Obstetrical care as a matter of time: Ultrasound screening in anticipatory regimes of pregnancy

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Bio Note

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Abstract

This article explores the ways in which ultrasound screening influences the temporal dimensions of prevention in the obstetrical management of pregnancy. Drawing on praxeographic perspectives and empirically based on participant observation of ultrasound examinations in obstetricians' offices, it asks how ultrasound scanning facilitates anticipatory modes of pregnancy management, and investigates the entanglement of different notions of time and temporality in the highly risk-oriented modes of prenatal care in Germany. Arguing that the paradoxical temporality of prevention – acting now in the name of the future – is intensified by ultrasound screening, I show how the attribution of risk regarding foetal growth in prenatal check-ups is based on the fragmentation of procreative time and ask how time standards come into play, how pregnancy is located in calendrical time, and how notions of foetal time and the everyday life times of pregnant women clash during negotiations between obstetricians and pregnant women about the determination of the due date. By analysing temporality as a practical accomplishment via technological devices such as ultrasound, the paper contributes to debates in feminist STS studies on the role of time in reproduction technologies and the management of pregnancy and birth in contemporary societies.

Introduction

In contemporary post-industrial societies, pregnancy and birth are medically framed and technologized. Prevention gained prominence during the twentieth century and is now the key logic of obstetrical care, which is essentially oriented on the detection and prevention of risks to the health of mother and child (Baumgärtner and Stahl 2005; Lindner 2010; Schumann 2011). Preventive actions are heterogeneous in scope and quality – the only thing connecting them is their temporal structure and the idea of acting now in the name of the future, thereby making the future part of the present. Adams, Murphy and Clarke describe "regimes of anticipation" as a hegemonic contemporary formation, a lived and felt way of actively "orienting oneself temporally" (Adams et al. 2009: 247) based on uncertainty concerning the future. Anticipation is made up of affective states of individuals and collectives, and shapes the present as something that necessarily has to be acted upon for the sake of the future. An exemplary site of anticipation is the field of reproduction, pregnancy and birth, for "anticipatory modes reach before birth, as active domains of the present that allow tactical intervention to prevent and/or enable imagined futures" (Adams et al. 2009: 251).

Feminist STS scholars and scholars of the "history of the present" have shown that time and temporal order play a significant role in the obstetrical management of pregnancy and birth. In obstetrical care, standards of normality are mostly time standards. These divide procreative time into fragmented units, each of which is imbued with the potential for danger. Pregnancy is inserted into calendrical time by establishing a due date. Medical time takes place in weeks and days, because these are shorter units than months or trimesters and because conceiving of pregnancy as week-based offers a more precise way of making changes observable and scheduling diagnostic tests (for example, screening for Down's syndrome or amniocentesis are only carried out in specific time frames in the course of pregnancy). Labour itself is treated as a three-stage process, and pregnancies are supposed to come to an end within a given time of 42 weeks at the most; otherwise, they become subject to medical intervention (Simonds 2002). The duration of pregnancy is highly contested in debates about the legal regulation of abortion (Beynon-Jones 2011; Graumann 2011).

However, especially relevant with regard to the proliferation of anticipatory regimes in the field of reproduction are historical shifts in the thresholds that mark entry into the human community. In an epistemic sense, the "prenatal complex" (Arni 2012: 46) – the modern nexus of medical concepts and interventions, epidemiological knowledge production,

population policy, and visual and reproductive technologies – has promoted a continuous time axis. Rather than presenting childbirth as a site of disruption that renders the periods of postnatal and prenatal time discontinuous, the period after birth is now framed as continuous with the prenatal period. In the second half of the twentieth century, the development of the medical concept of the prenatal and the proliferation of epidemiological studies focusing on perinatal mortality and morbidity resulted in the entry of a "new" entity that could live or die into population policy and health-care services targeting pregnant women – unsettling the birth threshold of the living subject, making it instead the "perinatal threshold" (Weir 2006) and marginalizing birth (Orland 2012). A "time displacement" (van der Ploeg 2002: 62) has taken place, consisting of discursive strategies in which the foetus and the pregnant woman are addressed as if the foetus were already born and the pregnant woman already a mother, as opposed to *becoming* an infant or *becoming* a parent. Drawing on Sarah Franklin's argument that the embryological developmental perspective is framed as a teleological process (Franklin 1991), van der Ploeg points out that a mechanism of "condensation of time" is also involved, in the sense that the "growing of the foetus is perceived as a process of unfolding of what is in principle (in potential) already there" (van der Ploeg 2002: 65). As a result, "developmental time" is accorded much more significance and is privileged over the "normal" biographical time of the pregnant woman, as it contains the entire life span of the future adult person.

In sum, different aspects of temporality are involved in obstetrics and pregnancy management, as follows. 1. The specific temporality of preventive care: the future is made part of the present. Medical care and control takes place in the present of the pregnancy in order to prevent bad outcomes for mother and child in the future. 2. Time standards: medico-scientific time schedules rationalize and structure the obstetrical management of pregnancy and the cultural and social forms of becoming a parent and "being" pregnant. 3. Epistemic time shift: measures addressing parental behaviour, medical treatment and state attention to population policy are implemented *before* birth, rendering prenatal and postnatal development continuous.

Drawing on praxeographic approaches, this article asks how ultrasound scanning makes possible particular anticipatory modes of obstetrical care and pregnancy management, and investigates the entanglement of different notions of time and temporality in these techno-

scientific practices. I use practice theory[1] as a heuristic device and a sensitizing framework for empirical sociological research, and as a way of analysing medical practice as cultural practice (Vogd 2008). My praxeographic perspective allows me to focus on the reality and relationality of foetal bodies and how they are handled in obstetrical practice, without ascribing to them a decontextualized "universal" reality (Michaels and Morgan 1999). In the first section, I explain the key features of maternity care in Germany, which is extremely medicalized and risk-oriented compared with other countries. The second section outlines how the attribution of risk regarding foetal growth in prenatal check-ups is based on the fragmentation of procreative time, and examines the role of time standards and normality standards stemming from biometric measurement and epidemiological knowledge production. The location of pregnancy in time and the attribution of measurable time units to procreative time through ultrasound scanning are discussed in the third section. In the fourth section, I show how notions of foetal time(s) and the everyday life times of pregnant women become entangled during negotiations between obstetricians and pregnant women about the duration of pregnancy and determination of the due date. Sections two to four are empirically based, using detailed records from participant observation of prenatal check-up visits and ultrasound examination in doctors' offices.[2]

Risk and anticipation in obstetrical care

The field of reproduction, pregnancy and birth is one marked by an expectation for medical intervention at any moment. Pregnancy and birth are culturally framed processes of gestation and foetal development. Through gendered conceptions of nature, the reproductive body is "othered" and conflated with a nature that has to be controlled (Honegger 1996; Oakley 1984; Oudshoorn 1996). The objectives and character of the medical control of pregnancy and birth are based on the notion of prevention. In general, preventive actions take a particular form: a central feature of such anticipatory regimes is risk management (Adams, Murphy and Clarke

[1]In practice theory, a strand of social and cultural theory, practices are seen as the central site of the social, and are understood as a "nexus of doings and sayings" – as a routinized way of moving bodies and handling things (Reckwitz 2002). Every practice is material insofar as it is carried out by bodies and artefacts. Knowledge is implicit, incorporated, and dispersed among participants in the practices, whether these are documents, bodies, artefacts or technical devices. Praxeology is designed to take into account the materiality of a physical reality, but it looks at reality "enacted" (Mol 2002: 44) in practice.

[2] In the ethnographic research project "Enacting pregnancy: The role of the sonogram in prenatal diagnosis", funded by the German Research Foundation (DFG), I observed 60 prenatal check-ups in five registered obstetricians' offices in a major German city, and talked to the women and their partners after each examination. My observations were documented in field notes taken while observing and by audio recordings. After each observation, I wrote a detailed account of the observed events. Verbatim quotations from the audio recordings were added to the written notes. This detailed record served as the basis for coding and further analysis (see Emerson, Fretz and Shaw 1995: 48-52).

2009: 254). The concept of risk is employed when calculating the likelihood of an unwanted or feared phenomenon. The attribution of risk makes it possible to give the future a form in which security and uncertainty are combined (see Bröckling 2008; Fuchs 2008; Lemke 2000). But risk is not something that simply exists. The significance of risk lies in what that risk is attached to and how it is used to govern behaviour and guide interventions in the present in the name of the future. Following Mitchell Dean, therefore, I understand risk as "a set of different ways of ordering reality, of rendering it into a calculable form. It is a way of representing events so they might be made governable in particular ways, with particular techniques, and for particular goals" (Dean 1999: 131). Medical obstetrical care and prenatal diagnosis are essentially framed in categories of risk (Erikson 2012; Lupton 2012; Meskus 2009; Ruhl 1999; Waldschmidt 2002). With regard to the organization of obstetrical practice, which differs from one country to another, an important question is thus how the frontiers are drawn between an account that treats pregnancy as a "normal" physiological process and one that treats pregnancy as a risky and pathological process, and how "safety" is organized locally through particular forms of surveillance (Pasveer and Akrich 2001).

In the German health system, pregnancy is treated as a potentially pathological bodily status that requires constant medical monitoring. This treatment of pregnancy contrasts with ones in other countries, for example the Netherlands, where pregnant woman seek expert advice mainly from midwives and pregnancy is generally deemed a normal physiological process (Pasveer and Akrich 2001: 69; Rose and Schmied-Knittel 2011). In Germany, expert advice and the monitoring of pregnancy is performed almost exclusively by obstetricians.[3] The medical profession's maternity guidelines state that the task of medical care during pregnancy and after birth lies in the prevention of dangers to the life and health of mother and child and the timely recognition and treatment of jeopardized health. The paramount goal of such care is early recognition of high-risk pregnancies and high-risk-deliveries (Gemeinsamer Bundesausschuss 1985: 2). "Safety" is attached to medical places, namely obstetricians' offices, clinics and prenatal centres, and to medical professionals, namely obstetricians with varying degrees of specialization.[4] Check-ups and ultrasound examinations are directed at

[3] Nearly 90 per cent of all pregnant women in Germany use maternity care, offered almost exclusively by obstetricians. The check-ups by obstetricians are regulated very closely by professional guidelines. The maternity guidelines call for a check-up every four weeks, and every two weeks during the last two months of the pregnancy.

[4] In Germany DEGUM (German Society for Ultrasound in Medicine) monitors the degree of specialization obstetricians can obtain, and certifies three degrees of ultrasound specialization in prenatal care. Certification from the Fetal Medicine Foundation (FMF) Germany is required in order to offer blood screening and nuchal translucency scans.

detecting risks or jeopardized health in pregnant woman and foetuses as early as possible in otherwise healthy pregnancies. With the proliferation of ultrasound scanning in obstetrical care in the 1980s – in Germany just as in other industrialized countries (Oakley 1984) – the number of possible risks that could be detected and attributed expanded. In Germany ultrasound is now routinely used three times in the course of pregnancy without any clinical indication.[5] The main goals of the screening are to detect multiple gestation, to confirm viability, to detect embryonic abnormalities and defects, and to track growth parameters.

"Timely" development and biometric measurement

To demonstrate how time standards and normality standards are involved in attributing risk in pregnancy, I now turn to the process of obtaining foetal growth parameters, which is a routine procedure usually carried out in ultrasound examinations. These parameters are ascertained in order to establish whether the foetus is growing "normally" or is too small or too large. Being too large or too small can mean being over- or undernourished, but it can also be an indication that the foetus is at risk of a wide range of health problems or may even have a chromosomal defect. In the practice of ultrasound examinations, screening for unusual growth feeds into the ongoing process of establishing the "normality" of foetal growth status and making sure that the embryo/foetus is growing in accordance with established standards, with "timely" development (*zeitgerechte Entwicklung*), a term widely used by obstetricians during ultrasound examinations and in consultations.

The following description of an ultrasound examination indicates how the time units used to measure the age of a pregnancy in obstetrical care are enacted as normality standards. The pregnant woman, Ms. Kessler,[6] is in the late stage of her pregnancy with her second child. She weighs 140 kg and has gestational diabetes. On the day of the visit Ms. Kessler is in an emotional state, because the previous week she had to stay in hospital for two days due to slight vaginal bleeding. She is worried because the doctor who did the ultrasound scan at the hospital said the child was too big, and because her blood glucose test in the early morning gave her a 'bad' result – her blood sugar is higher than it is supposed to be. Ms. Kessler has to follow a strict diet in accordance with expert advice and measures her blood glucose several times a day. In the upcoming ultrasound examination, the obstetrician will check whether the foetus is too big, which can be an effect of hyperglycemia. The questions for Ms. Kessler are

[5] Most women undergo more than these three screenings. Nearly two thirds have an ultrasound examination at least three to five times, and 22 per cent undergo five or more examinations (BQS Bundesgeschäftsstelle Qualitätssicherung 2008: 3.3).

[6] The names of the pregnant women and of the doctors have been anonymized.

whether she will have to inject insulin and whether she might have to give birth by caesarean section, which she wants to avoid.

> Ms. Kessler is lying on her back on the ultrasound examination couch, partially undressed with her abdomen exposed. She can watch an ultrasound screen on the wall opposite. Dr. Stein begins to scan, moving the probe along Ms. Kessler's abdomen. […] After moving the transducer around briefly, the doctor "freezes" an image on the screen, where something round can be distinguished. Then Dr. Stein moves a cursor around the distinguishable light-grey outline, and a circle appears. She draws a line from one point on the circumference to the other, and measures the diameter. Meanwhile Ms. Kessler tells Dr. Stein that the hospital doctor who did the ultrasound scan there measured 31.5 centimetres. She then mimics what the doctor in the hospital said, in a high voice: "Too big for that time, too big for that time." Dr. Stein looks somewhat surprised. She asks "why?", and – referring to the gestational age of the pregnancy – "how far are we?" Ms. Kessler asks doubtfully: "35th week?" and says that there are five weeks to go until the birth. "Yes," confirms Doctor Stein emphatically, "we are in the 35th week!" She points at the screen with her index finger and says energetically, turning to Ms. Kessler: "Have a look, what's it saying?!" By "it" she means the ultrasound machine, and she is also referring to something that is apparently revealed on the screen to both of them. The gesture with which she accompanies her request to look strikes me immediately, because usually when Dr. Stein wants to show something on the screen, she uses a small orange cross-shaped cursor to trace contours. But now she is pointing directly at the screen. At this prompt to "look", Ms. Kessler cautiously answers "thirty-one point five?" On the screen, at the bottom of the image, there is a chart that says "HC (head circumference) 310.5 mm 35 weeks 5 days". Dr. Stein confirms that Ms. Kessler is in the 35th week of her pregnancy. Ms. Kessler asks about the normal range for head circumference at this gestational age, and if it is right that a "normal" head circumference is about 34 or 35 centimetres. The doctor confirms this assumption, and says that the child's head has a circumference of 31 centimetres. She says she does not know why the hospital doctor found fault with that result.[7]

The telling gesture of the doctor, pointing her finger at the screen, and the request to "have a look, what's it saying?" diverts attention from the "making" of the visual display on the monitor[8] and the "blackboxed" (Latour 1999: 304) process of knowledge production involved. Ultrasound waves are sent by a transducer; they are reflected differently by body tissues and organs and are displayed in real time in different shades of grey on a monitor. In ultrasound scanning, basic planes are used to produce a diagnostic image. Building on incorporated embodied knowledge, Dr. Stein had to decide which image out of the continuous flow of images on the screen was a suitable diagnostic image and "freeze" it immediately.

[7] Excerpt from field record of an ultrasound examination in a resident obstetrician's office.
[8] On the political and cultural implications of visualizing the foetus, see, for example, Duden 1993; Mitchell 2001; Petchesky 1987; Rapp 1997; Taylor 2008.

The fixed sonographic image is a cross-section of the foetus, as if the body were cut by the waves from the transducer like the end of a log showing the tree rings (Sandell 2010). Once a suitable diagnostic image is fixed, a shape that counts as a representation of an anatomical feature has to be measured manually. The "freezing" of an image out of the real-time display of electric signals on the screen, the gesture, and the comment together endows the image on the screen with a stable referentiality.[9] The visual display of qualitative properties (round shape) is "datacized", translated into quantitative properties and into numbers (Döring 2011), indicating a certain circumference and diameter measured in millimetres. In their talk during the scan, Ms. Kessler and Dr. Stein discuss not only these measurements but also Ms. Kessler's gestational age. To indicate whether the phenomenon in question – the foetus – is within a normal range of development, the foetal parameters have to be related to a mean range of foetal development, for which gestational age plays a crucial role. After a foetal parameter has been obtained manually, each measurement is assigned a corresponding intra-uterine lifetime in weeks and days. Measuring a foetal parameter sets in motion a computerized calculation by which the present foetal parameter is compared with other foetal parameters stored in the software chart. This software function works with standardized foetal growth charts based on European and North American foetal measurements (Müller-Rockstroh 2010). A head circumference of 31 cm is considered to be the appropriate measurement for a foetus aged 34 weeks and five days. In the case of Ms. Kessler, the foetal age obtained corresponds satisfactorily to the gestational age and, as Dr. Stein underlines with her gesture, demonstrates "normal" development. This is the information Dr. Stein is seeking when, after Ms. Kessler tells her that the hospital doctor said the child was too big, she tries to ascertain "how far" the pregnancy is. Only on the basis of this knowledge of gestational age can she demonstrate the "normality" of the foetal parameter.

In the situation described here, the consequences of attributing timely development to the foetus are Ms. Kessler's subsequent moral relief that she has not harmed her child by her dietary habits, the avoidance of insulin injection, and the avoidance – at least for the moment – of a caesarian section.

The attribution of risk and/or the establishment of the normality of foetal growth is essentially based on the process of datacizing the foetal body and attributing to it time units (weeks and

[9] Referentiality means that as an effect of visual performances, a composition of visual signs is given meaning (Burri 2012).

days) that divide gestational time into measurable units. The "normal ranges" of epidemiological and statistical knowledge production that contribute to the attribution of an age to a foetus at a certain point in time are blackboxed in the software of the ultrasound apparatus: the network of ultrasound waves, transducers, ultrasound couches, reclining bodies and moving hands (Barad 2007: 189-222). The judgement that the foetus is not at risk is made by relating the foetal "age" enacted by biometric measurement to the actual gestational age. Assessing a gestational age entails locating the pregnancy at a certain point within a time interval of 40 weeks – the assumed mean medium duration of a pregnancy (Loytved et al. 2009). But how is a pregnancy located within this time interval in the first place?

Volatility of gestational age

Before the advent of ultrasonography in the 1980s, obstetricians determined the age of the pregnancy anamnestically through information given by the pregnant woman about her last menstrual period or the day of conception. Palpation of the woman's abdomen was a bodily way of assessing the age of the pregnancy. With the introduction of ultrasonography in obstetrical care, a new way of defining gestational age took over, and the use of ultrasound in early pregnancy is now the most common way of establishing gestational age in obstetrical care.[10]

The practice of dating early pregnancy via ultrasound is informed by knowledge of the stages of embryonic development drawn from the Carnegie Collection.[11] The Carnegie classification of developmental stages in human embryos is based on the parameters of maximum body length, external body shape, and degree of development of the internal organs. This staging system can be correlated with the sonomorphologic findings of body length and body shape in living human embryos (Merz 2005: 17). Developmental milestones in ultrasound visualization are correlated with the developmental stages of the Carnegie classification and related to the clinical method of measuring pregnancy time in weeks and days after the last menstrual period. However, in routine ultrasound screening it is biometric measurement that enables the

[10] Epidemiologists researching the factors that influence the average duration of pregnancy have even proposed ignoring studies carried out before 1980, because at that time the gestational age among the pregnant women participating in studies was not assessed with ultrasound (see Loytved et al. 2009).

[11] The Carnegie Collection is one of the biggest collections of human embryos, accumulated from 1887 onwards. It was formally founded by the anatomist Franklin Paine Mall in 1913. He persuaded the Carnegie Institution of Washington to fund an independent department of embryology on the campus of the Johns Hopkins School of Medicine (Morgan 2009: 45). The 23 "Carnegie stages" of embryological development are the international model of reference for embryological research. On the history of developmental series and their significance for the disciplinary formation of developmental biology, see also Hopwood 2005.

determination of gestational age. Obtaining a foetal parameter requires the measurement of a frozen image of a morphological structure, and sets in motion a statistical calculation using computer software embedded in the ultrasound apparatus. Each measurement is assigned a corresponding life time in weeks and days calculated from the last menstrual period. The age of the embryo results from the measurement of crown–rump length,[12] and is obtained on the basis of standard growth curves and growth models.

The practice of dating early pregnancies is also dependent on nationally specific ways of counting pregnancy time. In obstetrics in Germany, as in many other countries, pregnancy begins before conception: the "starting day" of medical counting is the first day of a women's last menstrual period. Pregnancy time is counted differently in the Brazilian or French health-care system, where the day of conception is treated as the "starting day" of pregnancy. In other words, "age" in obstetrical practice depends on the method of counting that prevails in the country where the ultrasound examination is carried out.

In medical textbooks, the process of determining gestational age is framed as a single, conclusive act in time (Merz 2005: 8) – but in the execution of prenatal check-ups and ultrasound screenings, the determination of gestational age by foetal parameter is never-ending. The process of gestational age assessment is frequently a topic in subsequent ultrasound examinations and prenatal check-ups. In the following description of consecutive prenatal check-ups, the gestational age is volatile.

Ms. Richter is early in her pregnancy with her third child. Two weeks ago at the ultrasound examination, another doctor measured a foetal parameter that indicated the child was older than previously thought, and suggested that the due date might be in July rather than on 5 August.

> Ms. Richter, still sitting on the gynaecological chair, says she would like to know how far advanced the pregnancy is. She believes that according to Dr. Müller's calculations, "we" are now at "10 plus 3 weeks", but according to Dr. Stein (the doctor who did the ultrasound exam two weeks ago) "9 plus 6 weeks". Dr. Müller says kindly but firmly that this is "a few days' difference only. That doesn't concern us". Ms. Richter giggles and declares she just wanted to do the maths a little. Then Ms. Richter and Dr. Müller go into the adjacent ultrasound room. […]

[12] Medically, the crown–rump measurement is regarded as the most reliable parameter for dating pregnancies within the first 12 weeks (Bahlmann et al. 1997: 203), because it shows less variation than other biometric parameters (Merz 2005: 28).

> Ms. Richter, who is now lying on her back on the ultrasound couch, says that "everybody" is asking her about the due date, and she always answers: "Anytime in July. You can take it that it will be three or four weeks earlier". Dr. Müller declares that today a due date will be specified, although the child probably will "anyway not be born on that day". Ms. Richter confirms that the child will certainly come earlier, and then Dr. Müller suddenly remembers that Ms. Richter can even "choose" when the caesarean section will take place, because as it is her third child after two deliveries by caesarean section she will have a caesarian section as a matter of course. […]

The ultrasound examination is finished. Ms. Richter and the doctor sit at the desk again. Dr. Müller hasn't mentioned the age of the pregnancy during the ultrasound examination, but has indicated that the foetal parameters are generally okay. The subject of the conversation is the calculation of gestational age. Dr. Müller says that there is the Knaus calculation, after the last menstrual period, that is "9 plus 1 weeks". Her ultrasound says the crown–rump length is "9 plus 4"; that is not a "serious difference" so she "won't change anything". Then she hesitates, and checks her documents to find out what Dr. Stein calculated at the ultrasound measurement two weeks ago. At that point, she continues, Ms. Richter was "7 plus 1" and Dr. Stein had calculated "7 plus 6". Dr. Müller concludes: "Well, it's always a little bit bigger and ahead of its time", and remarks that this still makes no great difference to the calculated due date. Ms. Richter asks if now the due date of 5 August is settled. The doctor inquires if she wants to change the due date. Ms. Richter pauses, and Dr. Müller repeats that she won't change the due date if the measurements are only a week's difference. Ms. Richter grimaces slightly and murmurs that "all" her family members celebrate their birthdays in July. "Oh I see, that's the issue," says the doctor and suggests scheduling the caesarean section on 1 August. Ms. Richter laughs, and says she doesn't think she will be able to wait that long.[13]

Two months later, the due date is corrected in the antenatal record. The gestational age is changed from 17 plus 1 weeks to 18 plus 0 weeks and the due date from 5 August to 29 July. When Ms. Richter is late in her pregnancy – in month eight she again asks how far the pregnancy "truly" is, because at the last ultrasound the foetal head was the size of a much older child. The doctor explains that this difference is nothing to worry about. She discusses a date for the caesarean section with Ms. Richter, who wants to have it earlier in the course of pregnancy – in late June or early July – because she doesn't want to give birth in the middle of July, when her daughter and other close family will be celebrating their birthdays; the doctor strongly advocates settling the date of delivery on the previous due date, 5 August, thus

[13] Excerpt from field record of an ultrasound examination in a resident obstetrician's office.

proceeding on the basis not of the "corrected" due date but of the previous due date based on the ultrasonographic findings from the first 12 weeks of pregnancy.

The naming of more than one due date and differing measurements of foetal parameters are characteristic features of obstetrical practice. Unlike the age of living persons, where in most countries the birth date is known, pregnancy time and foetal age are indefinite. In the situation described in the field record, Ms. Richter highlights the practical significance of determining gestational age: it serves to calculate the due date, based on a time period of 40 weeks from the last menstrual period.[14] The occurrence of differing "ages", i.e. different measurements of foetal crown–rump length and different ways of counting gestational time (the Knaus-Ogino rule after the last menstrual period or foetal biometry) is downplayed by the doctor. Her lack of concern can be explained by the fact that different measurements by different sonographers can occur at any time in ultrasound biometry, since measurement is sonographer-dependent.[15] Dr. Müller therefore explains to Ms. Richter at another check-up that the gestational age and thus the due date is not usually changed if the difference in measurement is less than a week, because the variation may stem not from the unusual growth of a foetal parameter but from the sonographer-dependent variability of measurements. Not only does the doctor downplay the occurrence of different "ages", which was what prompted Ms. Richter to ask how far the pregnancy "really" is and possibly to re-schedule the due date, but she also sets as the standard the gestational age that is valid for this pregnancy. Dr. Müller relates the two different foetal ages to this standard by saying: "Well, it is always a little bit bigger and ahead of its time". Here, she enacts a split between a physical embryo and the ways of counting pregnancy time. In regarding the growth of the foetus as "ahead of its time", she even attributes a certain individual quality to this rapid foetal growth.

This case of shifts in pregnancy time is no exception. Amendments to pregnancy time are built into the very material base of obstetrical work, the antenatal record known as the *Mutterpass*[16] that is used in obstetric practice in Germany. Medical records are actively involved in the performance and enactment of patient bodies and medical time (Berg and Bowker 1997), and the *Mutterpass* expressly mediates a shift in time with regard to

[14] The calculation of the due date is based on Naegele's Rule, formulated in 1812, and on the findings of the Austrian obstetrician Herman Knaus, but there is some debate about whether Naegele really meant his rule for calculating the duration of pregnancy to be understood in this way (Loytved et al. 2009).

[15] Most clinical studies therefore stress that only one operator performed the sonographic measurements; the reason stated is to exclude sonographer-dependent variability in measurements of foetal parameters.

[16] The *Mutterpass* is an antenatal medical record, in the possession of the pregnant woman herself, in which the health professionals monitoring the pregnancy document their diagnostic findings and treatments.

gestational age. It caters for two due dates, providing two fields where due dates can be entered (a "calculated due date" and another single line for the due date "where necessary corrected based on the course of pregnancy"). Shifts in gestational age are also considered in the gravidogram.[17] This has two columns for entering the pregnancy time: the column "week of pregnancy" and the column "week of pregnancy corrected". These columns enable a form of "double-entry accounting". They allow health professionals to consider the shift in time that occurs when the gestational age is re-dated while still monitoring the course of each individual parameter without any rupture or discontinuity.

In summary, establishing gestational age in ultrasonographic practice has a volatile aspect, and is an indeterminate process which is incorporated as such into the patient records of obstetrical work. This incorporation allows for shifts of gestational age, but the monitoring of the pregnancy continues along a linear time axis and along the time standards that fragment procreative time into weeks and days.

Entangled futures: Negotiating foetal time and everyday life time standards of pregnant women

In medical obstetrical care, the assessment of gestational age entails locating the pregnancy in calendrical time and fixing a due date.[18] The duration of pregnancy, or the question of the date on which delivery will take place, is subject to negotiation between health professionals and pregnant women. In these negotiations, the futures of the child and of the pregnant woman are entangled. Pregnant women evoke everyday life time standards, while medical professionals refer to the age of the foetus in terms of its physiological maturity. In the situation described in the field record, where doctor and Ms. Richter negotiate the gestational age of Ms. Richter's pregnancy, a conversational shift takes place: the conversation easily slips from the gestational age to the question of when the caesarian section is to be scheduled. This happens because the due date prescribes the best time frame for a planned caesarean section, which

[17] The gravidogram is a chart in the *Mutterpass* with columns for data on maternal and foetal parameters (fundal height, foetal position, heartbeat, blood pressure, blood levels, sediments in the urine, etc.).

[18] Health professionals use a *Gravidarium* to calculate the due date. This tool consists of two discs on a shared axis, one smaller than the other. The 12 30-day months of a norm-calendar year are printed on the outer disc; the smaller disc, which can be rotated, is marked with the mean duration of a pregnancy of 40 weeks (counted from the first day of the last menstrual period). A mark on the inner disc signals the "start day" of pregnancy. Once this mark is aligned with the date of the beginning of the woman's last period, her due date can be checked at a glance.

should be no earlier than two weeks before the due date.[19] This rule is informed by the epidemiological knowledge that mortality and morbidity rates for children delivered before the completed 37th week are higher than after that date. When Ms. Richter wishes to set an earlier date for the caesarian section, the doctor emphasizes that there should be no intervention in physiological processes (if the child is born earlier, that's the way it is, it can't be determined). In the practice of ultrasound examinations that I have observed, the temporal needs of the pregnant woman are seen as antagonistic to the temporal needs of the foetus, which has to reach a certain age or maturity. Another doctor argued, for example, that the earlier delivery is attempted and the less mature the baby is, the greater is the risk of an emergency situation.

Ms. Richter's interest that the child should not be born in a period when "all" her family members celebrate their birthdays is also linked to gendered dimensions of care work – the organization of birthday parties, cooking and baking, buying presents, decorating the house are all a feminized form of work. The gendered division of labour informs temporal needs regarding the scheduling of the day of delivery in other ways as well, for example when another pregnant woman argues that she gave birth to her previous children very fast and is now afraid that she may do the same anywhere, at the kindergarten or while out shopping. She also describes herself as the main care-giver for her other three children, without quick access to support if she should give birth unexpectedly because her husband's leave has to be planned in advance. The wish to give birth at a certain point in time arises from time constraints that, in turn, result from the gendered norms of familial time management (Jurczyk 1998). But the pregnant women in my study not only put forward their temporal needs arising from everyday life responsibilities; they also argue in much the same way as obstetricians as regards physiological features that – in their view – mark the maturity of the foetus. In an interview after the ultrasound examination, another pregnant woman, Ms. Diemel, explains her family situation in detail, saying why she doesn't want to give birth spontaneously, but she also legitimizes her need to have the child three weeks before the due date by referring to its physical maturity: "the lungs will be complete next week. It´s not as if I wanted to induce labour at 35 zero. None of my children had vernix, not even in the 36th week. They were complete – like caesarian section babies, they didn't have anything wrong with them". With regard to physiological features of the unborn child, this pregnant woman positions herself as

[19] A delivery in the period between the 37th and 42nd week is considered a "normal" duration of pregnancy. A delivery in the 24th to 36th week is considered to be a "preterm delivery". Even here, a distinction is made between "early preterm birth" and "late preterm birth" (Poets, Wallwiener and Vetter 2012).

an experienced and responsible mother who won't harm the child if labour is induced earlier than the scheduled date of birth.

Establishing the date of delivery affects the near future of the pregnant woman and also – from an epidemiological perspective – the longer-term future of the unborn child. The notions of foetal time and of everyday life time standards are therefore entangled. From a clinical point of view, the temporal requirement lies in the prevention of risks statistically associated with preterm or late-term delivery. From a pregnant woman's perspective, the requirements of familial time management prevail. The "developmental" time of the foetus is weighed up against the "Eigenzeit" (Nowotny 1993) of the pregnant woman. Two notions of time are in conflict.

Conclusion: Measurable time units, intersecting notions of time, and the paradoxical temporality of prevention in obstetrics

The widespread technique of visualizing and datacizing the foetal body through ultrasound scanning and the attribution of measurable time units strengthen the anticipatory dimension of preventive obstetrical care in more than one way. My examples have shown, firstly, that the time of the pregnant woman and the time of the embryo/foetus intersect. In negotiations over the due date, obstetricians act as champions of the foetus: they point out the maturity of the foetus, making "ontogenetic time" (Rheinberger 2002: 287) and the foetal future matter. Pregnant women, however, while acknowledging popularized growth standards regarding physiological maturity, make the temporal needs stemming from their daily work and family life and their near future around the circumstances of birth matter. Secondly, we have seen that time units used to measure the age of the pregnancy are enacted as normality standards, and that pregnancies are managed according to the evaluation of whether the foetus is growing in a "timely" way. And thirdly, it has become clear that the process of attributing time units to pregnancy time is highly volatile. In sum, the evaluation of whether the foetus is growing "normally" is a circular process: the gestational age, which has to be known in the first place in order to assess the normality of foetal growth, is volatile, but for practical reasons it is set as a fixed standard for the assessment of foetal growth.

In obstetrical care, ultrasound scanning and biometric measurement intensify the "paradoxical temporality" (Fuchs 2008: 364) of prevention, whereby the future becomes part of the present, and "time condensation" (van der Ploeg 2002), the entanglement of foetal time and pregnant

women's time and future. As "anticipatory modes" (Adams, Murphy and Clarke 2009: 251), these techno-scientific practices of attributing time units to visualized and datacized foetal bodies enact foetal futures in the present of the pregnancy. Ultrasound and biometric measurement might make it possible to avoid bad outcomes in the future, but as Adams, Murphy and Clarke have argued, having the possibility of calculating the future and acting in the present also entails the moral imperative of anticipating, the *will* to anticipate. In contemporary obstetrics, ultrasound scanning is a highly valued technological way of making pregnancies manageable and calculating epidemiological risk to the foetus.

Ultrasound is a technology for assessing, measuring and monitoring appropriate developmental progress. Clearly, the practice of evaluating such progress using medical time units is not unique to procreative time, but applies to all life events (Simonds 2002: 569). Time standards are norm standards postnatally as well. The growth of children is also subject to notions of "age-appropriate" development measured by paediatric instruments. The evaluation of age-appropriate skills and competences guides interventions in the child's life course and calls for particular observation skills and behaviour on the part of parents (Kelle 2010). With regard to the cultural and institutional forms that shape the experience of pregnancy as an embodied status passage to parenthood, the hegemony of "naturalized" time standards enacted by technological devices such as ultrasound and biometric measurement not only neglects the importance of everyday notions of time for pregnant women; it also discourages both professional practice and public debate from problematizing the time constraints that stem from the gendered divisions of care work involved in the experience and management of pregnancy and birth. Problems of time management are individualized, making conflicts that arise from asymmetrical notions of ontogenetic time and everyday life time into the personal problem of pregnant women, who are even suspected of hampering their child's "natural" development and future opportunities.

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