence*
2. *Feeling Secure and Certain*
3. *Implications of Commercialization*

I cannot claim this to be an exhaustive discussion of all findings, since the analysis brings forth many versatile findings, but I find it to be central and relevant discussion points to explore regarding further exploration of the implications of the n-US. It is important to discuss the affects and implications of the n-US in order to pursue for appropriate practices surrounding the technology. Such a focus for discussion also underlines the techno-anthropological (TAN) nature of this thesis, since techno-anthropologists, as Lars Botin writes: "... *try to produce responsible, sustainable, and appropriate technological solutions to be embedded in technological structures*" (Botin 2015:214).

5.1 Battling Transcendence

In the analysis it became clear several times how the expecting mothers' need for a n-US could be perceived as encounters with *transcendence*. The women found themselves confronted by different situations that were out of their control and understanding, which lead to a need for visual proof and knowledge. It brings attention to a main point, also mentioned in the analysis that there is a tendency of an increasing dependency on visualization (cf. subsection 4.3). Charlotte Kroløkke (cf. 1.0 *Introduction*) describes this too:

"In our community we grant the visual technology more and more power. If the picture shows that the baby is fine, then it is fine. The technology becomes the ultimate guarantee that everything is okay" (Information 2011)[72].

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[72] This quotation is translated from Danish to English by the undersigned author of this thesis.

In my study, *transcendence* was related to a sense of loosing control, which moreover meant that some women felt that they did not cope as well with their pregnancy. For instance Nanna stated that feeling worried prevented her from living her life normally (Annex 7). *Transcendence* is hard to accept, and maybe especially when there is an alternative, where the women have access to a technology, the n-US, which can help them reach the *transcendent dimension*, and thereby feel more secure (this will be further discussed in the next subsection).

Nanna expresses that to her a schism emerges, between dealing with pregnancy as a natural thing, which she as a woman is made for, and on the other hand feeling a need for and dependency on technological/visual confirmation to cope with pregnancy (Annex 7). In general, it seems that the women in my study did not feel that they could rely on their inherent intuition, and just let pregnancy run its course, they had a need to 'battle' *transcendence*.

It implies that *transcendence* is not longer a natural part of pregnancy and childbirth, at least it is not accepted. Kroløkke also accentuates this, by stating that there has been a shift, from letting pregnancy evolve by itself to now, where we need proof and certainty (Information 2011). However, this presents a dilemma. There is never a guarantee for knowing or detecting everything, and furthermore, things can develop during pregnancy. It therefore presents a risk of generating false security for expecting mothers, if they are not made aware of or look past this fact.

It underlines the importance of the information given to women concerning the n-US. Amongst others, they should be made aware that there is no evidence for multiple ultrasounds making pregnancy more secure, at least from an obstetrical viewpoint (Sundhedsstyrelsen 2015).

In my function as a midwife, I find that there is an ongoing debate amongst midwives on how to strengthen pregnant women's focus and believe in 'internal' parameters rather than 'external' parameters provided by technology. It correlates with the schism presented by Nanna (Annex 7), and furthermore with what Verbeek calls the *detaching effects* of ultrasound technology (Verbeek 2008b). In Verbeek's studies of the obstetrical ultrasound, he finds that ultrasound causes a separation between mother and the unborn, because the visualization robs the mother of her privilege of having

knowledge about the unborn. According to Verbeek the separation has different effects, and he describes one of those to be:

> "... that the mother is increasingly seen as the environment in which the unborn is living, rather than forming a unity with it. And while the fetus is constituted as a vulnerable subject, its environment is potentially harmful ... Rather than an intimate place to grow, the womb now becomes a potentially hostile environment which needs to be guarded" (ibid:17)

Even though Verbeek studies obstetrical scans, who's character is that of diagnostics and risk evaluation, he describes how the use of the technology in this setting has a broader impact and creates a risk-focused approach to pregnancy and childbirth, which is also emphasized by other researchers (cf. *'Introduction'*, Niklasson 2014). As stated, this separation of the women and the fetus can also be traced in my study, e.g. in the schism brought forth by Nanna, or in my informants doubts about trusting own bodily signals (cf. subsection 4.3).

If indeed the outside world generally obtains a risk-focused view on pregnancy, which moreover leads to the increased need for visual proofs, then it is not easy, if at all possible, to encourage a culture, where the woman's bodily perceptions are as highly regarded as the visualization technology, I would argue. Also, it might not at all be what is needed. In the PP approach, it is stressed that it is 'romanticism'[73] to think in the lines of dispensing with technological solutions, since human and technologies are inseparable entities, and instead we should attend to these human-technology relations and in them find solutions (Rosenberger & Verbeek 2015). Pertaining to a PP approach it becomes less relevant to settle if there should be a 'battle with transcendence', but instead explore how expecting mothers with the help of the n-US handle *transcendence* (which this study has shown in different manners), and from this discuss how responsible practices of its use can be formed. To actually form concepts for responsible practices calls for further research on the current practices surrounding the use of the n-US, such as the information given to the women.

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[73] Classical phenomenology approached the study of technology in quite romantic ways, meaning that it focused on how it alienated humans from the world and themselves, instead of how technology helps shape subjectivity and objectivity (Rosenberger & Verbeek 2015)

In connection to dealing with encounters of *transcendence,* the analysis explored how the n-US amongst others was able to promote a sense of realization. This was not only applicable to the expecting mothers, but also their partners, and family, as the n-US presented an opportunity for the partners to be more involved in the pregnancy (cf. subsection 4.4). In relations to the above it casts a positive side to Verbeek's 'separation' between the mother and the fetus, since a higher degree of involvement of the partner (and family), could mean that the women feel less alone in dealing with pregnancy. This was made probable in my study, for example when describing positive outcomes for their relationships (cf. subsection 4.3). Despite, the potential benefits for the women of their partner involvement, it is doubtful that it will eliminate the women's need for a close contact to a health professional. For several women the distance to the health professionals evoked the feeling of being alone, especially in early pregnancy, and caused insecurity and uncertainty (cf. subsection 4.2 and 4.3). The following section will further discuss this.

5.2 Feeling Secure and Certain

Insecurity and uncertainty are notions that reappeared several times in the analysis, and the n-US was found to be the mediator of security and certainty in different aspects, especially during early pregnancy, which positively affected how women coped with their pregnancy (cf. subsection 4.3).

However, it then becomes relevant to discuss whether it implies that the Danish antenatal care might be inexpedient regarding expecting mothers feeling of security. The Danish Health Authority (DHA) is the advisory assembly to the Danish regions and municipalities' healthcare committees. In this function the DHA composes guidelines and recommendations on which the regional health care is to be founded, amongst others regarding the number and types of antenatal consults (Sundhedsstyrelsen 2013). The purpose of the Danish antenatal care is formulated by DHA as follows:

"The purpose of the health care system's work in connection to pregnancy, birth and in the postnatal period, is to contribute to that the woman and child is given as good a patient care as possible. The work should be health promoting, preventive and curative, and it should strengthen and assist the woman and her partner/family during the entire

course. The purpose is that this period is experienced as a coherent, natural process in life with opportunity of personal development and security" (ibid: 16)[74].

He*alth*[75] and *health promotion* are important terms, since the main part of the contact between expecting mothers and the health care professionals are suppose to be focused on this. In *health promotion* focus is turned to *health* and works through activities that aim at promoting health by mobilizing resources and action competence in citizens (ibid). The idea behind *health promotion* can be understood in terms of *the river-metaphors*[76], where *health promotion* can be described as learning people how to swim (in the stream of life), instead of having to rescue them from drowning (curative) or preventing them from falling into a swift river (prevention) (Jensen & Johnsen 2006). When looking at these premises for antenatal care it can be discussed, whether actual practice then lives up to the standards, if expecting mothers feel 'left alone' and as a result insecure. Should the outcome of actual *health promoting* antenatal activities not be that expecting mothers feel secure and empowered, and left able to cope with their pregnancy? Do 'we' in fact practice what we preach? If not, it leads to further questions about how to organize the antenatal care in ways that are more *health promoting*.

One thing to look further into could be the *timing* and *number* of consults. In the fieldwork it was found that especially early part of pregnancy was perceived troublesome for the women, which was related to a need for a closer contact to health professionals (cf. subsections 4.2 and 4.3). This finding makes it relevant to look into the organization of the antenatal consults, and investigate whether there is a need for more and earlier scheduled consults, or if in different ways ensuring a more open contact is enough. Establishing a closer tie between expecting mothers and health professionals could attend to the expressed need, and act *health promoting*, and moreover accede to the issue of the n-US functioning as a 'stand in' for having a relevant contact person (cf. subsection 4.2).

However, the *health promoting* effect of these contacts are most likely decided by the *content* of the consults, which is why this is a second parameter to explore. As briefly

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[74] This quotation is translated from Danish to English by the undersigned author of this thesis.
[75] The DHA relies on WHO's definition of *health*, as a *"state characterized by physical, mental and social wellbeing"* (Sundhedsstyrelsen 2013:17).
[76] Aaron Antonovsky, a professor in medical sociology, used and refined *the river-metaphors* for framing the understanding of *health promotion*, and in arguing for a shift of focus from sickness to health (Jensen & Johnsen 2006).

touched upon in the previous section, 5.1, it is amongst others a question about how professionals can mobilize women's inner resources, and furthermore what role technology (e.g. the ultrasound) plays in this context. One perspective here is to attend to the tendency of humans being more visual oriented. In this context a higher amount of ultrasound scans might not obstetrically improve pregnancy outcomes, however, as seen several times in this study it affects women positively in respect to other parameters. Regarding the content of the consults, this perspective evokes an interesting query - could a *health promoting* modification be to offer more scans with a *non-medical* aim? In order to give a qualified answer to this it would be necessary to research it more targeted. This study indicates ambiguity amongst the informants on the matter. On one hand, many positive outcomes from n-USs are found (security, bonding and realization). On the other hand there is a rather sharp distinction made between necessary scans and the excessive ('the sprinkle'), and it is not clear-cut, where the n-US is placed, which probably also depends on the appropriation of it (cf. subsection 4.6). There might also be different needs between the women and their partners to consider, as implied in 4.4. For example it might be *health promoting* for the partners[77] to implement a 'bonding-scan'. Yet again, there would be a need for further research on the partner's perspective in order to assess the pros and cons of such an initiative.

This discussion has reviewed and explored several perspectives regarding the implications of the n-US in connection to the present organization of the public antenatal care. It points to a need for a multi-layered discussion about whether the current organization lives up to the standards that is formulated, and furthermore brings attention to relevant aspects to explore in such an inquiry such as the role of the n-US in public antenatal care. However, in order to give more qualified answers to the questions posed it calls for further research that is more practice-oriented and with special attention to *health promotion*, as being a common goal for the care provided.

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[77] From the DHA's purpose description (see p.74-75) it is suggested that not only is the antenatal care targeted the expecting mothers, but also their partners and family. This is further explicated by stating that the revised national guidelines (2013) grant more attention to the expecting fathers and their individual needs, in respect of the important role they cast (Sundhedsstyrelsen 2013).

5.3 Implications of Commercialization

In the analysis subsection 4.5, the commercialized relation between the n-US and the women were explored. Amongst others it was shown how this commercialization formed an opportunity for the women to *customize* the n-US experience, and how this prepared the grounds for several discussion topics. This subsection will dive into a discussion of the implications that arise from the commercialized relationship formed.

The commercialization brings attention to the fact that the ultrasound technology has been relocated to a new setting, different from its original obstetrical (medical) setting. The relocation carries along various and mainly positive affects for the expecting mothers, as shown. However, due to the commercial nature of the relationship it gives rise to potentially troublesome implications as well. For one, it seems that exactly, because of its commercial setting, there is no common commercial regulation or code of conduct for the use of the technology[78]. This is problematic from the women's perspective, because there needs to be someone that ensures their interests in the commercial 'jungle'. As stated, I find that there are indeed circumstances regarding the commercialized practice, which calls for reflection in order to form responsible and sustainable practices surrounding the n-US. This point is supported by Niklasson (cf. 1.0 *Introduction*).

A relevant perspective to discuss regarding the commercial relation is the risk of a 'slippery slope'. By this I mean that as the ultrasound technology becomes more accessible to expecting mothers, one could also speculate in terms of a gradual *embodiment* or privatization of it. This is already seen in cases of other technologies in antenatal care, and a very present example is the fetal Doppler, a small ultrasound device to register fetal heart rate. Once it was exclusively a technology used by professionals, but now the technology has become available for private purchase, and more expecting mothers buy them to use themselves. However this relocation from professional to private use, constitutes a line of dilemmas, the main problem being that it requires qualifications to listen a fetal heartbeat, and without these there can be made wrongful conclusions drawn from the 'sound'. For instance, it might not even be the fetus' heartbeat, but in some cases the mothers pulse that is captured. Even though the

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[78] To my knowledge, there are no established unions within this line of business to ensure such regulations. However I know that some clinics have formulated their own ethical code for their practice.

ultrasound apparatus is of another 'stature' (size and complexity, etc.) than a doppler, this move has already been implied, alone by the increasing accessibility in its current state, but furthermore Kroløkke states that:

"The technique will become so easy to use and cheap, so that the scans can be done at home, for example in connection with baby showers that are very popular in the US"

(Information 2011)[79]

Additionally, I have actually found an ad from a Facebook-user, who wanted to sell her baby-scanner (see picture below), illustrating that the 'privatization' has already started.

Picture 5 and 6: The picture on the left is an ad from a Danish supermarket, where they had a special offer on a fetal doppler. However they chose to withdraw the offer, after meeting massive objections from health professionals. Picture 6 (right) is an ad found on Facebook, where a user wants to sell a baby-scanner (ultrasound apparatus).

Like with the fetal doppler, the use of the ultrasound technology calls for a qualified interpreter, as emphasized several times in the analysis (cf. 4.2 *hermeneutic relation*), and there might be bad outcomes from unqualified use. With no regulations or laws on who can buy or use an ultrasound device (Sundhedsstyrelsen 2015), it becomes even more difficult to control this 'slippery slope'. I find that in asking how to handle this dilemma it becomes a complex multi-layered inquiry involving different parties and

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[79] This quotation is translated from Danish to English by the undersigned author of this thesis.

various aspects, which deserve a more thorough investigation than what is possible here. However, I will add that such an inquiry amongst others would include ethical considerations, for example on the relation between the individual's freedom of choice and liberty to customize own antenatal care, versus potential interfering public regulatory initiatives and the fetus' health.

The above leads to another perspective that I find is relevant to look further into regarding the commercialization of the ultrasound technology, namely the ethical implications. Even though it would require further studies to explore all of the ethical implications connected to the commercialization itself, one very obvious issue is emphasized in my fieldwork, which is the user fee. Having to pay for an n-US hinders some expecting mothers from buying one, due to limited economic latitude, despite that they might feel a need for it. It constitutes an unequal accessibility to the n-US that can be considered problematic, at least if the outcome of such scans can in fact promote wellbeing and coping in pregnancy, as indicated in this study. However, this dilemma might also be related to the discussion in subsection 5.2 about the organization of the antenatal care. For instance, if a reorganization in this area met the women's general need better it might make 'excessive' needs for n-US more justifiable in relation to payment.

It would be very interesting for a further study to focus on the ethical perspectives regarding the commercialized relation. Such a research study would be relevant in order to gain a more full comprehension of these perspectives, and explore how this knowledge could assist in forming responsible practices for the use of n-USs.

5.4 Summing up and final reflections

Summing up, this chapter has through three subsections, discussed main findings from the analysis and related implications. As mentioned, it is not an exhaustive account, which is also indicated several times during the discussion, by making visible the multiple perspectives to further discuss and study in relation to implications of the effects of n-USs.

The first part went into a discussion about women's needs for dealing with *transcendence*, and how n-USs became a tool in this context. However, it was found that this mediating role might lead to a false security, in the sense that it is never

possible to know everything. The trust in the technology compared to trust in own bodily perception was thus discussed and problematized in different manners. It was then shown that by pertaining to a PP approach to this discussion, the interesting next step would be to further study how responsible practices are formed surrounding the n-US, rather than thinking in lines of non-technological solutions. Finally, it was discussed how *realization*, as an effect of the n-US's mediation, could lead to a higher degree of partner involvement, and moreover, how this could be beneficial for the expecting mothers since they might feel less alone in their pregnancy.

The second subsection, '*Feeling Secure and Certain'*, took it's outset in the n-US as mediator of security and certainty, and how this is found to lead to better coping with pregnancy. With this premise it was discussed if this conversely implied that the Danish antenatal care is not suited to fit the needs of expecting mothers. The discussion touched upon different aspects regarding the established antenatal care program, for example the notion of *health promotion*, which resulted in an exploration of two different ways to consider reorganizations. However, it concluded that in order to give more qualified assessments on this matter it would need more targeted and practice-oriented studies.

Finally, the third and last sub-discussion focused on relevant perspectives regarding the commercialized relation formed between the women and the n-US. Firstly, I discussed the 'slippery slope': the risk of the n-US practice sliding into more privatized forms, and how this risk requires a multi-layered inquiry, including ethical considerations. Lastly, ethical implications were discussed as a second important perspective in connection to the commercial relationship. There might be many relevant ethical discussions, but in this context one example was set in focus, since this was especially clear in the fieldwork of this thesis, which is the user fee. Different ethical aspects of the user fee were then probed.

As a last remark on this discussion it might be noted that it points to several implications and perspectives of relevance that needs further research to be brought into practical application. Therefore, it can be seen to serve as an inspirational guide to further work in this research field. I find that this multi-directional outcome is a natural and fruitful outcome to a thesis, where its nature is exploratory, meaning that it had no pre-given direction.

Furthermore I feel it necessary to once again stress that this study's findings are contingent on its prerequisites in terms of methodological choices (cf. 2.0 *Methodology*). Especially one such reflection has struck me retrospectively, and that is that none of my informants, or the observed women, seemed to have an outright bad experience with n-USs that negatively shaped their perceptions of these. Such experiences are also highly relevant to look into when exploring the effects of n-US, to gain as full and deep understanding of the field as possible, on which to build responsible and reflected practices of use. Alike it would be necessary to also include encounters from women that deliberately choose not to have an n-US performed, or for that matter any obstetrical scans, and look into how they cope with parameters such as security and certainty.

6.0 Conclusion

The objective of this research was to answer the research statement: *how does non-medical scans affect women during low risk pregnancy?* This was approached by opening with a presentation of the current stage of fetal ultrasound scanning in Denmark. Here, it was shown how the n-US has become a common part of present-day pregnancies. Furthermore, the current research field was reviewed, strongly indicating a variety of significant effects of the n-US on expecting mothers, which was also illustrated from parental debates online. It raised questions regarding the nature and character of these effects and potential implications of these that are necessary to explore in order to further justify the n-USs, and form responsible practices surrounding its use. With this point of departure the thesis set off to explore how n-USs affect women during low-risk pregnancies (cf. 1.2 *Delimitations*). It did so by pertaining to an exploratory postphenomenological approach, and drawing on the PP theoretical concept: *Mediation Theory* (MT) (cf. Chapters 2.0 and 3.0).

From the generated field material emerged five main themes. With the use of MT these five themes were analyzed and unfolded, and several perspectives on the relation between the n-US and the expecting women were explored.

It became clear that the relationship established is a *hermeneutic relation*, because the women's perceptions are formed by representations made by the ultrasound technology. Furthermore, my research showed that the needs and reasons for seeking n-USs were caused by encounters with *transcendence*, and the n-US have become a tool to deal with this. In this context, the n-US mediates and constitutes various human-world relations (*stabilities*) that depend on the given meaning ascribed to it by the individual (*appropriation*). My analysis identified two overall types of *appropriations*, also reflecting the effects of the n-US. In the first, the n-US is a mediator of security and certainty; and in the second appropriation the n-US is the mediator of a more *existentialistic* type of knowledge that can lead to effects such as realization and bonding. Both *appropriations* affect the women in this study positively in regards to coping and performance in their pregnancy. However, the women regarded the first appropriation a bit higher, since it is considered more necessary and significant than the second is. The analysis also found that the second appropriation is associated with a

commercial relationship between the woman and the n-US. Although this study found many beneficial goods from the commercialized relation, this commercial association also caused an ambiguity in terms of general necessity of the n-US.

Finally, the analytical findings were discussed, and potential implications of the identified effects are explored. The result of this discussion is multi-directional, pointing to several implications and perspectives of relevance to study further in order to secure and form responsible practices surrounding the n-US. It attended to three overall discussions; the first, explored perspectives linked to encounters with *transcendence*, and how these could be incorporated in n-US practices. The second sub-discussion focused on the organization of the Danish antenatal care program, and a potential need for a reorganization taking the findings regarding security and certainty into account. The final part of the discussion included relevant aspects regarding the commercialized relation formed between the women and the n-US, touching upon a 'slippery slope'-effect connected to the n-US and ethical implications of the commercialized relationship.

I have in this study explored the effects of n-USs on pregnant women during low-risk pregnancy, and I have through an exploratory analysis gained an insight into these effects. This study has a multi-directional discussion, which is a natural outcome to an exploratory thesis. It means that this discussion does not provide a specific solution or recommendation for how to handle the implications discussed, but rather it serves as an inspirational guide and a predecessor for further research.

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- o Kapitel 7: Udførelse af et interview
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8.0 Annex

In the printed versions of the master thesis the annexes are found on the enclosed USB.

- **Annex 1:** *Interview Guide*
- **Annex 2:** *Invitation to Interview (from Min-Mave)*
- **Annex 3:** *Invitation Facebook*
- **Annex 4:** *Informants Catalogue*
- **Annex 5:** *Transcript Interview with M*
- **Annex 6:** *Transcript Interview with L+J*
- **Annex 7:** *Transcript Interview with N*
- **Annex 8:** *Transcript Interview with S+E*
- **Annex 9:** *Contact to Clinics (template)*
- **Annex 10:** *Overview of Field Observation Sites*
- **Annex 11:** *Field Notes – Observation Aarhus*
- **Annex 12:** *Field Notes – Observation Copenhagen*
- **Annex 13:** *Photos – Observations in Aarhus and Copenhagen*
- **Annex 14:** *Information Leaflet*
- **Annex 15:** *Field Notes and Photos – Observation with S+E*