KU LEUVEN

FACULTEIT PSYCHOLOGIE EN
PEDAGOGISCHE WETENSCHAPPEN

Parenting in digital times:
"Who said parenthood doesn't come with a manual?"

A philosophical investigation of parenting apps

Masterproef aangeboden tot het verkrijgen
van de graad van Master of Science in de
educatieve studies
Door
Leen Guldentops

promotor: Dr. Stefan Ramaekers
copromotor: Dr. Naomi Hodgson

2018-2019

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Summary

In contemporary times the vocabulary of ‘parenting’ is often used to talk about raising children and what it means to be a parent today. The parent-child relationship is described in technical terms, as a kind of know-how that parents can and need to obtain. Raising children is depicted as a ‘technique’ wherefore parents or the ‘educator’ can acquire particular knowledge and skills whereby raising children is seen in the light of a certain end-point.

Most of the critique on the parenting culture comes from the field of sociology and sociology of technology focusing on the parenting culture in general or the effects of digital technology on the child. For our study we placed the focus on the figure of the parent in particular to present another perspective and to contribute to the critique coming from the field of philosophy of education, presenting a pedagogical account of raising children and looking at the aspects that are left out in the discourse of parenting. The Master’s thesis is different from other research in the field of philosophy of education and sociology of technology because we attempted to understand the parent as a pedagogical figure within digital times. In our analysis we tried to understand how parents are constituted and constitute themselves in current digital times. For this purpose we used a specific source of parenting advice: parenting apps. This work is an attempt to move away from a technical description of the parent-child relationship in order to bring in the perspective of an intergenerational relationship from Schleiermacher, Arendt and Cavell, to re-open our thinking about the parent as a pedagogical and political figure.

Our analysis started with situating parenting apps within current digital times against the background of upbringing as an intergenerational relationship to point to what is left out in the current parenting discourse. In our further analysis we distinguished parenting in digital times from raising children in other times drawing on the writings of Foucault on governmentality and technologies of the self. In the study we drew our attention to the way parents are addressed in parenting apps. The description of the parenting apps (i.e. language) and what parenting apps visualize (i.e. visualization) are used to see how parents need to understand themselves. These findings are used to articulate what parenting apps mean for the figure of the parent today, situated against the background of raising children within an intergenerational relationship. Nowadays, parents are understood as algorithmic assemblages, reduced to measurable aspects and narrowed to the capabilities of parenting apps. As a quantified subject the parent needs to acquire skills and knowledge based on his own data for self-government. The parent is addressed as a vigilant in the sense of a monitor and as an executor to act upon his situation, leaving out the person of the parent and his political context (i.e. depersonalization and depoliticization of the figure of the parent). The perspective of the parent within an intergenerational relationship seems to be lost and the parent-child relationship is reduced to a quantified and datafied relationship in digital times.

Acknowledgments

The Master's thesis is a further development of the ideas from the work of Ramaekers, S. and Suissa, J. (2011; 2012; 2013) and from more recent work of Ramaekers, S., & Hodgson, N. (2018; in press). Their work have been an inspiration for my writings on the contemporary digital parenting culture.

I want to thank my co-supervisor, Naomi Hodgson, for answering my questions, sharing knowledge and giving me feedback on the writing process. Also, I want to thank my supervisor Stefan Ramaekers for helping me out when needed and being available for questions. I want to thank them both for being more than just a supervisor, for being supportive and giving me the feeling of being capable to deliver a qualitative work on the topic. Also, I want thank Claudia for being my biggest emotional support. Further I want to thank Jean-Pierre and Ellen for reading my work and giving me feedback on spelling mistakes and grammatical errors. I need also to thank my friends and family for their encouragement throughout my study.

Clarification of the student's approach

The topic 'Registers of learning in parenting apps' for the Master's thesis was proposed by professor Ramaekers. In the first meeting the topic was elucidated by the professors Ramaekers and Hodgson for the student. The student started reading the recommended literature to get familiar with the research topic and made notes for an in depth understanding of the topic. During the reading process, the student asked the professors for additional literature, searched for research articles and books in the databases connected to the KU Leuven and used the references from the articles and books to get a full understanding of the topic. In cooperation with the co-supervisor, professor Hodgson, the student discussed the further approach of the thesis. The student did the analysis of the parenting apps independently and asked the co-supervisor for feedback to improve the quality of the thesis. Also, the student contacted organisations in Flanders to get more information about the topic in family policy. With the help of professor Ramaekers regarding the policy in Flanders and the help of professor Hodgson regarding regular feedback and suggestions on the content, the student continued writing the thesis independently.

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Introduction

In contemporary times the parent-child relationship has become dominated by the vocabulary of 'parenting', which contains certain languages and forms of reasoning to talk about raising children and what it means to be a parent today. The way we speak or think about upbringing, the arguments and the logic we use in this vocabulary is often *technically* described. This implies that the parent is expected to raise his children on the basis of scientific insights. The parent needs to look at the child and the cohesion between parental actions and well-being in a scientifically responsible way (Hooghe, Grommen, & Van Crombrugge, 2005). The practice of raising children is often described as a specific set of knowledge and skills (Ramaekers & Suissa, 2012).

> In many countries, the government thus has begun to focus on improving parenting skills through diverse parenting support initiatives under the assumption that this will help solve the 'crisis' of childhood (Kehily 2010). At the same time, numerous popular reality television programmes, broadcast in many countries (including Flanders, Belgium), such as Supernanny and the House of Tiny Tearaways, have made parenting increasingly visible. (Stuyve, Simons, & Verckens, 2014, p. 786)

'*Parenting'* is a relatively new concept to address how parents should raise their children, instead of speaking about 'upbringing'. Hodgson and Ramaekers (2019) indicate that the word 'parenting' is often used in Anglophone countries (UK, US), this differs from the non-Anglophone Western-European countries such as Germany, The Netherlands, and Flanders. In these countries there is no equivalent for the word 'parenting', they continued to use the same 'old' words ('opvoeden', 'grootbrengen', 'erziehen'):

> But significantly, the conceptual field expressed by these 'old' words has shifted – or, perhaps, narrowed – in very much the same ways as denoted by the move to the predominant use of the concept of 'parenting' to refer to what it means to bring up children. (Hodgson & Ramaekers, 2019, p. 7)

It is important to note that the vocabulary of 'parenting', the *language* we use, determines in a certain way how we look at the parent-child relationship, but also how parents will act in this relationship (Ramaekers & Suissa, 2013). The technical description about how to be a good parent shows that we are in 'need' of the language of science to describe how a good parent should behave. It is on 'the basis of scientific insights' and in 'a scientific responsible way' we should act as a parent. Those 'scientific insights' come from disciplines such as developmental and behavioural psychology and more recently from neuropsychology (Ramaekers & Suissa, 2011), to give parents particular advice in raising their children and determine which knowledge and skills are important.

Parents are targeted with a whole range of parenting advice, coming from websites, (hand)books, experts, etc., but we can also think about parenting magazines, television programmes such as Supernanny (Dahlstedt & Fejes, 2014), and parenting apps (Ramaekers & Hodgson, in press; Ramaekers & Hodgson, 2018). Parents are conceived as educators who are 'in *need* of advice and experts'. They are addressed as if they "do not know how to handle

… and thus need to be told how to deal with it" (Ramaekers & Suissa, 2012, p. 3). Policy makers believe they can solve society problems by setting up family supportive programmes for parents and *preventative education* is used as a solution for achieving the full potential of children. Raising children is seen as something that needs support and advice, and social problems and children's learning problems are considered as a sign of parental failure. As well in Flanders, there are initiatives aimed to help parents when they get stuck in the education of the child, e.g. the Triple P programme[1]; groeimee.be[2]; de opvoedingslijn[3]. The omnipresent of the vocabulary of parenting indicates that there seems to be no other way of talking about the parent-child relationship or defining what it means to bring up children.

This way of conceptualizing parents is part of the wider context of responsibilization and governmentalization of learning in general. In this context the family became an instrument for governing society to ensure economic growth, with currently a high emphasis on learning (Simons, 2006). Problems are conceived as learning problems and parents are addressed as *learning subjects*. It is the learner himself who became the solution for perceived (social) problems as a matter of self-government to regulate his own learning process. The parent is seen as the one who is responsible for his own learning, and what he needs to learn can and should be managed. The collective responsibility (the society) has shifted to an individual responsibility (the parent).

In the critical literature on the parenting culture this is described as the idea that parenthood is a 'job', that the parent needs to take his task seriously, because his parenting style will decide the outcomes of the child. Mothers and fathers are not only seen as the cause of social problems but can also be the solution for them (Lee, Bristow, Faircloth, & Macvarish, 2014). "As a consequence, there is now a perception that it is necessary to set up preventative programs, including help lines for parents and monitoring systems to screen possible deviant behaviour" (Vansieleghem, 2010, p. 349). The parent-child relationship is seen as a causal interaction in achieving a certain endpoint. Parents are understood as being in need of education, to take up responsibility for the parenting job, and to professionalize themselves in a certain sense. The relationship between parents and children is seen in terms of educational *outcomes*, "Parents are expected to do things with their children that are in a very specific sense goal-oriented" (Ramaekers & Suissa, 2011, p. 26).

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[1] http://www.triplep.be/: Triple P is the Positive Parenting Program based on 5 principles to stimulate positive childrearing. ; Critique on Triple P: (Vansieleghem, 2010) (Ramaekers & Vandezande, 2013)

[2] https://www.groeimee.be/: Is a Flemish website who shares parenting information in the form of tips and answer to questions about topics such as 'social media', 'friendship', 'divorce'.

[3] http://www.opvoedingslijn.be/: Parents or educators can call this organization anonymous if they have questions about childrearing.

The phenomena of using scientific languages and professionalization in our way of speaking about the parent-child relationship or raising children in general, is described as '*the scientization* of the parent-child relationship', the parent-child relationship as in need of 'expertise' (Ramaekers & Suissa, 2011). In the context of Flanders we recognize some ideas of this discourse in addressing parents or speaking about parents. There is an increased *scientization* and *psychologization* of 'parenting' as Ramaekers & Suissa (2013) indicated in Goed ouderschap: Een andere kijk op opvoeden. In the context of Flanders the examples of neurologization are not as clear or visible as in the Anglophone context (cf. Macvarish, 2016) or The Netherlands, and even less researched. Leysen (2018) is doing her doctoral research on this topic, "Concerning the mechanisms and performative force of current neurodiscourse regarding parenthood in the case of Flanders". At the moment it is difficult to state how the neurodiscourse is operating in Flanders.

Most critique on the parenting culture comes from the field of sociology (e.g. Parenting Culture Studies), such as the work of Lee, Bristow, Faircloth, & Macvarish (2014), focusing on the parenting culture in general. The sociology of technology perspective by Lupton and Williamson (e.g. Williamson, 2015a; Lupton & Williamson, 2017), offers a critical analysis of digital technology and how it affects childhood (Ramaekers & Hodgson, in press). In the Master's thesis we want to focus on the figure of the parent in particular to present another perspective rather than focusing on children or the parenting culture in general. More recently the field of philosophy of education presents a pedagogical account of raising children and looks at the aspects that are left out in the discourse of parenting as a critique on the parenting culture. It is our attempt to contribute to this by an *intergenerational perspective* of upbringing children and the parent-child relationship, to regain focus on the parent as a pedagogical figure.

> In the field of philosophy of education, Stephanie Mackler has recently voiced concerns about how today's technical approach to childrearing, characteristic of the turn to parenting, obfuscates essential aspects of being a parent, in particular the possibility of reconceiving the world the parent represents in respons to the disruption of it posed by the child (Mackler 2017). (Ramaekers & Hodgson, in press, p. 3)

The current way of thinking about the parent-child relationship is in contrast to philosophical conceptions of raising children like for e.g. Schleiermacher, Arendt and Cavell, who speak about 'an intergenerational relationship' where pedagogical concerns were given shape by the state, the Church, the school, and the family (Ramaekers, 2018) or described as initiating children in relevant forms of live (Cavell, 1979). Preparing children for adulthood was a shared responsibility between institutions, not only between parents (Ramaekers & Suissa, 2012). Ramaekers & Suissa (2012) elaborate in their work a key difference between the conceptions of parenting and the intergenerational perspective: in parenting the parent-child relationship is seen as a one to one interaction in view of optimal learning outcomes while the

earlier philosophical conceptions (e.g. Schleiermacher; Arendt; Cavell) captured the intergenerational, social, and political nature of this relationship.

We want this study to be a contribution to the critique of framing upbringing as 'parenting'. That's why we look at a specific source of parenting advice – *parenting apps* – to understand how parents are constituted and constitute themselves in current digital times. By means of parenting apps we will try to 'demonstrate' that there is a profound shift in how we understand what it means to bring up children today. In research there is often a focus on personalized digital technology and how childhood is reshaped by it, from the perspective of the sociology of technology (e.g. Lupton & Williamson, 2017). Or there is a focus on how apps are used by children and how parents can deal with that, within the educational research literature (e.g. Mascheroni, Ponte, & Jorge, 2018). But there is less attention for what parenting apps can tell us about the constitution of the parent-child relationship or how parents are addressed in current times.

The Master's thesis is situated within the field of philosophy of education and sociology of technology. Different from most of the research in the field of sociology and philosophy we understand parents as pedagogical figures within digital times. Our framework is based on understanding parenting apps as a (digital) parenting advice that needs to be comprehend within a '*postdigital'* description of the relationship between humans and technologies. In current digital times it means that: "We are increasingly no longer in a world where digital technology and media is separate, virtual, 'other' to a 'natural' human and social life" (Jandrić, et al., 2018, p. 893). The concept 'postdigital' is often used by researchers as a critical reflection for the entanglement of digital technology and media, and human and social life. "The contemporary use of the term 'postdigital' does describe human relationships to technologies that we experience, individually and collectively, in the moment here and now. It shows our raising awareness of blurred and messy relationships between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bio-informational capitalism" (Jandrić, et al., 2018, p. 896).

Thus, parenting apps are understood and will be analyzed as *sociotechnical* technologies, we do this from a *governmentality* perspective drawing on Michel Foucault (2002a). This against the background of raising children within an *intergenerational relationship* and to articulate an account of the parent as a *pedagogical figure* rather than mere a technical executor. Considering parenting apps as *sociotechnical* (Lupton, 2018; Williamson, 2017; Seaver, 2017) means that (social) lives and practices of parents are co-constructed with technology.

> Digital technology is not an autonomous force that leads to changes beyond our control or comprehension. Instead, it is helpful to conceptualise digital technologies as being socially shaped. From this perspective, the nature and form of any device or application is subject to continual interactions and 'negotiations' with

> the social, economic, political and cultural contexts that it is embedded within. (Danby, Fleer, Davidson, & Hatzigianni, 2018, p. v)

Parenting apps are not neutral technologies but imbued with visions and values from the designers but are also understood in human practices. Technologies get their meaning from the social, economic, political and cultural contexts where they are embedded within, and humans make part of. In recent studies there is more awareness for software, algorithms, big data, … (that are part of the underlying mechanisms of apps) and how they are shaping our social world (e.g. Bucher, 2018). In this study we will pay attention to how algorithms contribute to a particular understanding of the parent-child relationship.

Drawing on the work of Michel Foucault (2002a) on *governmentality,* parenting apps are in this study considered as sociotechnical technologies that constitute parents as particular subjects. "The ideal parent is a subject who, guided by the coach, is constantly endeavouring to achieve a makeover. The objective of this endeavour, however, is self-control, whereby the parents will in the end become their own coaches" (Dahlstedt & Fejes, 2014, p. 169). Foucault makes a distinction between technologies of power and technologies of the self. We situate algorithms and parenting apps within the discourse of self-government and treat them as sociotechnical technologies of the self: "relate to people's self-formation and the way they produce themselves as citizens" (Dahlstedt & Fejes, 2014, p. 171). The approach of the study follows previous work on parenting apps by Ramaekers and Hodgson (2018; in press).

Apps and their algorithms need to be understood in a broader picture where they are influenced by politics, culture, economic and social discourses. We cannot disentangle these discourses from apps because they need to be understood in a technological and a sociological part to get a grasp of what algorithms mean in our lives and how they make understand ourselves. This means that apps are sociotechnical technologies, understood in the broader 'parenting' discourse. It is not the question whether or not using apps produces better outcomes but how the representation of parents in the apps constitutes a particular idea of raising children. In our analysis the particular focus is on the parenting information and advice that is being communicated and consumed via the app.

Technology is becoming increasingly more part of our social lives. In this study we take this as a concern for new modes of (self-)government and how this influences the understanding of the parent-child relationship. Ramaekers & Hodgson (2018) argue that digital technology is not only an intensification of the parenting culture but also marks a further shift in transforming how we understand the parent-child relationship today. With the thesis we want to work further on this through a focus on *the digital aspect* of the parent-child relationship in parenting apps. We focus on the digital aspect because this is missing from the critical literature, in sociology and philosophy of education. Personal, digital devices are not only ubiquitous in our lives (and so part of the context in which we raise children) but also now

specifically designed for and aimed at parents. It is to establish a "critical understanding of the very real influence of these technologies [on the conceptualization of the parent] as they increasingly pervade social life" (Jandrić, et al., 2018, p. 895). We see it as an attempt to unravel what is happening to the parent-child relationship within current digital times, rather than claiming the 'real' consequences of the pervasiveness of technological devices in our social lives.

In the thesis, we assume that the predominant ways of conceptualizing childrearing and the parent-child relationship are very powerful in our way of speaking or thinking about parents. We do not want to analyze if parenting advice coming from parenting apps is right or wrong but it is a concern of:

> … how the 'scientific account' of parenting – saturated with the discourses of psychology and the (perceived) need of, even fixation on, expertise – define and restrict both how we think and talk about childrearing and the parent-child relationship, and how parents accordingly understand themselves. (Ramaekers & Suissa, 2012, p. 3)

It is our concern how advice is given to parents, where it comes from, and how it potentially displaces the parent's representational role. Therefore, we assume that *parenting advice* "always reflect[s] certain values and normative assumptions about what constitutes being human, living well, about what the role of childrearing is in a particular society, and about what constitutes good parenting" (Ramaekers & Suissa, 2012, p. 11). This means that parenting advice cannot be neutral but is influenced by the wider cultural, historical, political and social context.

What we will try to do in the analysis of the apps is to draw attention to the way parents are addressed in apps, the language that is predominantly used to speak about the parent-child relationship and what parenting apps visualize. We do not want to question the information that is given to the parents but broaden the causal relationship to an intergenerational relationship – "in which the parent is a pedagogical figure with (political) responsibility for representing the world to the next generation (Arendt, 2006; Molenhauer, 2014)" (Ramaekers & Hodgson, in press, p. 3). The thesis is an attempt to move away from the technical description of raising children and to offer a more philosophical perspective on the parent-child relationship. We do not focus on the parenting culture in particular but on how parenting apps raise the issue of the displacement of the parent as a pedagogical figure, a representational figure situated within a culture, values, personal beliefs and priorities etc. This philosophical and sociological account not only want to contribute to the critique of the parenting culture but also draws attention to what is left out (e.g. the sense of raising children as an intergenerational relationship, the context of moral judgements and values in which the parent is situated) and what parenting apps mean for the understanding of the family life.

1 Parenting in digital times

Parenting apps connect the two words: 'parenting' and 'apps' which in the first place do not relate to each other if we think about childrearing. "In contemporary times, the word parent has taken a whole new significance as a verb – 'parenting' (Gillies, 2012, p. 17). The verb 'to parent' refers to the family practices and particular parenting techniques that are expected from parents. Childrearing is here reframed as a 'job', which requires knowhow and aptitude (Gillies, 2012). The word 'app' comes from another discipline - computer science – and refers to 'application'. 'Parenting apps' combine both *techniques* with our (social) world and create a particular '*sociotechnical environment'* for parents to educate their children. In the 'parenting' discourse, parenting apps can be seen as a technical understanding (cfr. supra) of the parent-child relationship or how 'parenting' is understood in terms of causality. In this context, it makes sense that an app can help the parent, because "who said motherhood doesn't come with a manual?"[4]

In the parenting culture bringing up children is reframed as a verb – 'to parent' – to talk about the parent-child relationship. 'Parenting' is something what parents '*do'*, the ways parents (should) raise their children, what it means to bring up children, or the features of the experience of raising a child/process of upbringing children (Ramaekers, 2018). It became the predominant way to speak and conceptualize the parent-child relationship and how parents should understand themselves.

> Or, more generally, our conceptualization and talk about childrearing and the parent-child relationship today is pervaded with a sense of the need for expertise in this area, even to the extent that parents are expected to professionalise themselves in a certain sense, something which we see encapsulated in the very use of the verb 'parenting'. (Ramaekers & Suissa, 2012, p. 3)

The languages we use to speak about the parent-child relationship come from psychology, developmental and behavioural psychology and currently from neuropsychology, and inform the conceptualizations and ways of speaking about raising children. In this part we want to describe these themes in order to "open up [again] our thinking about childrearing and the parent-child relationship" (Ramaekers & Suissa, 2012) in chapter 4.

1.1 Upbringing as an intergenerational relationship

In our philosophical account, we want to describe and approach the parent-child relationship as an *intergenerational relationship* in which the parent is seen as a pedagogical and political figure to set out a richer and more complex account of upbringing than describing it as 'parenting'. The 'Erziehungstheorie' from Schleiermacher (1768-1834), within a Christian frame of reference, raises the question of what 'upbringing' means, where it takes place and

[4] https://www.mother.ly/

for what purpose. He indicates that upbringing is intergenerational, it is an *ongoing process* between the older generation in dealing with the younger generation.

> The human gender always consists of individuals who go through a certain cycle of existence and then disappear again so that all those who belong to a certain cycle can be divided into an older and a younger generation, whereby the first always disappears earlier from earth. (Thoomes, 1989, p. 8, Trans.)

According to Schleiermacher (1989), the influence from the older generation to the younger generation needs to have the character of 'art' ('Kunstlehre'). This means that practice comes before theory, upbringing takes place in the family and not because of a theory.

> The influence exerted by the older generation always represents a certain value and, conversely, it also are the values (" Sittenlehre "or" Ethik ") from which the parent's actions (as" Kunstlehre ") must be derived. It cannot be assumed that the practice acquires its own character through theory. At the most the practice is made more conscious by theory ("Die Dignität der Praxis"). Together the generations merge into one larger whole: the state. And it is political theory, also viewed as ethical science, that plays a coordinating role (between pedagogy and ethics). (Thoomes, 1989, p. 17, Trans.)

He argues further that the state should be aware of this intergenerational aspect and need to take up responsibility for it. We need politics to ensure the survival of the state. This means that both theories, pedagogy and policy, interact and need to be ethical sciences (Thoomes, 1989). Schleiermacher (1989) indicates that parents raise their children to be included in society. In terms of Schleiermacher this means that children are raised to 'mondigheid', this is when the younger generation cooperates independently with the older generation to the moral task. He defines here a certain 'end-point', to become 'mondig', that also can be seen as a 'starting point', participation in community life.

Arendt (1994) described in a similar way the intergenerational relationship as 'preparing the younger generation for a common world'. The essence of upbringing is for Arendt (1994) *natality*, the fact that human beings are born in the world. This means that the new generation comes in the world of the older generation, the child is a 'human being to become' but also a 'new human being'. 'To become' means here that the child has to be brought up and the educator has to take responsibility for this. 'New' is about the fact that the world already exists and is imbued with meanings – which we represent as being part of the older generation, it is our responsibility to take care of the continuance of the world. This responsibility means protecting the world for the younger generation but also give the younger generation opportunities in the world. Arendt (1994) divides the world in a public and a private world to indicate the role of upbringing for parents. The public world is a world where we are equal, where we discuss, argument and criticize the other because of what we represent. The private world is the family life where we protect our children from the public world, because it is fundamental, as Arendt argues, that children can grow in, slowly, in the public world and need therefore protection.

> Education is the point at which we decide whether we love the world enough to assume responsibility for it and by the same token save it from that ruin which, except for renewal, except for the coming of the new and the young, would be inevitable. And education, too, is where we decide whether we love our children enough not to expel them from our world and leave them to their own devices, nor to strike from their hands their chance of undertaking something new, something unforeseen by us, but to prepare them in advance for the task of renewing a common world. (Arendt, 2006, p. 193)

Representing a world also means that human beings are historically situated, the older generation is situated between the past and the future and takes a stance in it. The parent as a pedagogical figure needs to think about what is important to pass on to the younger generation. It is the younger generation that eventually decides what they want to represent later on.

What the younger generation does with what the older generation represents, can be taken more radically. Drawing on the Excursus of Wittengenstein's Vision of language, Cavell (1979) articulates that parents are generally the first persons who speak to their children. So, it are the parents that *initiate* children in the world by offering them *language*. According to Cavell (1979), we take too much for granted in the language we use for initiating our children in the world, he doubts if we can even know what the child really thinks or learns. "What I am afraid of is that we take too much for granted about what the learning and the sharing of language implies" (Cavell, 1979, p. 173).

> The voice expressing disappointment ('But then doesn't …?') is a sceptical voice. What haunts the traditional philosopher—and what marks this as scepticism—is, according to Cavell, a strong sense of disappointment with the ordinary words we use, because they (presumably) are not powerful enough to reach what we think we 'really' want to say. It is a sense of disappointment with our ordinary uses of words, with their lack of power to offer conviction for our knowledge of the world and of others in it. (Hodgson & Ramaekers, 2019, p. 19)

So, what does it mean to say that children learn language from us? "In learning language, you do not merely learn the pronunciation of sounds, and their grammatical orders, but the 'forms of life' which make those sounds the words they are, do what they do …" (Cavell, 1979, pp. 177-178). Cavell (1979) uses therefore the word '*initiation'*, "We initiate them, into the relevant forms of life held in language and gathered around the objects and persons of our world" (Cavell, 1979, p. 178). This means that words are learned in 'certain contexts' but are also 'appropriate projections into further contexts', learning words is never over and 'we will keep finding new potencies in words and new ways in which objects are disclosed'. Within the parent-child relationship this also means that we cannot control how the 'other' sees the world or check this. According to Cavell (1979), it is a misconception that we can do it and should undertake attempts to unravel this. It is up to the younger generation if our words will have meaning, if they find it important enough to keep understanding us. The world that we take for granted can be taken no longer for granted by the new generation. This indicates that

upbringing children and initiate them in a certain world is less tangible than we would like to admit.

For the thesis, the interpretation of Schleiermacher and Arendt we use, is one that sees the parent as a pedagogical figure, this means then that figures like parents and teachers are representatives of a particular world. What parents (the older generation) will represent is embedded within the broader context of society. They make a particular interpretation of rules and values. The representation of the parent attaches the parent to society, the public world. This means that the parent is always a political figure, what he presents is an interaction between pedagogy and policy (e.g. Schleiermacher) to take care for the continuance of the world.

> Drawing on the insights of these, and other, philosophers to address the educational relationship as a 'relation between grown-ups and children in general', as Arendt has it (2006, p. 193), implies trying to come to terms with the idea that being a grown-up in that particular relation, i.e. being a parent, has a representational dimension; that grownups, i.e. parents, unavoidably represent the socio-cultural meanings that shape their lives and into which they introduce their children. That is, it means trying to come to terms with what we would like to call (the parent as a figure of) *pedagogical representation*. (Hodgson & Ramaekers, 2019, p. 17)

We will use the pedagogical-philosophical account of upbringing children within an intergenerational relationship, as described by Schleiermacher (Thoomes, 1989) and Arendt (1994), and the further articulation of Cavell (1979), as the fundamental background of our approach. The parent is seen as a figure of a pedagogical representation that is less tangible than we think. However this is an endless attempt of science to do this, without taken into account the consequences of moving further and further away of a philosophical and political understanding of the parent.

> Parents unavoidably represent the socio-cultural meanings that shape their lives and into which they introduce their children. Upbringing, then, is always a political event. That is: (1) in raising their children parents lead them towards a public or communal life; (2) in doing so, parents make choices when representing the world (take sides, give consent, utter dissent); (3) parental representations of socio-cultural meanings can be contested by others, not least by their own children, which puts the nature of collectivity or community at stake. (Ramaekers & Hodgson, 2018, p. 1)

The parent within the intergenerational perspective is therefore a human being part of a wider social and cultural context but also a representative thereof. Thus, we can argue that the parent as a pedagogical and political figure is at stake in the scientization of the figure of the parent, narrowing and instrumentalizing the parent-child relationship.

In our case of parenting apps we try "to articulate an account of the parent as a pedagogical figure under conditions of the digitization of parenting" (Ramaekers & Hodgson, in press, p. 2), because it is vital that we look at this, given the ubiquity of digital technologies in our lives today and their political and pedagogical implications, parenting apps have not yet received a lot of attention in this area. Such as Vlieghe (2016) discusses the need to study

digitization from an educational-philosophical perspective because processes of digitization change what it means to be educated and what it means to be human today. Ramaekers and Hodgson (in press) already indicated that parenting apps have radically transformed the understanding of upbringing as a political[5] event, and the understanding of the parent as a pedagogical and political figure.

1.2 The scientization of parenting

There is an important shift in how we speak or think about raising children that can be described as the *scientization* of the parent-child relationship, this is the phenomena of using scientific languages and professionalization in describing this relationship, the parent-child relationship as in need of 'expertise' (Ramaekers & Suissa, 2012). Scientific languages and neuroscience seem to determine what *good 'parenting'* is in our current ways of conceptualizing and talking about childrearing and the parent-child relationship (Ramaekers & Suissa, 2012; Macvarish, 2016). Research and the pedagogical interaction between parents and children are narrowed to the technical jargon from disciplines such as psychology, development and behavioural psychology and neuropsychology. We can see this in magazines about upbringing (e.g. Triple P magazine), websites for (new) parents (e.g. baby brains website; Vroom), books (e.g. The Wonder Weeks), … later we will analyze if this is also the case for parenting apps. What parents do is no longer 'living with their children' but is understood as '(a professionalized) interaction', for example: reading to children is now understood as 'stimulating their language or brain development'.

According to Ramaekers & Suissa (2012) there are different normative assumptions that underpin the current conceptualization of childrearing and the parent-child relationship. These are: *universalism, standard family, (causal) logic of developmental psychology, the parent as a learning subject and neuroscience*. In the following sections we discuss these normative assumptions and what they mean for the contemporary parent.

Universalism refers to the understanding of raising children on the basis of developmental psychology. General concepts are used to 'help' us better understand the development of our children, (however raising children can never be seen independently of the context). In this view, parents are asked to take the third-person perspective of experts and the insider-perspective of the parent is not taken into account (Ramaekers & Suissa, 2013). It looks like experts can provide universal methods for parents to raise their children, one that is objective, think about a handbook for parenthood, a website, and so on.

[5] "Political, here, then refers to our embeddedness within communities of flesh and blood others and our inescapable obligations to them; the weight that our everyday sayings and doings have in the initiation of children into language and culture" (Ramaekers & Hodgson, in press, p. 3).

The (*causal*) *logic of developmental psychology* makes us understand upbringing children as a linear process, what kind of goals or outcomes that parents 'need' to reach. The resources that parents use are seen as important without taking into account their values. Psychology has itself established as a scientific discipline that aims to make objectivations of the modern subject. In research the 'standard' relational setting in which children are raised is often used with little attention to the role of the father. The discipline actually produces a psychologized subject who needs to view himself as an object of psychology (De Vos, 2013). This means that the focus is placed on the individual for explaining (social) problems. Into the terms of psychology it is not about what the parent does, but about what is the best way to do it. Human actions are reduced to behaviour within the discourse of psychology: "… it is the implied reduction of human action to behavior, a process that is inherent to the very paradigm of the disciplines of psychology, i.e. the paradigm of causal explanation" (Hodgson & Ramaekers, 2019, p. 11). Certain outcomes are seen as desirable and achievable, understanding the process of childrearing in terms of 'efficiency': what can I do as a parent to be effective? Here, the parent-child relationship is instrumentalized, what the parent does is put in a causal relationship to the optimal outcomes of raising children. The term *psychologization* is "used to describe a process whereby psychological discourses and theories have become the backbone of our attempts to understand ourselves, others and the world at large, resulting in a fundamental shift in the nature of modern subjectivity" (De Vos, 2015, p. 280). Or described as "the dominant presence of languages of psychology [and neuropsychology] in the literature on parenting, specifically the language of developmental psychology" (Ramaekers & Suissa, 2011, p. 205). When we speak about psychologization in the study, we refer to this dominant language coming from psychology in our way of speaking about the parent-child relationship or understanding ourselves.

Neuroscience claims that there is 'real knowledge' for upbringing our children or to increase brain development. This means that what is meaningful for parents should be scientifically proven. Language coming from neuropsychology "has the effect of establishing the idea that it is now possible to have 'real knowledge' in the area of psychology" (Ramaekers & Suissa, 2012, p. 20). Within this language it seems possible to make 'claims' about what we 'know', the ability to explain something. The implication of this is that we now know what we, as an educator, should do and that it can be done correctly. This idea has led to the assumption that parents cannot raise children by themselves but need support. The parent is addressed as 'in need of education' and the experience of being a parent is framed in terms of 'parenting'. Parents are asked for example to assure optimal learning, stimulate brain development, and avoid risks. The parents need to think as an expert and gather knowledge so they can prevent the child from harm. "Parents can (and should) learn how to manage their children's … behavior. They each can learn how to relate to their child in the 'right' ways, that is, how to

‘parent’ ” (Hodgson & Ramaekers, 2019, p. 13). Websites for parents, (hand)books, parenting magazines are here an example of and take the form of a *manual*, the idea that the parent need to be ‘informed’ and ‘advised’ in order to professionalize himself and manage his ongoing learning process to be a good parent. “This is captured in the observation that childrearing has become to be conceptualised as a ‘job’, or a ‘task’, and the now common references to ‘parenting skills’…” (Ramaekers & Suissa, 2012, p. 27).

The discourses of (neuro)psychologization and professionalization influence the way we think about parents and childrearing in current times. The defined problems in (neuro)psychology are combined with professionalizing the parent as a solution for the problems. Ramaekers & Suissa (2012) describe this combination as the *scientization* of the parent-child relationship. What makes this notion of scientization distinctive from earlier times is the fact that how we understand the care of the child has changed. In the past the care of children was focused on ‘security’ according to safe water, medicine, and so on, because it was uncertain if the child would live. This worry is replaced by the psychological vitality and the development of the child (Ramaekers & Suissa, 2012).

This way of framing the parent-child relationship leaves not much room for a certain kind of openness in the experience of raising children (Ramaekers, 2018). “The perspective on upbringing, however, suggests the possibility of ‘closure’ or ‘achievability’, whereby one can be deemed to have succeeded as a parent” (Ramaekers, 2018, p. 15). Also Hodgson & Ramaekers (2019) argue: “In essence, this shift, or this narrowing down, entails that the concept of ‘parenting’ only captures only one, rather specific, set of features of the experience of raising a child, or, put differently, of the process of upbringing” (Hodgson & Ramaekers, 2019, p. 7). The shift to parenting narrows the understanding of the parent-child relationship as intergenerational, which means there is no acknowledgement for the cultural or historical contexts or values from the parents. We point here to the fact that it is just impossible to reduce parenthood to a mechanical process with predicted outcomes, you cannot leave out the social world of the parent that is infused with meaning and complex interactions.

> It is precisely in the sense of ‘what people of people we hope to be’ that more values come into what we do and when we act as parents; wanting to be certain kinds of people and wanting our children to be certain kinds of people is a part of living as moral agents in a social world. (Ramaekers & Suissa, 2012, pp. 93-94)

It is not rare to state that we are in ‘need’ of a philosophical account of the parent-child relationship. Parental determinism is often found in research on parenting and advice for parents as indicated in the critical literature in the fields of psychology and sociology (Hodgson & Ramaekers, 2019). “Parental determinism acts to disregard any possibility that learning by experience, and the tacit knowledge that accumulates this way, is perfectly good and acceptable to go about raising children” (Lee, Bristow, Faircloth, & Macvarish, 2014, p. 219).

The attempt of science to predict certain outcomes with theoretical analyses cannot be used to describe good parenting. “There is no simple sense, in other words, in which to capture this causality and reduce its inherent complexity” (Ramaekers & Suissa, 2012, p. 75). The questions that parents will have cannot be predicted in advance, because they are derived from and are given meaning through the experience of being a parent (Ramaekers & Suissa, 2012).

In the next chapter, we start with an analysis of the increasing role of technology – and apps – and the underlying mechanisms within the context of recent modes of governmentality in our society, to better understand the digitized context. We first present governmentality in a broader perspective to later on focus on what the design and functionality of apps tell us about the parent child-relationship. This is to articulate what is left out from the dominant discourse of parenting and to regain focus on the parent as a pedagogical figure (Ramaekers, 2018).

2 Governing society: from organic capital to datafied capital

In this part we will try to distinguish what makes 'parenting in digital times' different from raising children in other times. The writings of Foucault on governmentality (Foucault, 2002a) and technologies of the self (Foucault, 2002b) will be described here to function as a framework for our later analysis.

> Foucault tries to articulate how from the 19th century onwards politics understand itself not anymore or only in relation to subjects (in a juridical sense) or to a territory, but in relation to the life of an individual or species. (Simons, 2006, p. 525)

It is the question about how to govern oneself, how to be governed, how to govern others, by whom the people will accept being governed, how to become the best possible governor, as a characteristic of the sixteenth century. It raises the "issue of how one must be spiritually ruled and led on this earth in order to achieve eternal salvation" (Foucault, 2002a, p. 202), rather than governing a territory. The government itself is put as the central problem. The question of this governmentality has been described in three forms. In the first place, it is about governing yourself in relation to morality. Second, the art of governing a family which belongs to economy. Third, the science of good governing of the state, concerning politics. This means that the act of governing is less and less situated on governing in the sovereign way (exercise of power) but on what modern society actually manages and regulates.

In modern society the art of government "is just the art of exercising power in the form, and according to the model, of the economy" (Foucault, 2002a, p. 207). The economy is here introduced into the practice of politics. "To govern the state will mean, therefore, to apply economy, to set up an economy at the level of the entire state, which means exercising toward its inhabitants, and the wealth and behavior of each and all, a form of surveillance and control as attentive as that of the head of a family over his household and his goods" (Foucault, 2002a, p. 207). Through the science of economy it was possible to identify problems that are specific to the population. To govern, here, is understood as to govern things rather than people. "Government is defined as a right manner of disposing things so as to lead not to the form of the common good, as the jurists' texts would have said, but to an end that is 'convenient' for each of the things that are to be governed" (Foucault, 2002a, p. 211).

The object of government became translated into specific finalities. The government aims for example: quantity of wealth, sufficient provisions, birth. In order to achieve those finalities, the emphasis is not on obedience (of a law), as in the sovereign society, but on employing tactics (laws can be used as tactics) in the modern society. "Within the perspective of government, law is not what is important … which explains that it is not through law that the aims of government are to be reached" (Foucault, 2002a, p. 211). It is in the 18th century that the family becomes the target of campaigns and an instrument to govern society, for e.g. to reduce mortality, to promote marriages, vaccinations. It is a transition from an art of

government to a political science, “from a regime dominated by structures of sovereignty to one ruled by techniques of government, turn on the theme of the population, hence also on the birth of political economy” (Foucault, 2002a, p. 218). The concern is placed on individuals who compose the family, their wealth and prosperity. The care of governing is focused on the conditions under which people live and the way in which their bodies act as carriers of biological processes, also called biopolitics (Schuilenburg & Van Tuinen, 2009).

Foucault (2002a) makes a distinction in governmentality between technologies of power and technologies of the self but also emphasizes that those technologies can hardly function separately. Technologies of power “determine the conduct of individuals and submit them to certain ends of domination” and they are technologies of the self “relate to people’s self-formation and the way they produce themselves as citizens” (Dahlstedt & Fejes, 2014). Or in terms of Foucault technologies of the self are technologies “which permit individuals to effect their own means, or with the help of others, a certain number of operations on their own bodies and souls, thought, conduct, and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality” (Foucault, 1997b, p. 225). Technologies of the self were used in Christianity for self-examination to come to self-knowledge. “Disclosure of the self was conducted through the technique of verbalization” (Dahlstedt & Fejes, 2014, p. 171), there was a high emphasis on to confess to know oneself. This way of disclosure of the self continued until the 17th century, however until today, ‘verbalization has become the most important action’ (Foucault, 2002b). This way of self-governing, confession, can be linked to science and ‘thus has become scientized’. Verbalization is used as a scientific practice to help us ‘live a better life’ (e.g. personal examinations; the general documentation and data collection of personal data; therapeutic techniques) (Dahlstedt & Fejes, 2014).

2.1 Life as an organic capital

In modern times, the government focuses on the life conditions of the whole population and subgroups within the population. Interventions are taken for the sake of general health of the whole population or to assure social security. An example thereof is: “… in the beginning of the twentieth century, the population is becoming problematised in terms of race-hygiene and eugenics can become an active political intervention” (Simons, 2006). In this perspective, parents and children are being viewed form a ‘biological and eugenic selection’. The context made biopolitical intervention in the educational environment possible and life is seen as ‘a function of economic development’. This means that life became understood as a kind of capital (‘organic capital’), from now on the qualification of human life as a capital and resource is a solicitude of the government. “Life becomes a matter of investment and something to be judged upon using the criteria of economic return” (Simons, 2006, p. 531).

Foucault (2018) describes biopower as an important element for the development of a capitalistic society, because it enables new ways of controlling people and their bodies for the economy. Life itself is placed at the central of a normalizing society.

> Biopolitics is about governing life, governing ways of life and regulating for example danger and accidents at the level of the individual and species. What is at stake therefore, is to secure normality and order at the level of the population. And in order to achieve this, biopolitics can develop central mechanisms of control (campaigns on public health or central medical care) or can try to establish throughout disciplinary power a relation to the self (hygiene, frugality, providence) that promotes at the level of the collective or population. (Simons, 2006, p. 526)

It is a movement that brings in the family as a field of intervention. Statistics are used to reveal the features of the population and show domains calling for action, such as levels of mortality, epidemics but also specific economic effects. It is the family that is considered as an element internal to the population, and a fundamental instrument for governing society. This is where the family becomes an instrument – "the privileged instrument for the government of the population and not the chimerical model of good government" (Foucault M. , 2002a, p. 216). This means that we can speak about an *instrumentalization* of the family, "for the regulation of the population" (Simons, 2006, p. 526). However, the family is not only seen as a political instrument but also as an economic one, as a 'return on investment'. This is where "life as a whole and in its totality is part of processes of production and reproduction. The result is that our social order, our body and affects and our subjectivity are always already the outcome of (material and immaterial) processes of production" (Simons, 2006, p. 528).

This is also seen in the discourse of psychology, where the modern subject is made an objectivation for explaining (social) problems. With claims from neuropsychology we can explain what we 'know' and we can put the parent-child relationship in a causal interaction to ensure optimal learning outcomes of the child. The parent is seen as an instrument for solving (social) problems. In the discourse of professionalization this developed further in an understanding of the parent as a learning subject.

2.2 The parent as a learning subject

It is not new that the government is interested in the family or parenting, it has been the case for a longer time. "Today, however, there is an emerging focus on and concern with parenting as well as an intensification of governmental intervention in the spheres of parenting" (Stuyve, Simons, & Verckens, 2014, p. 786). This has led to a changed relationship between the government and parenthood, influenced by the discourse of psychologization and professionalization. Parents are addressed in interventions and advice as in need of learning to carry out their role as a parent, but this cannot be disconnected from the broader context of governmentalization and educationalization of human life.

In the neoliberal context 'learning' has become inseparable from speaking about ourselves, others, and society with an emphasis on the development of the self. Educationalization[6] and grammar of schooling are used to speak about subprocesses of 'modernization' of the society.

> In this context, the self constantly has to prove its market value by means of 'employability', 'adaptability', 'flexibility, 'trainability', and the like. This led not only to the erosion of the idea of permanent education – all creativity is subordinated to the regulatory discourse of the knowledge economy and technology – but also of learning itself, which is reduced to a 'krisentaugliche Veränderungsroutine'. (Depaepe & Smeyers, 2008, p. 383)
>
> At present, the motto for learning might be summed up as the preparation for self-adaptation to change, reflecting a certain kind of personality that flourishes in the new economy and, with reference to Bauman's concept, thrives in 'liquid modernity' – a personality oriented toward the self, not looking back, thinking only of the short term. (Depaepe & Smeyers, 2008, p. 384)

This means that in the current society there is a higher emphasis on the aspect of 'learning' itself. Therefore Simons and Masschelein (2008) suggest the concept of the 'learning apparatus', "as an alternative concept for addressing these issues and as a point of departure for an analysis that focuses on the 'grammar of learning' " (Depaepe & Smeyers, 2008, p. 386). How we understand ourselves or speak about ourselves has become regarded as the necessity to learn certain competencies connected to our 'job' (parenting, teaching).

> Investment in human capital of children will also imply that parents have to invest their own time and also with regard to this the entrepreneurial parent is calculating the added value for herself and for the child. In this perspective, 'quality time' refers to using the scarce time in such a way that it is an optimal (given other needs) investment (in the human capital of the child). (Simons, 2006, p. 535)

The present regime of governmentality can be understood as the 'governmentalization of learning', "learning has become a matter of both government and self-government" (Simons & Masschelein, 2008, p. 393). In this perspective problems are experienced as learning problems and the solution lies in the enhancement of learning. The turn to parenting can be seen as part of wider shifts in the mode of governance, from the welfare state to late neoliberalism, in which private actors, e.g. businesses, are involved in the provision of 'public' services. This means for the relationship between the state and the individual that 'public services' now can appeal the individual on his responsibility to govern himself. Political interventions are used as a solution for 'good parenting' because 'poor parenting' causes social disadvantage (Lee, Bristow, Faircloth, & Macvarish, 2014). The government has made the family a public concern. It can take all necessary interventions for educating parents because they have to learn parenting skills to raise 'better' children. The language of 'parenting' has made us understand and support parents in a certain way.

[6] Educationalization as the general concept to identify the overall orientation or trend toward thinking about education as the focal point for addressing or solving lager human problems (Depaepe & Smeyers, 2008, p. 379).

Parents need to use knowledge that comes from experts, but parents also have the responsibility for evaluating themselves, seeking an applying feedback, and now in apps self-government does not come from the parent himself or what he sees as something to work on but comes from an algorithmic logic, translating data in statistical representations. In terms of self-government this means that the learner himself should be aware of his learning process and should actively regulate his process. “Learners should become the ‘managers’ of their own learning, for example, by developing their own learning strategy, monitoring the process, and evaluating the results” (Simons & Masschelein, 2008, p. 400). This is how Simons and Masschelein (2008) articulate the educational process of students. When we translate this to parenting, parents are also responsible for their own learning process (development, strategy and monitoring). Learning is regarded as a kind of capital, “as something for which the learner him- or herself is responsible, as something that should be managed, and as something that is employable” (Simons & Masschelein, 2008, p. 402). Today, parents are seen as ‘learners’. For the learner it is important to take care of his ongoing learning process and his professional development. You should be up-to-date to the knowledge that is developed by experts and science and as a parent you should acquire particular competencies. It relates to our earlier point that ‘parenting’ is professionalized and regarded as a ‘job’ (cfr. supra).

We can see here that the ‘organic capital’ (2.1.) is no longer a matter of investment but becomes another kind of capital in terms of ‘learning capital’: to something for which the learner is personally responsible to something that can and should be managed, and to something that must be employable. The parent is responsible for himself and his children, but the responsibility of parents is interpreted as something that is manageable and employable.

As such the parent today is seen as an individual in need of parental expertise and advice. In our context parents are seen as learning subjects, they need to learn how they can manage parenthood. “Within the discourse of parental services, parenting is seen as a task for which individuals are themselves responsible” (Vansieleghem, 2010, p. 346). “Thus knowledge is not viewed as something parents have to learn by heart, but instead functions as data and services that parents, according to their needs, should always have at their disposal” (Vansieleghem, 2010, p. 347). There is a difference from earlier times in how parents are addressed as a learning subject. We shifted away from a welfare state (collective responsibility) and moved towards an individual responsibility (responsibilization) and marketization. “We can say that there has been a notable paradigm shift from a system of surveillance to one favouring proactive intervention” (Vansieleghem, 2010, p. 351). This also means that the current modes of surveillance differ from how surveillance was described by Foucault in Discipline and Punish.

> For Foucault, surveillance serves as the starting point for intervention and control. Surveillance, as he understood it, consists in norms – knowledge produced by statistics – that inform the way in which the parent understands him- or herself as a parent, according to this knowledge and in relation to others (the population). Modes of governing – for example, in relation to health, hygiene, and education informed by statistical norms – instill in the parent a particular self-understanding. Surveillance within the discourse of parental expertise and advice, however, operates differently. It is subordinated to information technologies and communication networks that address parents as consumer rather than as subjects. As such, parents are encouraged to focus their efforts on assessing and taking into account the risks associated with their behaviors on the basis that they are individually responsible for the consequences of their parenting choices and engagement. The primary emphasis is no longer upon diagnosing society's and individuals' problems in relation to, for example, health, hygiene, education, or sexuality with reference to a general norm. Today's discourse of parental care addresses parents in a manner intended to cultivate both a willingness to work on the self and the disposition to routinely take account of their limitations and work to develop further their abilities in facilitating self-actualization. (Vansieleghem, 2010, p. 351)

For our analysis, this means that parents in digital times are still addressed as learning subjects but now, are being increasingly informed by technology based on their own data, they are moving to a more individualized responsibility. Parents are individually responsible for the parenting choices and engagement they undertake for the child. The emphasis is less put on a general norm but on a willingness of working on the self and enhancing oneself. Surveillance is no longer used for intervention and control but for proactive intervention, based on the idea that we can ensure optimal learning outcomes for children, making sure that parents can facilitate self-actualization. Within the learning discourse: "Parental care is presented as a process of learning that can and should be managed first and foremost by parents themselves, and this becomes the justification for the arsenal of services that have been mobilized in support of parents" (Vansieleghem, 2010, p. 352). This means that *responsibility* within the parent-child relationship is here taken in a very narrowed sense. It is narrowed to "in terms of the correct application of scientific knowledge and in terms of an attitude on the part of parents of (what we could call) vigilance (as opposed to care in some form) (Ramaekers & Suissa, 2012, p. 4). This vigilance refers to the position of the parent as a vigilant for the development of the child, willing to do and learn everything that is necessary, as a consequence of the scientization of the parent-child relationship. According to Ramaekers & Suissa (2012), parents are positioned in the perspective of the 'outsider' to look at the parent-child relationship, in order to be capable of making the 'correct' actions. This is different from looking from an insider perspective, as a person in a particular situation within a particular context, as an intergenerational relationship.

The specific focus on family and parents is, here, articulated as a form of risk prevention, this 'risk prevention' is no longer seen as 'at-risk' families but all parents are in need of education. The need is placed on "to have access to support, advice, and guidance" (Gillies, 2012, p. 13). This is where the "growing interest among policy makers and researcher

to mine parents' observations, experiences, and perspectives as valuable sources of data or information about the child and childhood" (Vansieleghem, 2010, p. 347) comes in. Gillies (2012) argues that the family is been positioned as a public rather than a private concern. This refers to governments prioritizing families as mechanisms for tackling social ills. This is described as the *politicization* of the parent.

In order to govern society the family life has become a field of intervention and an instrument for solving (social) problems. The parent is put in a causal relationship to the child and seen as a learning subject that needs support and advice to carry out his role as a parent. In the broader perspective we see the learning discourse has become the way for understanding ourselves as an individual. As a consequence, the parent is professionalized and appealed on his individual responsibility towards the child and his own learning process. However this responsibility is taken in a very narrowed sense, as a correct application of scientific knowledge and in terms of attitude in order to achieve optimal outcomes. The parent is positioned in an outsider perspective rather than as an insider to look at his own situation. All parents are addressed as individuals in need of expert knowledge, need to seek and apply feedback and now algorithmic logic in apps translate our data in statistical representations. In the next part we want to ask ourselves what this means for our current understanding of the parent-child relationship in digital times. What happens to the parent as a political figure and learning subject mediated by (self-tracking) technologies?

2.3 Life as datafied capital

In the learning discourse it is not about a concern with 'better science' or 'greater certainty' but it seems to be a way to promote one's ability to learn. *All* parents can learn to be more effective. Digital technologies are a great way to gather (personal) information from parents and to appeal parents on their individual responsibility because these technologies are part of the family environment. Apps are in the middle of personal family experiences. Vansieleghem (2010) also argues that "monitoring systems and parental services instill in parents a kind of self-understanding that is not free from external control, but that is suspended from external control of norms (whether God, the Nation, the Economy, and so on)" (Vansieleghem, 2010, p. 353). This argument does not fully apply for parenting apps, the self-understanding of the parent is indeed not free from external control – which we understand as the wider society and the particular mechanisms that operate in apps such as big data, algorithms, and so on – but there is not only a form of external control of norms. The parent himself or more precise – his data – becomes the norm, it is his data where the app functions of and gives feedback to the parent.

There are increasing capacities for "monitoring and coordinating individual behavior amount to a significant change in the possibilities for establishing conditionality and putting

greater weight on personal responsibility in managing welfare risks" (König, 2017, p. 3). Due to apps and other technology the potential to collect immense amounts of very fine-grained data about individual behaviours and dispositions cheaply and unobtrusively has grown dramatically. The result thereof is a growing datafication of social reality. Datafication can be described as "automated data extraction performed on the masses of user data generated through digital media platform is assumed to reveal patterns of information about specific human behaviors" (Williamson, 2016, p. 404) .

The processes of datafication and computer software have become interwoven with contemporary forms or governance. Here, we understand governing in terms of shaping our actions, thoughts and behaviour. "More and more everyday practices, social interactions, cultural experiences, economic transactions and political decision-making are now mediated and governed through software systems" (Williamson, 2015a, p. 83). Some researchers describe this phenomenon as 'digital governance'. "Networking, mobile, and sensor technology have made it possible to cheaply and unobtrusively collect such data in a highly distributed fashion" (König, 2017, p. 5). It is because of the technological advancements and the possibility of gathering data that digital governance became possible and made changes in the information structure of the welfare state.

In current times network-based and database-led software facilitate governance over people. This does not mean that networks or databases are neutral, they are infused with "normative imaginings of the future and reconfigurations of subjectivity" (Williamson, 2015a, p. 91). How people understand and take care of themselves today is influenced by medical science, psychology and neuroscience and now tracked by digital governance. This digital governance is a mix of business interests and government agencies acting on public health agendas. König (2017) argues further "These increased capacities together establish conditions under which it is possible to provide highly personalized and targeted solutions or treatments (products, services, etc.) to individual wants and desires on a massive scale" (König, 2017, p. 3). The digital governance makes it not only possible to gather data on a massive scale but also has the capacity to target individuals very personally and make them feel responsible (because digital governance make use of their personal data). Monitoring people is no longer on the level of the state but enabled by wearable devices and apps on the level of the individual. Apps are a particular way to support and increase the individual responsibility of parents and their self-governance because they function on algorithms based on their personal data.

In the digital society the consequences for individual responsibility become more visible. Technology transformed our society in multiple ways and became omnipresent. The mechanisms of technology in apps make it possible to target the individual personally, so the individual gets even more responsible for his own activities in order to manage society.

> As information and communication technologies lead to a far-reaching transformation in societies' information infrastructure, more decentralized and individualized mechanisms for coordination can be used to manage societal complexity, with important consequences for the role of conditionality and the idea of individual responsibility. (König, 2017, p. 1)

König (2017) comments that this change enables "an extension of conditionality in the area of welfare through greater activation, enhanced self-management, and a personalization of risks" (König, 2017, p. 1). And that the conditionality and personal responsibility "form an important ideational template and a legitimatory basis for facilitating value creation that is based on data as a raw material" (König, 2017, p. 1). This change can also be described as "a shift from a more 'open and innovative' Internet experience to a social experience of digital interactions that has become extremely commodified, patterned, and determined by service providers" (Barassi, 2017, p. 2). Accordingly, authors argue that "app-centric media employ an imagery of autonomy and empowerment for both users and producers while being grounded in the political culture of neoliberalism, control, and commodification of user data" (Barassi, 2017, p. 2). Apps can be seen as sociocultural artefacts "that convey information and draw on, and reproduce dominant meanings, tacit assumptions and practices" (Thomas, Lupton, & Pedersen, 2018, p. 761).

Because of the availability of big data to commercial companies and government agencies, Williamson (2016) argues that there is a new form of 'soft politics', which he describes as "one that functions through algorithmic sorting of users' data and is embedded and integrated within a social system, whose logic, rules, and explicit functioning work to determine the new conditions of possibilities of users' lives" (Williamson, 2016, p. 404). This means for social actors that the datafication of everyday life can be powerful 'to conduct a constant algorithm diagnosis of patterns of human life'. This algorithm is not visible but is one of the underlying mechanisms of an app. This means that we, as a parent or user, are not aware of their existence or capabilities. The insights algorithms get from these processes of datafication can be used to form new models, classifications and theories of individuals and social behaviours in a more 'natural way', i.e. the conduct of conduct - governmentality. "This leads to the design of particular technologies to maximise such behaviours, shaping individuals with the correct behavioural comportment for a desired social order" (Williamson, 2016, p. 404), without even questioning the particular design of such technologies or how they make understand ourselves. To illustrate with an example, "digital media provide a potential avenue for men to learn about fatherhood and express and share their experiences with each other" (Gareth, Lupton, & Pedersen, 2018, p. 760). So the apps are used to form men into a particular father, a father who expresses and shares his experiences with other fathers and needs to learn how to become a father. Here it is necessary to be critical about how the parent is

constituted in the app, and how the parent needs to understand himself to problematize the enhanced individual responsibility of parents, and the narrowed perspective of the parent-child relationship that is presented in the app.

This means that parents understand themselves as an 'ecological-environmental self'[7] and apps create a particular form of subjectivity. Apps are based on the personal data of the user, which makes it even more personal. The information that the parent gets is a response to his own situation. It is to say that apps are an enhancement of self-government because they target people very personally and often in their personal (family) context. This implies a greater personalization of risks. The app 'speaks' to the parent in a direct way and appeals the parent to take action. The way of targeting the parent in this way seems to be legitimate because the value that is created comes from the data of the parent himself. Apps seem to create more autonomy and empowerment for parents but are actually capable of enhancing self-government and self-actualization.

In the context of the learning discourse the focus is placed on the individual, the parent became the subject and the instrument for governing society. As a consequence, all parents are 'at risk' and responsibility is understood in a more narrowed sense, the parent as a vigilant and 'outsider' of his own situation diagnosing his own process for self-government. Digital technology increased the capacities for self-enhancement, self-actualization and self-management of the parent through data processes. Those technologies operate on an individual level and take the parent himself, his data, as the norm for his learning process. There is an emphasis on (individual) responsibility and surveillance is used for risk prevention. Nowadays, people are becoming more and more part of algorithmic systems that try to maximize the desired behaviour in a more 'natural way', described as 'soft politics'. This means that parents are subordinated to technology and their communication networks and how they address parents. In the discourse of parental care this means that parents are addressed as willing to work on the self and take responsibility for self-development.

In parenting apps personal data are now used as datafied capital for the 'digital knowledge economy': governments, commercial bodies, workplaces and educational institutions, cybercriminals, use it all for their own (beneficial) purposes. "Biotechnologies for the modification of living beings mean the body is increasingly viewed as 'molecular software that can be read an rewritten' " (Williamson, 2016, p. 403). It is necessary here to be critical about this intertwining of technology and the parent-child relationship to see how parents are constituted in apps.

[7] Ramaekers & Hodgson, in press; Simons, M. and Masschelein, J. (2008) 'From schools to learning environments: The dark side of being exceptional', *Journal of Philosophy of Education*, 42(3-4): 687-704.

> Advanced biotechnologies have the potential to change the appearance and functioning of the body, but also to make it more malleable, correctable and improvably by turning 'individual and collective lives into information and knowledge' in order to 'intervene on them'. (Williamson, 2016, p. 403)
>
> Through the intersection of biological and computer codes in biotechnology, the human body is configured in terms of sequences, cells and molecules, and in terms of software, databases and programmes that can be patched, de-bugged and optimised to produce configurations of 'biodigital life'. (Williamson, 2016, p. 403)

The complex parent-child relationship and childrearing becomes even more complex thanks to social media and technological devices. Parents can upload information about themselves online and gather information by wearable devices. This opens discussions about privacy issues, big data and dataveillance (Barassi, 2017; Leaver, 2017; Lupton & Pedersen, 2016; Lupton & Williamson, 2017). Many aspects about their lives can be revealed through engagement with social media or other technological devices. Web searches and browsing habits can be monitored to their experiences of pregnancy and parenting, but software and apps request even more intimate information about their lives, like for example fertility cycles of women. Also "their omnipresence makes sure that we are never unconnected from the network of ubiquitous information and, via that network, from others. Our situation is hence one of 'continuous connectivity" (Gabriels, 2016, p. 175). "Indeed, apps are one of the latest digital-media technologies to have entered the realm of pregnancy and parenting advice and support" (Gareth, Lupton, & Pedersen, 2018, p. 759).

We do not want to argue here that there is something wrong with data-driven media production, because it also helps us finding a way in an overload of information. Also, the interaction with the user is not always passive, because if you understand how algorithms work, you can 'manipulate' them for your own good. The question we need to ask here is if this also counts for apps and what this means for the understanding of the parent-child relationship because we will argue that they operate in a different way than other social media.

There seem to be two aspects about algorithms, one is that algorithms interact with software and the second is that algorithms interact with humans. Therefore, we look at how we need to understand algorithms, software and codes in a technical sense and how algorithms interact with software. Then we look at the interaction between humans and algorithms to come to a sociotechnical understanding for our analysis.

2.3.1 How do we understand algorithms, software and codes?

Digital technology can do what it does because of algorithms, software and coding processes, we need to take them into account to analyse the apps for a better understanding of how the parent-child relationship is constituted.

Algorithms cannot be captured in a simplistic understanding of what they are or could be, algorithms are multiples. Here 'multiples' is understood as "unstable objects that are

enacted through the varied practices that people use to engage with them, including practices of 'outside' researchers" (Seaver, 2017, p. 1). We can understand algorithms in a *technical* sense, regarding to machine learning, this means that algorithms operate in systems and are able to learn from data input and make predictions. They can also be understood in a *sociological* sense from a power and politics perspective. It is important to keep in mind that we do not draw a line between the technical and sociological sense, they need to be understood in a dynamic notion of algorithms (Bucher, 2018). Williamson (2015b) argues that algorithms are not a simple recipe that follows a particular sequence of steps but that they are dynamical and 'constitute certain forms of social practices'. This refers to a sociotechnical understanding of apps.

If we describe an algorithm in the *technical* sense, we can use a computer science definition: "an algorithm is a set of instructions for solving a problem or completing a task following a carefully planned sequential order" (Bucher, 2018, p. 20). Or "Algorithms are sets of steps or processes which specify how to transform a given set of inputs into an output" (Williamson, 2017, p. 54). Here algorithms are presented as following 'a set of instructions' or 'sets of steps', algorithms are understood as following a plan to 'solve a problem' or transform 'input' in 'output'.

A distinction can be made between 'technical' algorithms: "algorithms that are pre-programmed and behave more or less deterministically and algorithms that have the ability to 'learn' or improve in performance over time" (Bucher, 2018, pp. 23-24). When you give deterministic algorithms a certain input, they will always produce the same output. It runs through the same sequence of steps. In contrast, the learning type, 'will learn to predict outputs based on previous examples of relationships between input data and outputs'. When you use these kinds of algorithms they are learning through experiences and are capable of changing (Bucher, 2018).

This means that the bigger the database is, the better the algorithm can recognize relevant patterns. The working of algorithms however cannot be disconnected from humans, 'who specify the states and outcomes in which they are interested in the first place' (Bucher, 2018). This is again an argument for our assumption that apps are sociotechnical technologies. The technical and social function together and cannot be easily disconnected from each other.

Algorithms however cannot operate alone. They are part of software, data structures, databases, data types, hardware, codes,… Software can be described as "a set of instructions, written in computer code, which instructs a computer" (Williamson, 2017, p. 54) and codes can be understood as:

> The instructional script that makes software work, and is constructed by programmers using specific programming languages, while programming is the art and science of putting together algorithms and instructions that can be automatically read and translated by a machine in order to process data and do something. (Williamson, 2017, p. 54)

So, algorithms are programmed in codes, and codes are inscribed in software that makes technological devices work and do particular things. This means that they do not operate independently but need each other to make a device work. The technical sense of algorithms helps us understand how algorithms work technically but algorithms work because of software that is made by 'designers'. People who have particular purposes and use software to reach those purposes. This makes algorithms and apps far from neutral, they work on behalf of values and assumptions of the designers who also look at parents in a particular way. How parents need to be addressed or constituted in apps. Williamson (2017) also recognizes the broader 'extensive claims, promotional activity and imaginative marketing' of the broader (economic) culture.

The learning discourse and scientization made it possible to see the parent as datafied capital. Dataprocesses made the digital capital more and more part of our lives in a more natural way (i.e. softpolitics) to maximize a desired behaviour. The world we live in influences and stimulates designers to generate particular apps, they think we 'need' or would be 'interesting'. This is where 'parenting apps' come in. In our broader culture 'parenting' is often technically described (cfr. supra). Could it be that the technical solutions – parenting apps – are seen as capable of transforming parenting (for the better)?

2.3.2 It is not all about the algorithm

Algorithms are the underlying mechanism of digital technology that make data processes possible, generate patterns of information from human behavior, show information to the user, and so on. The algorithms make the technology do what it does. This means that nowadays we:

> might say that life is not only lived in and through media but in and through specific types of media. What these activities have in common is a high degree of interaction with algorithmic media, media whose core function depends on algorithmic operations. (Bucher, 2018, p. 1)

Bucher (2018) argues here that life is now interwoven with media that make a particular kind of interaction possible. It is an algorithmic and software mediated interaction because digital technology depends on them to control their operations. The way algorithms present our 'social world' makes us understand ourselves in a particular way in the world. We use the information from algorithms to give 'meaning'. 'Data sense-making' is the way "in which people engage with and learn from information" (Lupton, 2018, p. 2). Lupton (2018) argues that humans learn in and through their bodies:

> It incorporates the entanglements of the digital sensors with the human senses in the process of sense-making. In these enactments, bodies are not only knowing and perceiving, but they are sensing, responding to and assessing the information returned by digital sensors. Data sense, therefore, may be conceptualized as the co-constitution of human and non-human sense-making. (Lupton, 2018, p. 3)

Digital technology changed the way we were governed before. Now we relate ourselves digitally to look at parts of our lives today. It seems that digital technology changed the relationship between the body and our expertise. So, in the past, we learned by means of books, or relied on professional doctors to diagnose a problem. But now we are using real-time data. We no longer only rely on the expertise of doctors. However, Lupton (2018) motivates that the way how people live with their data is often ignored in research. For our analysis we use an entangled perspective of 'apps' and human sense-making, instead of analysing it in a cognitive or technical way. The idea of entanglement is not that apps control parents, but it is about a voluntary interaction – the parent as a responsible, vigilant parent.

2.3.3 Algorithms as sociotechnical mechanisms

This means that algorithms can be understood in a sociological sense. Other scientists and humans' scholars "are not primarily concerned with the technical details of algorithms or their underlying systems but, rather, with the meanings and implications that algorithmic systems may have" (Bucher, 2018, p. 29):

> According to Galloway, to understand power relationships who are at play in the 'control society', he argues that it is crucial to start with the questions of how technology works and who it works for. In fact not addressing the technical details of software or algorithms as part of a sociological or critical inquiry is seen as problematic. (Bucher, 2018, p. 30)
>
> Networks have both a material basis in computer code, calculation and algorithmic structure, and a basis in social, political, cultural and economic discourse. (Williamson, 2015a, p. 92)
>
> Big data is not just technical. It is, rather, the 'manifestation of a complex sociotechnical phenomenon that rests on an interplay of technological, scientific, and cultural factor'. (Williamson, 2017, p. 13)

Parenting apps are influenced by politics, culture, economic and social discourses and make use of algorithms to make an understanding of the parent. Seaver (2017) proposes a critical understanding of algorithms through ethnographical research. He arguments that algorithms need to be seen as 'heterogeneous' and 'diffuse sociotechnical systems', instead of 'rigidly constrained' and 'procedural formulas'. He suggests a thinking of algorithms as "not in culture, …, but as culture: part of broad patterns of meaning and practice that can be engaged with empirically" (Seaver, 2017, p. 1). We do not need to seek what algorithms are but what they do in particular situations as part of (social) culture. "Like other aspects of culture, algorithms are enacted by practices which do not heed a strong distinction between technical and non-technical concerns, but rather blend them together". "Algorithms are cultural, …, because they are composed of collective human practices. Algorithms are multiple, like culture, because they are culture" (Seaver, 2017, p. 5). Apps are sociotechnical technologies in the

sense that humans make technology valuable in their culture. Technological devices on itself have no value, it is according to the use of humans that devices get their meaning. Technological devices get their meaning from the situations wherein they are used. But also, algorithms are imbued with values and assumptions of humans who made them to make the technology work. So, we understand apps as culture because they are composed and understood in human practices.

For our analysis this means that we take a *sociotechnical* perspective in account, this indicates that (social) life and practices are co-construed with technology. We start from the acknowledgement that there is a co-constitutive relationship between humans, digital technologies and data. “Sociotechnical imaginaries are collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology (Jasanoff, 2015, p.4)” (Williamson, 2017, p. 16). Sociotechnical imaginaries are visions and values that are used to design technological projects, these are developments that produce or materialize the desired future:

> Transformative scientific ideas, technological objects and social norms become fused in practice and help to sustain social arrangements or create new rearrangements in cultures, institutions and routines. Sociotechnical imaginaries are therefore the product of specifically political acts of imagination, because they act as powerful aspirational and normative visions of preferred form of social order. (Williamson, 2017, p. 16)

This means according to Bucher (2018) that ‘world-making’ can be conceptualized in terms of power and politics as discussed with reference to Foucault. Algorithms do not merely have power and politics; they are fundamentally productive of new ways of ordering the world. Importantly, algorithms do not work on their own but need to be understood as part of a much wider network of relations and practices. Williamson (2017) also indicates that software cannot be viewed only in technical terms. This means that algorithms are productive in emphasizing our current understanding of the parent as a ‘learning subject’ and ‘datafied subject’, and increase the personal responsibility for managing his process based on data. Parenthood is understood in terms of manageability and employability for governing society. We indicated that this narrowed down how responsibility was understood before in the richer notion of the parent as a representational figure. What the parent does is becoming now the focus within those technologies rather than who the parent is or what he represents. The parent-child relationship is presented as a one-to-one interaction, moving away from a broader conceptualisation as being part of a society.

3 Parenting apps: language and visualization

In our analysis of the apps we draw our attention to the way parents are addressed in the description and pictures of the apps, to see how parents need to understand themselves. We will look at the language that is used to speak about the parent-child relationship and what parenting apps visualize. The analysis is not about how parents use apps or what kind of child is sought, but what the kind of sources and advice are and how it is presented.

3.1 Selecting the apps

For our analysis we identified apps relating to parenting by using key terms including 'parenting', 'pregnancy', 'parenthood', 'pregnancy tracker', 'educating children', 'baby', 'child', 'raising children', 'app for parent' to find apps that can be labelled as a parenting app. We define a parenting app here as an app that is primarily focused on (future) parents. We also used Dutch key terms including 'ouderschap', 'zwangerschap', 'opvoeden', 'zwangerschap kalender', 'kinderen opvoeden' to find apps that can be labelled as a parenting app in the context of Flanders and the Netherlands. In the Apple Store and Google Play Store we found a whole range of apps that relate to 'parenting'. We limited ourselves to apps that are focused on parents with children of 0 to 3 year old and/or expectant parents. In total we used 57 apps[8], which we categorized into three categories (see Appendix 1), for our analysis. The first one is based on apps that come from other countries (29 apps) like India, Germany, Switzerland, US, UK, … but those contexts do not always relate to the Belgian (Flanders) context. The apps are useful to see what is happening in parenting apps in general. So, we looked for apps from the Netherlands (18 apps) because their context relates more to Flanders. The third category are apps made and/or used in Belgium (10 apps). The amounts of downloads varied between +500 and +10.000.000. The apps were categorized under different topics in the app stores: 'parenting', 'medical', 'parenthood', 'health and fitness', 'books and references', 'education', 'entertainment', 'lifestyle', …

3.2 Why use a parenting app?

In this part we will describe the language that is used in the 'description' of parenting apps. The description in the app stores is used to attract and convince parents to use the parenting app. We concluded that there are two main categories in the description of the apps (see Appendix 2). A category that refers to keywords that relate to 'parenting language', the

[8] 'ABC Parenting Guide'; 'Ovia Parenting'; WOW Parenting'; 'Tinystep'; 'The Mom's Manual'; 'Parenting Challenge Quiz'; '100 Baby Growth'; 'Parenting at Meal & Playtime'; 'Parenting Tip'; 'Parenting Magic'; 'Mindful Parenting'; 'Good Parenting'; 'Parenting Tips'; 'CryAnalyzer'; 'Pregnancy Tracker'; 'Baby Log Lite'; 'Baby Sign 3D'; 'Universal Baby Monitor'; 'Pregnancy+'; 'Pregnancy Tracker & Countdown to Baby Due Date'; 'Wachanga'; 'Glow baby'; 'Baby Connect'; 'Hello Belly'; 'Hello Baby'; 'Supernanny Parenting'; 'Potty Trainer++'; 'Pregnancy to Parenting'; 'Quick Tips for New Dads'; 'iGrow'; 'GroeiGids'; 'Groeicurve'; 'Veilig groot'; 'Zwanger en Zo'; 'Doula Bevallingscoach'; 'Oei, ik groei'; 'Samen Voeden'; 'Prénatal'; 'Tuurlijk schatje'; 'Zwanger in Nl'; 'Van Nul tot Taal'; 'Tandenland'; 'BoekStart'; 'ZwaPP'; 'Werken en Zwangerschap'; 'Opvoedingscanon'; 'Bewust Zwanger'; 'GoCheckKids'; 'PARC'; 'KiT'; 'Stap voor Stap'; 'Appje voor de Borst'; 'Zwangerschap & Baby'; 'Skoebidoe'; 'Bsit'; 'De Roze Doos'; 'Coach Babyboom'

language that is used in the parenting culture to tell the parent what he should do. The second category with keywords that relate to 'datafied language', the language that came in with the digitization of our lives and the use of digital technologies. Examples thereof are: 'data', 'logs', 'tracking', and so on. We analyzed further the category of 'datafied language' to dig deeper in the digital aspect of the parent-child relationship and how parents are addressed. We then made subcategories to get a grasp of what the datafied language tries to indicate. The same categories and subcategories can be applied to the parenting apps in the context of Flanders.

3.2.1 Parenting and parenting apps

Table 1 *Datafied language: parenting and parenting apps*

What parenting is	What an app does/is	Assistance
Inspire co-operation	To analyze (baby's emotion)	(when you are) having trouble
Reduce family conflicts and sibling rivalry	To identify	The right guidance
	To predict	The smartest parental assistant
Make your home a sanctuary	To record	With you every step of the way
Real-world parenting	Record the pitch and frequency	For every period of the parenting journey
To seek and study	To analyze the emotional state	
To make it healthy and effective	To tell you …	Take Supernanny with you in your pocket
Workout-tips	To understand	
Trade tips	Timer	Showing what you should (not) do
The tasks execution	A universal video baby monitor	
Tasks	Compatible	
Never miss any milestones	To detect	
Celebrate every moment	Sound sensitivity	
Memorable moments	Recordings	
Treasured memories	To receive	
Irreplaceable moments	To explore	
Fun and helpful	To ask	
'we all want to be great parents, starting with the safest, healthiest birth possible'	Humorous tone	

We will first discuss the categories from Table 1: 'what parenting is', 'what an app does/is' and 'assistance' to get an understanding of parenting apps[9] and how parenting is understood within datafied language. Parenting apps speak about *what parenting is* in terms of to 'inspire co-operation', 'reduce family conflicts and sibling rivalry', 'make your home a sanctuary'. A good parent 'seeks and studies', uses 'workout-tips', trades 'tips' with other parents, 'executes his tasks', 'never misses any milestones', 'celebrates every moment'. If you want to be a good parent you 'start with the safest, healthiest birth possible'. The moments with your child are 'memorable' and 'irreplaceable', and need to be 'treasured'. That's why the *parenting apps*: 'analyze', 'identify', 'predict', 'record', 'tell you', 'make you understand', 'detect'. The app functions as a 'recorder', a 'timer', a 'universal video monitor'. Parenting apps say that it is easy to integrate them in your life and present themselves as 'the right guidance' or 'the smartest

[9] See footnote 8 for the apps

parental *assistant* 'when you are having trouble', 'with you every step of the way', 'for every period of the parenting journey', this to 'show you what you should (not) do'. It is like 'taking Supernanny with you in your pocket'. Parenting apps present themselves as 'assistant technology' that can guide parents.

There is a clear idea about what parenting is within datafied language, the parent is seen as a learner and datafied subject. He needs to learn (tips and advice) and needs to execute his parenting tasks by making use of his own data to ensure the child's development. The parent is seen as a vigilant[10] of his own situation and it is his individual responsibility to do something with the advice and data. The app is presented as the 'perfect' assistance for the parent, to help him through his 'job' every step of the way.

Figure 1. 'Van Nul tot Taal'.

Figure 2. 'Baby Glow'.

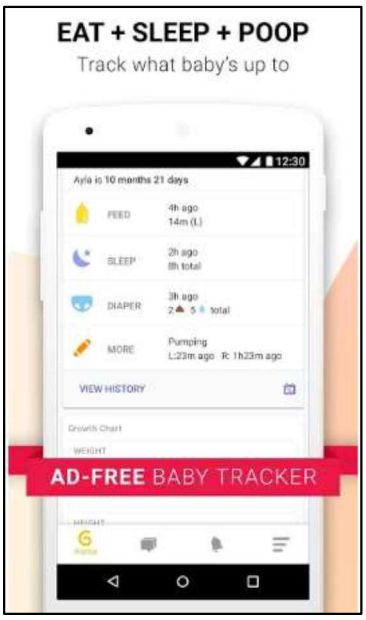

Figure 3. 'Baby Glow'.

What is seen in the datafied language can be illustrated by these examples. In Figure 1, parents get language tips for their child related to his age. To be a good parent, parenting, is here demonstrated as using tips at the right time to ensure the language development of the child. In Figure 2, good parenting is about 'celebrating' milestones. This illustrates what we said about the parent as a vigilant, he needs to look very careful at the child to see what the child needs, and sharing is here narrowed to what is seen by the parent in terms of 'milestones'. It means that apps direct the attention of the parent to particular aspects of the child's behaviour, development, and so on.

Figure 3. *'Baby Glow'.* illustrates that parenting apps present themselves as assistant technology and helps the parent to remember what happened or what needs to be done. It is the app that identifies what the parent did (not). This relates to what we said about the

[10] (Ramaekers & Suissa, 2012)

discourse of psychologization and professionalization, the app can be seen as a consequence of the idea that parents cannot raise their children by themselves and thus need support. The assumption is also that raising children can be done correctly (Figure 1), it seems that children can be given the 'right' language stimulation at the 'right time' or that all children have the same 'developmental milestones' that need to be celebrated (Figure 2). These figures are an illustration of what Ramaekers & Suissa (2012) call the 'third person perspective'. The parent needs to look from an outsider perspective to his own situation and is in need of knowledge from experts.

3.2.2 Features of parenting apps

Table 2 *Datafied language: features of parenting apps*

Daily	Information	Key features	Economic	Competition
Daily Easily to integrate in daily routines Daily maternity calendar Get daily parental tips from experts	Information feed Real-world advice A great resource Written by child development experts Legitimate and useful information Instructors The *reason* why the baby is crying Perfectly timed Next-level (health awareness)	An easy to use platform A fast_Android user-interface Fast performance No excess clutter A wonderful *solution* … % accuracy / accurate Recommended Chosen by 15 million moms The world's most trusted pregnancy brand A must-have The maximum resolution	To spend App and content are free Without having to purchase expansive infant bool Free Free trail To purchase Marketplace Famous gift packs Coupons and free products	To test ability Score To challenge other parents Measurements

The underlying algorithms of parenting apps make particular things visible and possible, and generate particular features that are specific to parenting apps[11] as indicate by Table 2. The subcategories 'daily', 'information', 'key features', 'economic' and 'competition' give inside in those features.

Parenting apps want to be part of our every*day* lives, it is about getting 'daily' messages, 'easily integrating in daily routines', a 'daily maternity calendar', getting 'daily parenting tips from experts'. Algorithms make it possible that data processes become more and more part of our daily routines based on the idea that parents 'need' information and 'assistance' on a daily basis. Messages are directed by algorithms, and specific information or

[11] See footnote 8 for the apps

tips are chosen to present to the parent based on the data. Parents are targeted with their own data and appealed to their individual responsibility on self-management. This is where the consequences for the individual responsibility of the parent become more visible in the digital society. In this way algorithms make parents part of a controlled, patterned and determined environment with the emphasis on self-development. So, parenting apps try to maximize particular behaviour.

The *information* in the parenting app is described as 'real-world advice', 'a great resource', 'written by child development experts', 'legitimate and useful', 'perfectly timed', 'next level', it is often given by an 'information feed' and can tell you for example 'the reason why the baby is crying'. The language used here indicates that parenting apps claim that they can give parents the right information they need on the perfect time. Apps certify their legitimacy with reference to science: evidence-based, tried and tested, developed by experts, etc. The presented information gives an indication of what is found important, what the parent needs to know or what they find legitimate and useful information.

Parenting apps see themselves as a 'wonderful solution' for the parent because of his *key features*: 'easy to use platform', 'a fast user-interface', 'fast performance', 'no excess clutter'. This is due to the technological capabilities of parenting apps. But they also try to persuade the parent because of his 'accuracy', 'recommendation', 'world's most trusted', 'must-have'. The idea that is presented here, indicates that parents 'need' parenting apps because it is recommended or used by million others, and indicates that you are not the only one, in the sense of advice and assistance. *All* parents are in *need of education*, and the need of parents is placed on support, advice, and guidance which parenting apps are willing to offer. This comes from the broader context wherein parents are addressed as learning subjects.

There is also marketing language (≈ economic) in the description of the parenting apps, the app is 'free', 'without having to purchase', 'free trail', 'a marketplace', there are 'famous gift packs' and 'coupons and free products. The parent is seen as a consumer who can use free products or needs to buy stuff. Technologies are thus embedded within economic, political and cultural contexts, where they get their meaning from. In the marketing language we see that the economic context is given meaning within the app and how the responsible parent is understood.

Sometimes, competition is part of the parenting apps, parents can 'test their ability', 'challenge other parents'. It is about 'scores' and 'measurements' of the parents' knowledge and skills. Parent's abilities are tested or measured within the app and compared to others, this is not seen in other kind of parenting advice and this can be considered as specific to some parenting apps. Competition in parenting apps is described as *gamification* (Lupton & Thomas, 2015), the term refers to using game design elements in non-game contexts.

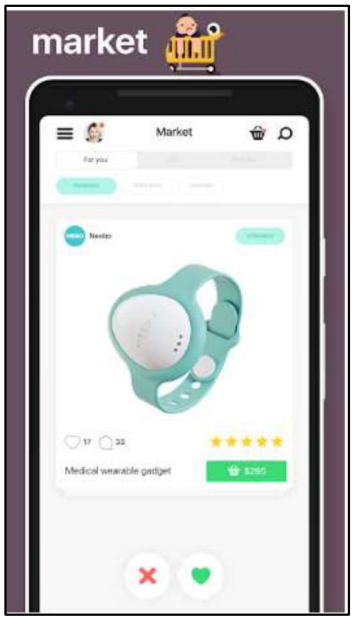

Figure 4. 'Hello Baby'.

Figure 5. 'Pregnancy Tracker & Countdown to Baby Due Date'.

Figure 6. 'Parenting Quiz'.

These figures illustrate what we described in the datafied language related to the features of apps. Using the words of Vansieleghem (2010): “As such, parents are encouraged to focus their efforts on assessing and taking into account the risks associated with their behaviors on the basis that they are individually responsible for the consequences of their parenting choices and engagement” (Vansieleghem, 2010, p. 351). In Figure 4 we see an illustration of ‘marketing’, the medical wearable gadget is considered as something the parent can use to monitor his child. Parents are appealed on their responsibility, to buy particular stuff because it is presented as something that will help you to be a good parent. Figure 5 is an illustration of the given information in parenting apps and the aim to give perfectly timed information and tips. The app from Figure 6 aims to give parents a parenting score to challenge others, competition is here seen as part of your learning process, you can measure and compare yourself with others in order to maintain your knowledge and skills. This is described by Lupton & Thomas (2015) as *gamification,* we come back to this in chapter 4. Algorithms create a particular environment specific to parenting apps, wherein the parent is related to himself (his data) to make an understanding of himself. The parent is addressed as a learning subject in need of advice and assistance, and as a consumer who can use or buy stuff.

In this section we see that what parenting apps ‘show’ in their language relates to what we said earlier about the parenting discourse. The parent is seen as a subject in need of advice and expertise, e.g. scientization. Terminology and information come from disciplines such as (developmental) psychology claiming that the given information is correct and perfectly timed. Apps introduce the idea that particular outcomes are achievable and desirable, and determine how good parenting looks like. The apps present themselves as assistant technology that is daily available for the parent based on the idea that all parents can use assistance and advice

or are in need of education. Apps are namely used by a million others (see Appendix 1). The data of the parent are used to make statistical and visual representations of the parent and give an overview of what needs to be done for self-management, appealing the parent on his responsibility (e.g. responsibilization). The parent needs to enhance and manage is his own situation through self-government (e.g. learnicization). Also, the parent serves economic purposes as a marketing subject in parenting apps. Thus, the apps operate and get their meaning from the broader economic and learning discourses.

3.2.3 Parenting apps and the parenting discourse

Table 3 *Datafied language: parenting apps and the parenting discourse*

Datafication	Responsibilization	Visualization	Personalization	Community
Track and log 'we want to know' Baby's need to sleep Breastfeed timing Developed an algorithm An algorithm of the personalization Logs Unlimited data Datasheet Back-up and restore data Parenting posts Pregnancy tools Dynamic stickers Appointment tracker Contraction counter Breastfeeding tracker Notifications	Follow the tips in this application Feedback To check News Updates	To see To grasp structured and topic-based video content Classy short videos Real-life examples Well arranged and presented To display the analyzed percentage To review Intuitive layout and clever design A clean design To visualize Trend Beautifully illustrated Timeline Metrics Thematic forms 3 D visualization Customizable times and messages In specified intervals Bringing the app to life	To personalize Personalized updates Application settings Personal pregnancy journal The colorful keepsake journal of your child Personalized marketplace	To share To connect To join groups Community of parents Join a tight-knit community of parents-to-be Get support from an active, caring parent community A list of your relatives Community involvement

We mentioned in chapter 1 that there is an important shift in how we speak or think about raising children, described as the scientization of parenting. The discourse of parenting became characterized by scientific languages and the parent is seen as in need of expertise. In current times there is put a higher emphasis on 'learning' with a focus on the parent as a vigilant. The parent himself is individually responsible for the development of the child and his own learning process. Processes of datafication and the working algorithms contribute to this perspective as we found in the datafied language[12] illustrated by Table 3.

[12] See footnote 8 for the apps

Datafication becomes possible when we use technological devices. In the description some words refer to processes of datafication: ‘track and log’, ‘algorithms of personalization’, ‘unlimited data’, ‘back-up and restore data’. But also refer to what becomes possible because of these processes: ‘parenting posts’, ‘pregnancy tools’, ‘dynamic stickers’, ‘appointment tracker’, ‘contraction counter’, ‘breastfeeding tracker’ and ‘notifications’. This means that process of datafication are used to promote the app and make monitoring and coordinating of individual behaviour possible. The apps can collect a massive amount of data about parents’ behaviours and this results in a growing datafication of parenthood. In parenting apps the data is visually presented or used for presenting information to the parent. This creates a different background on which the parent bases his actions on but also makes an understanding of himself.

Responsibilization in the parenting apps is seen in ‘follow the tips in this application’, ‘use feedback’ and follow up ‘news and updates’. The parent himself is the only one who can do this because he chooses to use the app or is the individual user of the app, so the app can appeal the parent on his individual responsibility. The parent is part of his own individual feedback loop within the app. This means that there is put a higher interest on the personal responsibility of the parent in order to manage himself because the environment is highly personalized. In parenting apps this responsibilization is also visible in the visualization of the apps, presenting the data of the parent applied to his situation.

The parenting apps make use of *personalization*, this is found in ‘to personalize’, ‘personal updates’, ‘application settings’, ‘personal pregnancy journal’, ‘the colourful keepsake journal of your child’ and ‘personalized marketplace’. Information in parenting apps is aimed to be personally for the parent and his situation. This means that the parent is targeted very personal based on his own data, the individual parent is appealed to his responsibility to take action for activities. Parenting apps also visualize the information from the parent and the general information in specific ways (e.g. informational pictures; graphs; timelines).

Parenting apps describe themselves as capable of *visualizing* information in ‘classy short videos’, ‘real-life examples’, ‘3D’, ‘customizable times and messages’, ‘specific intervals’, ‘trends’, ‘timelines’, ‘metrics’, ‘percentages’. The information is ‘well-arranged and presented’, has an ‘intuitive layout and clever design’ and is ‘beautifully illustrated’. The visualized information is used in parenting apps to inform the parent about the development of the child or his own skills and knowledge.

Parenting apps also present themselves in the description as a way ‘to share’, ‘to connect’, ‘to join groups’ in a *community* of parents. The community is seen as ‘tight-knit community of parents-to-be’, ‘to give support from an active caring parent community’, ‘relatives’ and ‘involvement’. Parenting apps offer you the possibility to connect yourself with

like-minded parents, a community of relatives who share the same ideas and information/stories:

> Join a community of parents going through *the same things as you*. Find real-world advice about parenting skills, pregnancy, your life, family time and great conversation *with moms like you* ('The Mom's Manual').
>
> Join a tight-knit community of parents-to-be *with due dates in the same month*, and get support from an active, caring parent community that shares a post every 3 seconds ('Pregnancy Tracker').

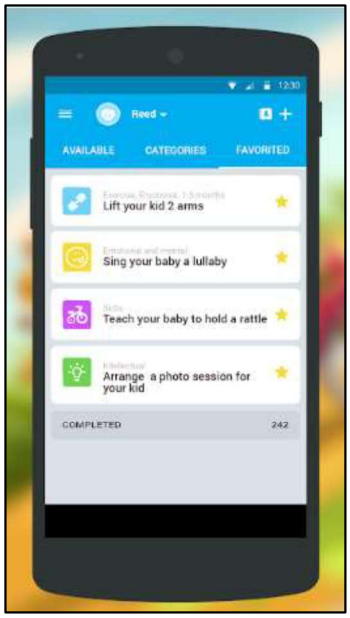

Figure 7. 'Wachanga'.

Figure 8. 'Zwangerschap+'.

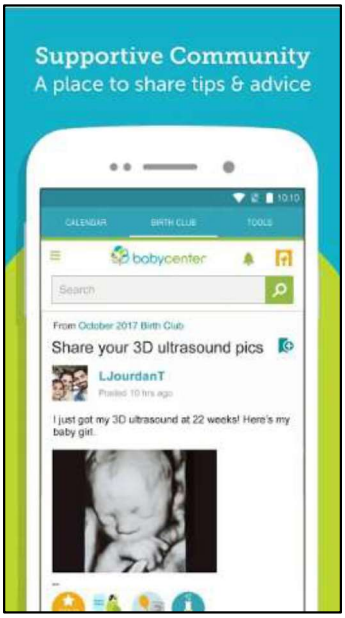

Figure 9. 'Pregnancy Tracker & Countdown to Baby Due Date'.

These figures are examples of what is seen in those categories of the datafied language. Figure 7 is an example of an app that tracks the parent and what he already did, and provides data processes to monitor and coordinate particular behaviour. It is about 'sing your baby a lullaby' or 'teach your baby to hold a rattle', this gives a specific interpretation of the parent. The parent is here seen as an executor who has to execute particular tasks in order to take up his responsibility. If you don't do what the app asks, then you will get no star. In Figure 8 we notice how processes of datafication can be visualized in an app. The presented graph is a representation of the parent's weight. This illustrates that the parent is part of his own individual feedback loop to monitor his weight. Figure 9 is an illustration of how community groups are understood in apps. It is a place where you can share tips and advice, addressing the parent as a learning subject that need tips and advice or support. In these brief examples, we can already see how visualization works in parenting apps. Figure 8 presents the personal data of the parent in a graph, Figure 7 indicates which parenting tasks have (not) been done and Figure 9 illustrates what a community can look like in an app.

3.3 Visualization in parenting apps

In this part we describe the subcategory ‘visualization’ from datafied language (3.2.3. Parenting apps and the parenting discourse, see Table 3) and divide it again into subcategories to get a grasp of what the app tries to do by visualization. We also add information from the presented pictures in the Google Play Store and the Apple Store. The pictures are used to describe what is visualized in the parenting apps. In general parenting apps try to create an attractive environment for the parent, which is easy to use and connect to his personal data. In here, we see that ‘graphs’ and ‘pictures’ do something more, it is not only about presenting information in an attractive way but also an articulation of how the child or parent is doing. It literally translates the information and presents it in particular ways. The parenting apps from different contexts (also Flanders) apply to the same subcategories of visualization, so the pictures are taken together for the analysis, to see what is happening in general.

Visualization is used in parenting apps to inform the parent about his situation based on his own data. Parents within the learning capital are addressed as learning subjects that have the responsibility to evaluate themselves, seeking and applying feedback. Parenting apps do this in their own specific ways, they use visualization to tell the parent for what he needs to take responsibility, what is needed to be evaluated, and give in this way feedback applied to his situation based on data. The parent is seen as an executor of the given feedback, in terms of self-government this means that apps seem to be capable of enhancing self-government and self-actualization in a particular way. It is more self-executing, you need to do what the app tells you to do because this is ‘the best’ for the child. The information in parenting apps is not only visualized but also aestheticized, to look attractive for the parent.

Figure 10. 'Pregnancy Tracker'.

Figure 11. 'Appje voor de borst'.

Figure 12. 'GroeiGids'.

Figure 10 and Figure 11 are examples of visualizing information. This also gives an indication of what is important to visualize. In Figure 10 it seems important to know the weight and height of the baby when you are pregnant, this goes on when the baby is born as seen in Figure 11. In the app from Figure 11 the visualization is also an evaluation of the child's growth process. In Figure 12 we see that visualization is used to make the app attractive for the user by pictures. In those examples the information for the parent comes from developmental psychology. Parenting apps seem to find it important to inform the parent about the development of the child in terms of growth.

We now try to describe how visualization makes an understanding of the figure of the parent. For this we use Table 4 and Table 5 that present the subcategories of visualization and pictures from the parenting apps for our investigation. Every subcategory will be described separately and illustrated with pictures from the description of the apps. Our aim is to describe what is visualized or evaluated as a form of feedback for the parent to unravel for what the parent has to take responsibility for and how the parent is presented.

Table 4 *Subcategories visualization: graphs, pictures, and organization*

	Graphs	Pictures	Organization
From datafied language	Timeline To display the analyzed percentage Trend In specified intervals Metrics	3D Visualization To visualize Classy short films To grasp structured and topic-based video content Bringing the app to life Real-life examples Beautifully illustrated	Thematic forms
From the pictures	The size of your baby Percentages The development of your pregnancy Recordings Eat sleep poop Growth charts	Pregnancy Calendar Development videos Videos In the womb	Tips and advice The stories that interest you Must know facts Parenting tips Age Particular topics
From Dutch parenting apps	Gewicht moeder en kind Aftelkalender Groeicurve Gewichtcurve Aantal weeën Borstvoeding (links/rechts) Luier Bloeddruk	Duidelijk en informatief	Categorieën Info

Table 5 *Subcategories visualization: to inform, sharing, parenting tools/ tasks, and community*

	To inform	Sharing	Parenting tools/tasks	Community
From datafied language	Customizable times and messages To review To see (to learn what's new)			
From the pictures	What nobody tells you Logs A must have for new parents Milestones and development tracker Daily personalized articles and tidbits Blogs from experts Daily updates Research-based Expert tips	Share with friends and family Pictures Moments Celebrate (milestones) Photo's Album	To help you track and plan Alarm Checklist How-to-guide	Supportive Share your moments with parents all around you Ask questions and get answers from a community of parents Parenting score Challenge others Chat with other parents Tips and advice Find other new moms
From Dutch parenting apps	Groei-info Ontwikkeling van het kind Over jouw lichaam Je verloskundige bellen? Tips Pijnstilling en bevallen Zwinger op het werk Moeder worden Meldingen over het kind Volg je zwangerschap op de voet Informatie per zwangerschapsweek Artikels op maat			

3.3.1 Graphs

Figure 13. 'Pregnancy Tracker'.

Figure 14. 'CryAnalyzer'.

Figure 15. 'Zwangerschap+'.

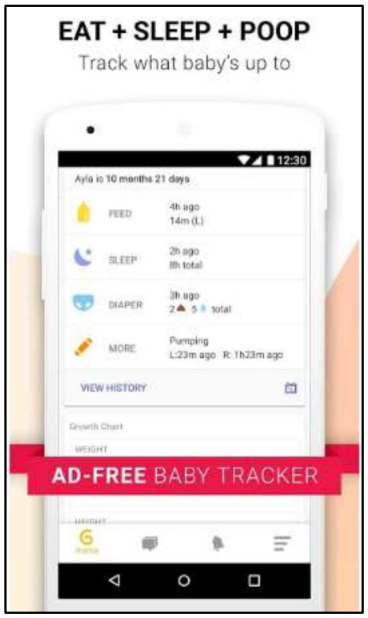

Figure 16. 'Baby Glow'.

Figure 17. 'Appje voor de borst'.

Figure 18. 'Oei, ik groei'.

Parenting apps inform us visually about babies' growth, hungry/poop status, weight, … as seen in the figures. The app 'measures' physical details and mental states of the child but can also 'measure' the weight gain of the mother. These details are shown with an orange, graphs, timelines, etc., and depict the parent-child relationship in a statistical way. Apps seem to indicate that the parent needs to manage his ongoing process, always can do better and can evaluate if he is doing well enough based-on statistics. The language is about 'timelines', 'trends', 'specific intervals', 'metrics', 'percentages' and 'growth charts' to speak about child's development or mothers' pregnancy/progress, presenting 'recordings' and 'eat, sleep, poop'.

The apps translate the information that they get from users (via algorithms) and make a visualization. We can get a timeline, like in Figure 13, that indicates how long it takes before the baby will be born but also gives us a picture (to compare the baby with fruit) to tell us how big or heavy the baby is in the current pregnancy week. The child is compared in the app with an orange to indicate how heavy or big he is. The app from Figure 14 analyzes the cry of the baby and represents it in percentages. Figure 15 indicates the weight of the mother and Figure 17 indicates the weight of the child, they do this by numbers and trends. The app from Figure 18 suggests that there are particular 'jumps' or 'mental changes', sometimes called 'milestones', by the child on particular times. They are presented in a scheme. This visualization and measurement relate to the parent as a learning subject and the professionalization of the parent. The app decides what needs to be learned or what the parent needs to know, the information comes from developmental psychology. It is about milestones of the child, growth processes, basic needs (e.g. Figure 16). The parent is seen as an executor of the parenting job. He needs to foresee in the basic needs, act upon milestones, ensure the growth of the child, measure weight gain, and so on. There seems to be the idea that raising children can be done correctly in terms of development.

3.3.2 Pictures

Figure 19. 'Pregnancy Tracker'.

Figure 20. 'Pregnancy Tracker & Countdown to Baby Due Date'.

Figure 21. 'Zwanger en Zo'.

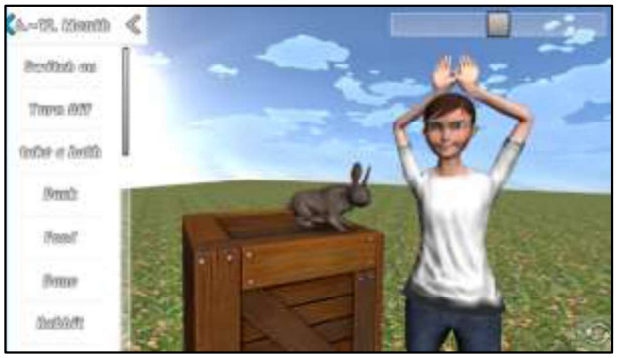

Figure 22. 'Baby Sign 3D'.

Figure 23. 'ZwApp'.

Parenting apps also try to visualize information through pictures. Those pictures are mostly combined with information for the parent about nutrition, pregnancy, stimulating activities, improving skills and knowledge. In a lot of parenting apps pictures are used for the design, to make it attractive. The figures that are given here are used to *inform* the user, different than *attract* users to the app. *Informational* pictures can be found in pregnancy apps, to inform the user about the foetus in the womb: 'what the foetus looks like in the current pregnancy week' (Figure 19); 'what is meant by breech' (Figure 23); 'how the baby is growing' (Figure 20). The information that is given by these kind of pregnancy pictures are tips for your 'diet', the weight of the child, what he is doing in the womb. Those pictures give general information to the parent. This is different from what we see in the graphs. Still, the 'general' information has a 'personal' character. This means that the app decides *when* particular information is given or needed. When you are for example 35 weeks pregnant, you get different information than when you are 25 weeks pregnant. The information is still applied to the situation where you are in, and is 'personalized. Sometimes pictures are used to *teach* parents something (Figure 22). Here we see that the app is trying to learn the parent baby signs. The aim of this kind of visualization is to 'bring the app to life', give 'real-life examples', to 'visualize' information in '3D', 'calendars' and 'videos' indicated by the language that is used in the description. The parent is also seen as a learning subject, that needs to learn information by visualization, often found in pregnancy apps. The apps present particular information to the parent that seems to be the 'norm' for a well-developing child, illustrating how the baby is doing at the moment and claiming that they present the correct information. The apps seem to claim that they can present 'perfectly timed' information.

3.3.3 *Organization*

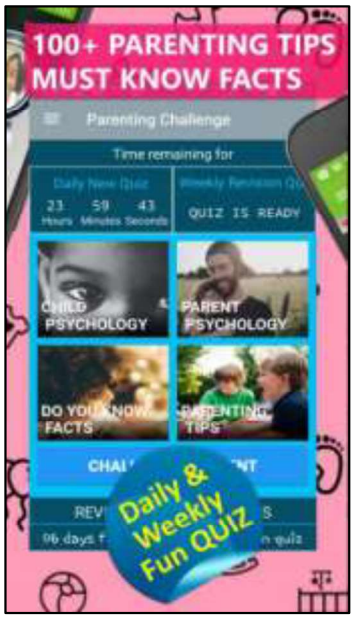

Figure 24. 'Parenting Quiz'.

Figure 25. 'Good Parenting'.

Figure 26. 'Parenting at Meal & Play Time'.

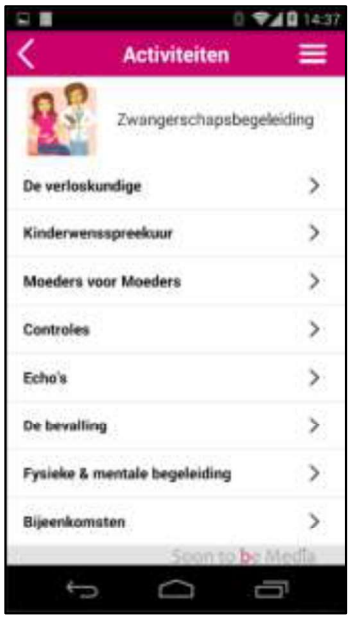

Figure 27. 'Zwanger in NL'.

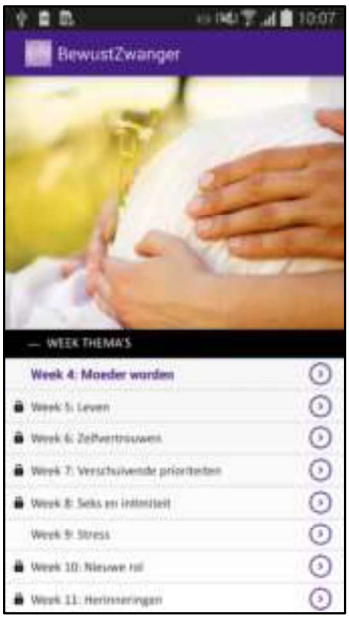

Figure 28. 'BewustZwanger'.

Figure 29. 'Van Nul tot Taal'.

In parenting apps information is often visually organized to inform the parent. In Figure 26 and Figure 29 the information is based on different age categories; in the other examples the information is organized on different themes. In Figure 25 we see the topics: ‘become new parent’, ‘do open communication and listening them’, ‘bedtime stories’, ‘first foods’ and ‘eat healthy food’, this suggests a particular understanding of what the parent should do to raise his children. A good parent is one that has attention for himself to become a new parent, one that communicates in a particular way with the child, read bedtime stories, and so on. This relates to what we said about the discourse of psychologization and how the discourse has

become the backbone of understanding ourselves and parenthood. The discourse can also be seen in the other figures, where 'must know facts' are understood in terms psychology, that parents have to parent during mealtime and playtime, that there are specific language tips dependent on the age of the child, etc. Many daily aspects of the family are put into tasks that the parent has to execute and manage. This implies a normative understanding of raising children, there are particular things that you should do as a parent to make sure that your child can develop. Raising children is understood here in a linear-development process that the parent needs to maintain. There is also a normative understanding of pregnancy, in Figure 28 it is assumed that pregnancy does something with your 'self-confidence', your priorities, your stress, your new role, etc. Figure 27 focuses on the need of pregnancy counselling. This refers again to the responsibility of the parent to evaluate himself and the child, seek and apply feedback or counselling, using information in order to manage your own pregnancy or parenting process. Parenting is seen as a job and executing particular tasks. Figure 24 is an example of an app that tests our parenting skills. Particular questions are asked to measure the skills of the parent. If we use the app of Figure 28, we see topics that are framed as learning problems: 'living, self-confidence, shifting priorities, sex and intimacy, stress, …' The language used here wants to inform the parent based on 'tips and advice', 'stories that interest you', 'must know facts', and 'parenting tips'. This is often the basis for organizing the information in the parenting apps.

3.3.4 To inform

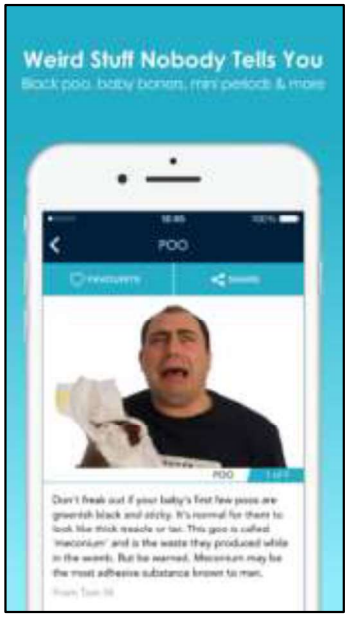

Figure 30. 'Quick Tips for New Dads'.

Figure 31. 'GroeiGids'.

Figure 32.'Appje voor de dorst'.

Figure 33. 'Skoebidoe'.

Figure 34. 'Supernanny Parenting'.

Figure 35. 'Oei, ik groei'.

In the visualization of these figures we see that parenting apps often aim to inform parents about raising children, pregnancy and parenting in general. They inform parents in different ways: articles, specific information on particular times during childhood/pregnancy, notifications on weight, tips, ,… The parent gets 'daily personalized articles and tidbits', 'blogs from experts', 'daily updates', 'researched-based' information, 'logs' to be informed about the development of the child and himself as seen in the language and visualization that is used. The given information seems to be legitimate because it is based on the data of the parent but also on research or coming from experts, referring to the parent as an individual in need of expertise and advice (cfr. supra: scientization of parenting). Parenting apps target parents with general information but also with specific information based on data, for example Figure 32 give the following notification: "Emilia did not urinate very much yesterday, probably not a problem, but check it off with your midwife" (Figure 32, Appje voor de dorst app, Trans.). This gives an example of how parenting apps are able of creating a particular reality for the parent, in this example the app seems to say that there may be a problem. However, are apps even capable of recording everything or creating the 'reality' of the parent? Parenting apps only make use of (tracked) data. This means that what is not recorded, is not taken into account. A simple explanation for this example could be that the battery of the phone died during the day, and so not every visit to the toilet was recorded. In Figure 34 we see titles from articles who seem to know how raising children works: 'How to get bedtime back on track'; 'Does my child have a sleeping disorder?'; 'Getting toddlers to stay in bed'. This language implies that there is a correct or effective way to raise children, that certain outcomes are desirable and achievable. The figure refers to the instrumentalization of the parent-child relationship, which is a causal relationship and the parent has to ensure optimal outcomes for his children, coming

from the language of (developmental) psychology. Also medical language comes in the understanding of parents within apps, parents are 'medically' informed. In Figure 34 the parent can check if the child has a sleeping disorder, intertwined with a deterministic understanding. The parent is approached as a vigilant to check from an outsider and medical perspective: what is 'wrong' with the child?

3.3.5 Sharing

Figure 36. 'Ovia Parenting'.

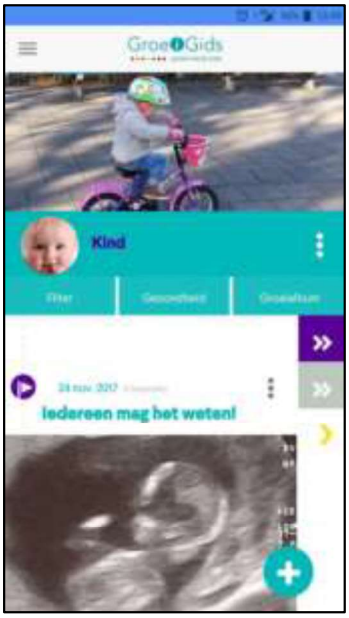

Figure 37. 'GroeiGids'.

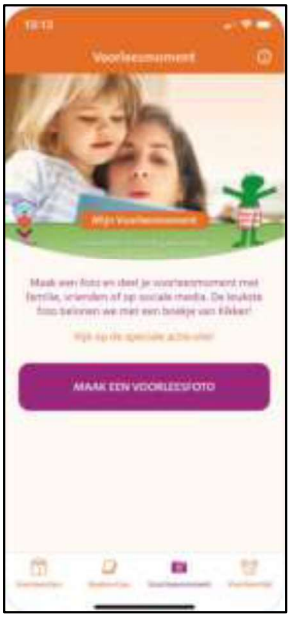

Figure 38. 'Boekstart'.

Figure 39. 'Baby Glow'.

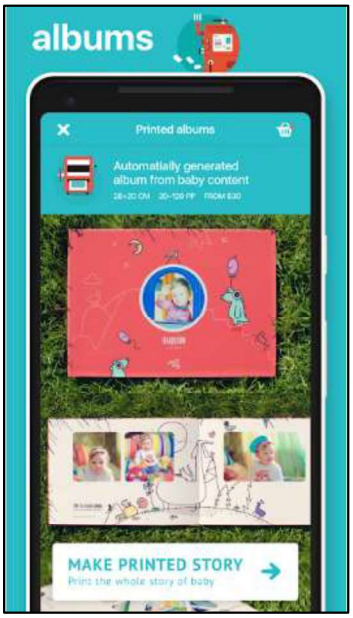

Figure 40. 'Hello Baby'.

Just like other social media (Facebook, Twitter, Instagram) we see in the visualization that parenting apps offer the possibility to share moments with friends, partner and family. This possibility is also used to promote the app. But there is something different that happens within

apps, here it is not only the user who chooses when to post a picture. It is also the app that ‘decides’ or ‘recommends’ which moments are important. So, here, the examples demonstrate that the apps are capable of creating a particular ecological environment and a form of subjectivity. Sharing *intimate* information is normalized, in Figure 39 the app highlights that particular milestones are important to share or celebrate. In Figure 38 the app stimulates to share ‘voorleesmomenten’ (‘reading aloud moments’). The apps put emphasis on particular information that needs to be shared with others. Sharing moments, are often achieved by photos from the child, ‘maak een voorleesfoto’ (‘make a reading aloud picture’), ‘make an album’, ‘Rachel invited you to follow Olivia’. The emphasis is not only on the importance of the visual (e.g. graphs) but as here indicated also on the need to see and show ourselves and others.

3.3.6 Parenting tools / tasks

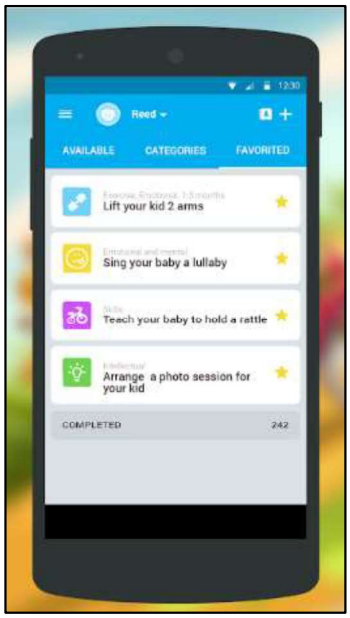

Figure 41. 'Wachanga'.

Figure 42. 'Potty Trainer ++'.

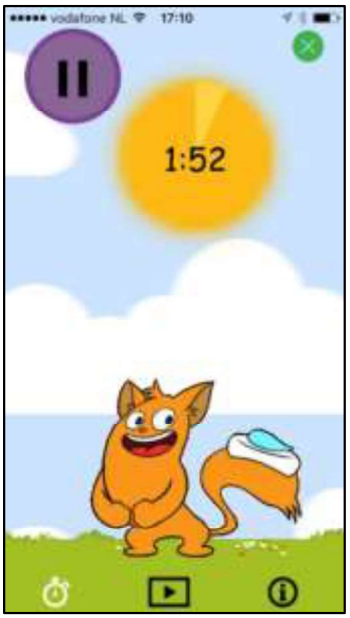

Figure 43. 'Tandenland'.

Figure 44. 'Boekstart'.

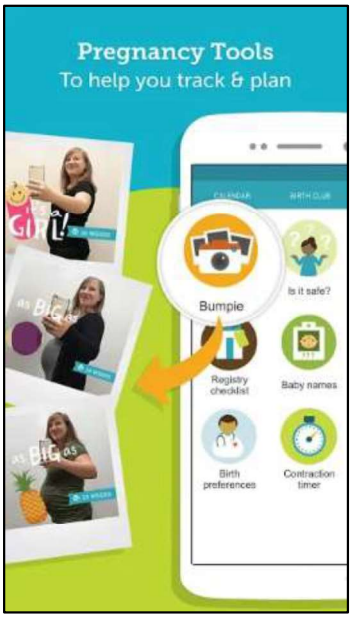

Figure 45. 'Pregnancy Tracker & Countdown to Baby Due Date'.

Figure 46. 'Prénatal'.

Parenting apps offer particular tools or give you particular tasks to be a good parent through visualization. This illustrates that parenting is professionalized and seen as a job. In Figure 41 the app guides you in your parenting journey by offering you parenting tasks like ‘sing your baby a lullaby’ or ‘teach your baby to hold a rattle’. If you have done a task you will score points, this is what we will define in chapter 4 as *gamification* (Lupton & Thomas, 2015). These tasks have the goal to assist the parent in their kids development (physical, emotional, socialization). The app as an assistant technology for the parent because the idea is that you cannot do this by yourself. The app of Figure 42 will support you in remembering the child to use a potty chair, it also guarantees you wonderful results in 2-3 weeks time. As you can see in the figure you can give your child ‘virtual’ stickers to award him. It is the potty trainer that helps you decide when to use the stickers: ‘on each potty attempt, at each mile stone’. The award in the app seems to be for the child but can also be seen as an award for the parent, an indication of doing the right thing, executing tasks. The app from Figure 43 helps you in your parenting task ‘brushing teeth’. The app of Figure 44 remembers you of ‘voorleestijd’ (‘when it is time to read aloud to the child’). The apps from Figure 39 andFigure 40 help you track and plan what you need for the baby when he is born. Prénatal app even offers you the option to immediately buy the products (the app thinks) you need. Parenting apps functions as ‘how-to-guides’ or ‘checklist’ to ‘help you track and plan’. The apps present themselves as *support* for the parent. This implies the idea that parents cannot raise their children by themselves. Parents are here understood as in need of particular ‘tools’ and ‘tasks’ in order to manage the parenting job to be a good parent.

3.3.7 *Community*

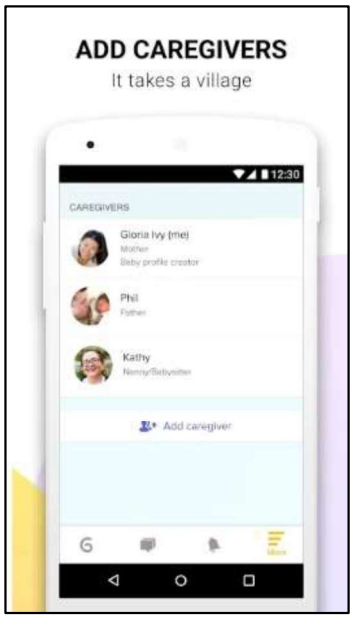

Figure 47. 'Baby Glow'.

Figure 48. 'Parenting Quiz'.

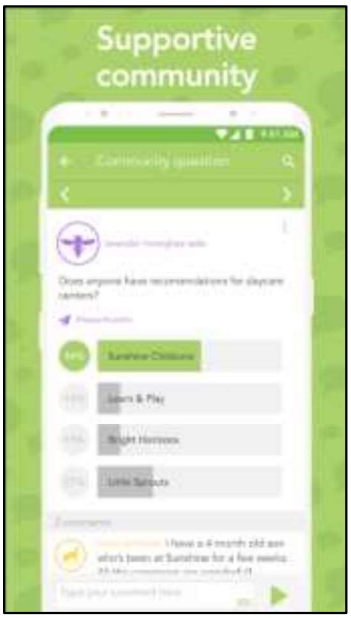

Figure 49. 'Ovia Parenting'.

Figure 50. 'Pregnancy Tracker & Countdown to Baby Due Date'.

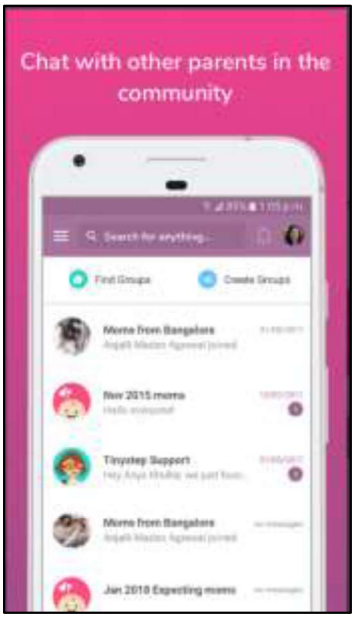

Figure 51. 'Wow Parenting'.

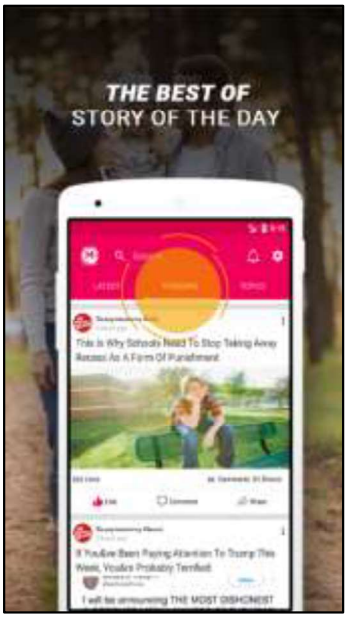

Figure 52. 'The mom's manual'.

In parenting apps, you can also interact with a community that is visually created in the app. In this community you can also give or get advice to or from other parents. The community can help you choose for example which daycare is the best. In Figure 49 the community members have voted for the day-care they think is the best. It is also possible to chat with other parents, you immediately contact them (if they are online). The parenting app of Figure 48 lets parents challenge each other and creates competition between parents. Communities in parenting apps are understood as ‘supportive’, to ‘share your moments with parents’, to ‘chat with other parents’, to get ‘tips and advice, to ‘find other new moms’, to ‘ask questions and get answers

from a community of parents'. Sometimes, communities are understood as competitive, it is about 'challenging others' and comparing 'parenting scores'. This indicates that parenting apps assume a particular shared idea within the communities of what the parents ought to be doing. It is about chatting with like-minded others, measuring and comparing scores, discussing day-care, and so on. We described in the datafied language that communities in parenting apps are different from how communities are understood in an intergenerational relationship. These apps are there an example of. They create a particular ecological environment where the parent can connect himself with like-minded parents, people that share the same ideas and information/stories. In this understanding the parent seems no longer a political figure, taking care of the continuance of the world (cf. Arendt). Within parenting apps the notion *community* narrows to 'like-minded' relatives where the parent in the public world (cfr. supra: Arendt) no longer seems to have to take a side or to utter dissent. This is different from what the app in Figure 47 seems to say – "it takes a village" as it relates to the idea that it is about a culture, a society and multiple generations that raise children. In the apps, the 'village' is a community of like-minded parents, sharing the same ideas and information, and a network of caregivers.

To conclude this chapter we can state that in the visualization the parent is addressed as a learning subject, a vigilant and an executor. The parent needs to learn particular skills and knowledge. He is informed with general (e.g. articles) or specific (e.g. graphs) information that has a personal character because it is given at a particular time and applies to the situation of the parent. The content for the parent is normalized in the sense that it presents a 'normal' childhood, what is seen as normal growth, what you need to do to be a good parent, what the child looks like, and so on. Also in the visualization we described that the apps claim that the information is correct and perfectly timed, in this way the apps present the idea that raising children can be done correctly and that particular outcomes are desirable and achievable (i.e. scientization). Parenting apps present themselves as assistant technology that parents need because they cannot raise their children by themselves. The apps can be seen as manuals that guide and support parents. The parent needs to look at his own situation from an outsider perspective, willing to do and learn everything that is necessary. Parenting apps indicate what is important to do, wherefore the parent needs to take responsibility, and also evaluate the situation to indicate where the parent needs to work on (i.e. responsibilization). The parent is appealed on his responsibility, but this responsibility is narrowed to seek and apply feedback, counselling and looking at the child from a developmental perspective (i.e. professionalization). In parenting apps daily family activities are algorithmicized in parenting tasks that the parent has to execute and manage. This means that parenting apps are capable of creating a particular reality, one that indicates what possible problems are, what is normal to do and what is necessary to know. Parenting apps create a reality only based on the data of the parent, it is the question in how far these apps are capable of creating the reality of the parent.

4 What does the parenting app mean for the figure of the parent?

This chapter aims to contribute to the work on the critique of framing upbringing as 'parenting'. We focus on the digital aspect of the parent-child relationship, because this is missing from the critical literature in sociology and philosophy of education. While digital technology has been addressed in relation to e.g. pregnancy and children in sociology of technology (e.g. in the work of Lupton & Williamson) the specific pedagogical, representative nature of the parent-child relationship has received less attention in relation to digitization. Chapter 4 is an attempt to understand how parents are constituted in and constitute themselves through parenting apps. The question we try to answer is how the parent figure is constituted in this specific digital technology? We ask ourselves questions about what is left out in the present parent-child relationship within the parenting apps to regain focus on the parent as a pedagogical figure. We want here to broaden the narrowed perspective of the parent-child relationship from the parenting discourse and current digital times to an intergenerational relationship, "…in which the parent is a pedagogical figure with (political) responsibility for representing the world to the next generation" (Ramaekers & Hodgson, in press, p. 3)

Especially in this part, parenting apps are understood as parenting advice within a sociotechnical and postdigital perspective on the relationship between humans and technologies. This means that parenting apps do not work mere technically – algorithms – but are also influenced by politics, culture, economic and social discourses. Digital technology can no longer be separated from an understanding of human and social life in current times, it is a "blurred and messy relationship between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bio-informal capitalism" (Jandrić, et al., 2018, p. 896). We combine this understanding with the broader context of 'parenting' (chapter 1) and 'digitization' (chapter 2) and use the insights from chapter 3 to inform what is coming in this chapter. Our analysis is situated against the background of raising children within an intergenerational relationship and tries to articulate an account of the parent as a pedagogical figure rather than mere a technical executor.

4.1 Algorithmic life in current digital times

In this part we elaborate the concepts that we discussed about the figure of the parent throughout chapter 1 and 2, and use the insights from chapter 3 to focus on the digital aspect of the parent-child relationship. The examples we use to illustrate our points refer to the apps from appendix 1.

In digital times we see that digital media have become more and more interwoven with parenting practices (Mascheroni, Ponte, & Jorge, 2018). Those parenting practices are

mediated by 'sharenting[13]', an increased reliance on the internet and parenting apps, and the use of wearable technological devices. There is an increased datafication of children's and parents' lives. Their data are tracked, stored and analyzed as part of 'surveillance capitalism'. This means that parents and children are part of intensified networks of surveillance through the use of sharenting, the use of wearable devices and parenting apps. This includes 'commercial dataveillance' and 'intimate surveillance[14]'. This poses new challenges to parents but also how parents are understood or understand themselves today. We try to understand the sociotechnical aspects of parenting apps in relation to our encounters with algorithms, the language from the description of parenting apps and the visualization of information, and how they try to shape a particular world, incorporated within the wider politics, culture, economic and social discourses. It is our attempt to understand how parents are constituted and constitute themselves through parenting apps to indicate what is left out from the intergenerational perspective. We discuss the concepts datafication, surveillance, self-tracking and self-governing, visualization, responsibilization and personalization, and professionalization to point to what is at stake in the intergenerational relationship as seen in parenting apps.

4.1.1 Datafication

We use the concept *datafication* to refer to the processes of gathering massive amounts of data from parents and the increasing understanding of parents through these processes in digital times. These processes make it possible to gather a lot of data that can be stored and tracked. Also parents can be targeted very personally with their own data (e.g. weight, feeding times). This makes parenting apps distinctive form other parental support, because parents' actions are now monitored very closely and their understandings are based on the feedback from the processes of datafication. The (limited) possibilities of algorithms and datafication make parents understand themselves through the logic of numbers and what they are capable of to present (e.g. graphs; timelines). This makes clear how the parent is understood in the form of a '*quantified self*'[15]. The parent constructs his knowledge based on his own tracked data. Graphs, timelines, trends and percentages, try to inform the parent about his children or pregnancy (e.g. 3.3.1). The tracked information is translated through processes of datafication into algorithmic functions and visualized for the parent. The parent is addressed as a learning subject in need of advice and as a professional to manage himself. For example, "WOW

[13] Sharenting can be defined as sharing photos and videos of your children or grandchildren on social media, often without their consent (Trans.). Gegevensbeschermingsautoriteit. (2019). *Sharenting*. Retrieved from https://www.ikbeslis.be/ouders-leerkrachten/sharenting

[14] Intimate surveillance entails close and seemingly invasive monitoring by parents (Leaver, 2017, p. 1)

[15] A person constructs knowledge about himself through the logic of numbers and what they present (Gabriels, 2016)

Parenting is a parenting app that helps you to *solve* all your daily *parenting challenges*. This parenting course has helped 1000s of parents worldwide develop the right *parenting skills*" ('WOW Parenting'). Parents are thought of being capable of understanding the statistical information correctly. It also seems to be a way for the parent to control himself, he can check his own or the child's process. 'Wachanga' present itself as a personal guide for the kid's up-bringing: "Metrics – fix your kid's height and weight as often as you can to get graphics, pretty colourful lines and recommendations for physical development".

Parenting apps make clear that they want to be part of our daily life and so that datafication needs to be inherent to it. The parent need to be daily connected with the app to be a good parent. The 'Pregnancy Tracker & Countdown to Baby Due Date' app is an example thereof:

> You'll receive a daily pregnancy news feed, food and nutrition ideas, health and pregnancy exercise advice, weekly checklists and reminders, and tips for dealing with morning sickness and other pregnancy symptoms. Learn about prenatal vitamins and healthy snacks and get workout tips to help keep your pregnancy weight gain in a healthy zone. ('Pregnancy Tracker & Countdown to Baby Due Date')

It is no longer enough to read sporadically a book or visit a website to be up-to-date. The parent has to look at the app every day and integrate it in his parenting routines. Here it is assumed that parents cannot raise their children alone and therefore need apps to support them on a daily basis. As seen in the following examples: "Baby Sign 3D is easily to integrate in daily routines and by imitating your baby will learn incredibly fast!!!" ('Baby Sign 3D'). "Parenting is one of the most complex and challenging things you'll face in your lifetime, but in ABC Parenting Guide you will find some tips, activities, and ideas that will help you" ('ABC Parenting Guide'). Parenting apps present themselves as assistance technology that parents need to be a good parent.

However, the underlying algorithms 'decide' what is seen or presented and how. Apps seem to have agency in mediating and constituting the parent-child relationship. The app influences the understanding of the parent of himself and what he needs check, also they make parents feel (daily) responsible for it because of the very personal (visual) representation of the parent/child. The parent is part of a continual feedback loop within the app which forms the basis for the parent to make an understanding of his own process and self-government. It means that the parent looks from an outsider perspective to his own 'quantified' situation.

4.1.2 Surveillance

The processes of datafication make it possible to speak of an age of ubiquitous computing, high levels of social media use and sensor-embedded physical environment as specific to our digital society. Digital data is increasingly generated by people and others about their behaviours and bodies (cfr. supra: 'postdigital'). According to Leaver (2017, p. 1) "parental monitoring and mediation contribute to the normalization of intimate surveillance to the extent that surveillance is (re)situated as a necessary culture of care. The choice to not survey infants

is thus positioned, worryingly, as a failure of parenting". There seems to be a moral imperative to use such apps then, you don't take full responsibility as a parent if you do not use them. As a parent you need to see yourself as a *vigilant* to take care of the child.

> Raising children isn't easy and you will need a great resource for parents to learn about every aspect of child discipline and motherhood. Parenting toddlers can be especially challenging for many new parents. Parents everywhere need a handy parent guide to help them learn about positive parenting and give them good parenting tips. ('Parenting Challenge Quiz').
>
> Parenting is crucial as both the child and the parent learn it with the process. To make it healthy and effective we sometimes need to get the right guidance and we are here to help you with that. We will let you know what changes are to be made in your parenting techniques with the growth of child and change in the environment. ('Parenting Tips').

Apps are seen then as digitized strategies to monitor continually the behaviours and bodies of the user. Datafication takes place 'wherein all social activity is being tracked and digitized', this means that it differs from *surveillance* that 'presumes monitoring for specific purposes. Dataveillance entails the continuous tracking of (meta)data for unstated pre-set purposes' (Leaver, 2017). *Dataveillance* operates when a user makes use of digital technologies and takes place at 'varying degrees of people's knowledge and consent'. This does not mean that users are aware of these processes of dataveillance. Parents put increasingly information in apps, and they are monitored and tracked voluntarily, often without being conscious about the consequences (e.g. Barassi, 2017; Leaver, 2017; Lupton & Pedersen, 2016; Lupton & Williamson, 2017). Growth, development, health, social relationships, moods, behaviours, educational achievements, and so on, are recorded from the child.

> Parents may now purchase wearable devices, changing mats, baby scales, clothing, dummies, feeding bottles and toys embedded with sensors. These devices can record their children's biometric data such as heart and breathing rate, body position when sleeping, dietary intake, oxygen levels and skin temperature, all sent to the parents' smartphone apps in real time. (Lupton & Williamson, 2017, pp. 783-784)

Apps do not only generate data about children but as well from parents to monitor and evaluate them, such as feeding the child, doing exercises, parenting challenges, testing skills.

This means that in current times, the way of gathering information from people has changed. Parents can be monitored through social media and apps using processes of datafication. The technologies brought also a change in when we start collecting information. Once the infant is born, apps are available for parents to monitor such aspects as their infant's sleeping and feeding patterns, medication regime, development growth and health. The practice of the child becomes understood and portrayed via algorithmic knowledge that the technologies generate about them. It is the parent's task to take care of the child on the basis of and in light of the generated knowledge. "By tracking of your baby's natural eating and sleeping rhythms, Baby Log makes it easy to anticipate your baby's needs even when you're stressed, tired and overwhelmed" ('Baby Log Lite'). Parents are stimulated to show themselves and encouraged to share particular moments (indicated as important by the app) and pictures

with others (e.g. partner, friends, family). In communities particular activities are normalized, such as measure your parenting score, chat with other parents, share the same ideas and information in a community.

> Welcome to parenting challenge: a fun-filled quiz that will test your ability to crack everyday conflicts in your parenthood journey, while trying to give you a comprehensive understanding of child behavior and how to enforce child discipline. Try answering common parenting questions, find your score and challenge other parents… ('Parenting Challenge Quiz').
>
> Join a tight-knit community of parents-to-be with due dates in the same month, and get support from an active, caring parent community that shares a post every 3 seconds. ('Pregnancy Tracker').

You can create and comment on online content (of others), monitor your own body or the child/foetuses and share personal experiences (about your pregnancy or parenting) in the apps, with an increasing *quantitative precision* (Lupton & Pedersen, 2016) (e.g. smart diapers and clothing). Raising children is now understood in this kind of logic, where comparing and judging upon the data is the norm. What is calculated is limited to the capacities of algorithms. Algorithms only generate limited information from the parent. It is only information that 'fits' within the algorithm. This leaves out the complexities, potentialities and opportunities parents have outside the algorithmic system. The parent is addressed as a vigilant but in a narrowed sense, this means that the processes of datafication and the idea of surveillance indicate where the parent has to look at. He needs to understand himself through algorithms, tracked data, and statistical logics coming from disciplines as medicine and developmental psychology (e.g. medication, milestones). The apps present the parent as a learning subject and normalize the processes of datafication, sharing and measurement.

Intimate surveillance is normalized and seen as a necessary 'task' for the parent to take care of the child. This kind of surveillance puts emphasis on what the parent does. Raising children in a context where personal data collection and monitoring becomes the norm means that the parent judges and compares himself to this logic. Parents need to understand themselves as 'calculable persons' who judge upon parenting tasks to improve and predict their own development, and ensure the optimal learning outcomes and health of the child. Specially developed technologies (e.g. clothes, dummies, wearable devices) aim to help the parent reaching this. These are self-tracking technologies and track the data from the parent or the child, and contribute to surveillance and self-government of the parent. "Self-tracking makes the individual's body more transparent and calculable, because the technology allows to measure, model, stimulate, monitor, and manage our bodies ever more deeply" (Gabriels, 2016, p. 175). These self-tracking technologies make it possible to monitor and gather very precise data from the parent and not only what the parent puts in the app by himself.

4.1.3 Self-tracking and self-governing

Parenting apps make often use of self-tracking technologies and so are capable of directing parents in a particular way to understand themselves and their relationship with the child. This

means that apps generate a particular understanding of what parenting is and how we should think about upbringing (e.g. parenting and tracking from conception onwards; parenting skills; irreplaceable moments; healthiest birth possible). The concept *self-tracking* refers to the capability of tracking a constant stream of precise data from the behaviour and/or body of the user, about his activity and performance for every aspect that is possible by the app he uses (e.g. breastfeeding; contractions; feeding and sleeping schemes). In terms of parenting apps this means that technology gathers data of the activities and performances of the parent or the child and how their skills and body are trained, monitored and progressed.

Self-tracking technologies contribute to the idea of understanding ourselves within a context of numbers and what they present (i.e. quantified self; cf. Gabriels, 2016), because they generate very precise data that only fit in a statistical logic and numbers (e.g. graphs; timelines; percentages). The app makes an assumption of what the parent has (not) done or assumes what the parent needs to do and makes use of the tracked data to represent the situation of the parent. Compared to apps, advice from e.g. books still need to be applied to the particular situation of the parent. This makes information from apps more personal and pervasive but also more statistical. Those numbers and graphs seem to suggest that it is *possible* to translate the parent-child relationship or childrearing practices into a statistical logic, implying that a certain end-point can be reached. Also, they imply the idea that the relationship need to be judged upon based on the logic of self-tracking processes.

These relative new technologies seem to expand the opportunities for parents in the first place but actually create new ways of *'parenting'*, that were not possible or easy to do before (e.g. parenting scores; analyse baby's emotion; perfectly timed information).

> A number of commercial child-tracking devices and applications have been launched to allow parents to generate knowledge about their child's health. These include sensorenabled 'smart diapers' to enable urine analysis and identify health patterns, and 'smart baby clothing' activated with 'sleep algorithms' and temperature and respiratory sensors to continually monitor infant health. (Williamson, 2015b, p. 138)

Williamson (2015b) notes here that there are a lot of options to track pregnancy or children. This goes together with an increasing quantification (and self-government) of the individual mediated by algorithms. The algorithms organize and classify information and so enforce a particular understanding of what 'parenting', 'health', is. How this is defined through the system and the algorithms, determines how people will see themselves, and identify or conduct themselves. "The body becomes a series of interrelating digitized informatics, which demand new ways of interpreting these signs and signals of bodily function and movement" (Lupton, 2018, p. 2). "In this sense, the 'lines of code' that constitute computational technologies are also transcoding of 'codes of conduct', particular ways of conducting one's life that users are encouraged to inhabit, internalize and embody in the ways they comport themselves" (Williamson, 2016, p. 404). Some authors argue that new ways of governing became possible within these highly coded social environments, "they refer to how software creates new

spatialities of everyday life and new modes of governance" (Williamson, 2017, p. 62). "On the one hand, the growing abilities to track and assess the minutiae of individual behaviour produce new forms of knowledge about the self that can help people to gain more awareness over their habits and lifestyle, which may ultimately enhance control over their life" (König, 2017, p. 2). This means that self-tracking contributes to the governmentalization of learning. Self-surveillance and self-tracking have disciplining effects on the parent to self-regulate his behaviour according to what 'good' parenting is in the app (e.g. prepare for birth; listening and communication skills; read parenting tips). It is an ongoing self-disciplining, self-regulating, and self-optimalization of the parent in order to meet the ideals of the current digital parenting discourse, as seen in these examples: "With this parenting course, you will learn simple parenting techniques, and the right skills to deal with typical issues with children like: Peer pressure, Distractions, Relationship Issue, …" ('WOW Parenting'). "Even if you have experiences in raising children and think you already know all about baby and toddler milestones, you will learn a thing or two from various tips and articles in our app" ('100 Baby Growth'). "If you answer incorrectly, you will learn the facts about child development that will give you ideas about the best way for raising children" ('Parenting Challenge Quiz'). This relates to what we said about making parents part of a continual feedback loop of self-government and tracking a constant stream of knowledge within the processes of datafication. Parents' behaviours and bodies are monitored and tracked voluntarily willing to work on the self. Parents only have few options to challenge the predictions that are made by the algorithms and have often little knowledge about this calculation or how organizations make use of their personal details.

Today there is an increased datafication of children's and parents' lives (i.e. surveillance capitalism, commercial dataveillance and intimate surveillance) making parents and children part of intensified networks of surveillance. An implication thereof is that value creation is based on the data of the parent/child himself and self-tracking processes change the way how we look at 'things' such as diapers, clothes, watches, and so on, that generate our data. Before these 'things' had another meaning for parents, it was something that was inherent to the parent-child relationship. Now those 'things' get another meaning because they are becoming more and more self-tracking and self-governmening technologies, having a kind of 'agency' in the parenting practices and feedback of the parent. These 'things' give the app data to judge upon and change the way we understand parenting practices (e.g. Godwin, 2019). This illustrates why the sociotechnical perspective is important for understanding the parent-child relationship today. Practical materials now become sources of additional data for the parent (e.g. clothes). It is to say that those 'things' and self-tracking processes are becoming more the centre of the parent-child relationship, because the relationship is today understood through the logic of statistics. The parent-child relationship is not between a

contestable historical, political context where values may or may not be passed on, but between a parent and his network, the child, and the 'tried and tested' scientific knowledge against which data/behaviour will be judged. It seems that the parent as a *person* no longer seems to matter in this relationship, because every person can track the child and execute what needs to be done. This reduces the parent to a calculable person (i.e. quantified self). Therefore we see a *depersonalization*[16] of the figure of the parent. Parents are pushed into a depersonalized relationship with the child in meeting a standardized set of capacities to ensure the optimal learning outcomes and self-enhancement.

> What matters is not the person of the parent, what she stands for, what she finds herself representative of, but whether what she does leads to the expert-verified, app-generated outcomes. The discourse of personalisation goes hand in hand with a de-personalising effect, upheld in the space of equivalence: parents here are, as indicated, 'like-minded'. (Ramaekers & Hodgson, in press, p. 19)

The context of the parent is left within this statistical perspective but also the norms and values or the choices that parents make are not taken into account. Processes of datafication, surveillance and self-tracking direct parents to look at themselves from a statistical point of reference. Childrearing is seen as doing the right 'quantifiable' *things* for the child and interaction with the 'broader' context comes down to sharing experiences, pictures or tracked information (e.g. family and friends on social media). We see how 'learning' (based on data/ statistical representations) has become inseparable from how we understand ourselves today. Learning is modified and encouraged in apps, it is about enhancing the self-government of the parent. The actual physical body of the child and the parent have become the objects of intervention in particular parenting apps, in other apps it can be the child's or parent's mind.

An important implication is that self-tracking technologies narrow the perspective of the pedagogical relationship, even more than the analogue parenting culture. It is a way of quantifying and datafying the parent-child relationship. This is problematic because the pedagogical relationship cannot be narrowed in this way because it disrupts and decontextualizes the parent from an intergenerational relationship, and it does not appreciate the nature of the parent as representational figure (i.e. as a grown up, with views, values, uncertainties). The app sees the parent as a 'parenter' (cf. Daly, 2013) to effect optimal learning outcomes and minimise risk. Presenting the parent-child relationship as a quantified and datafied relationship nullifies upbringing as described by Schleiermacher, Arendt and Cavell (cfr. supra).

We looked at datafication, surveillance and self-tracking as separated concepts for understanding how the figure of the parent is constituted in parenting apps. Here, we want to argue that it is better to see those concepts as interwoven and entangled processes that operate together within parenting apps. The concepts make clear that there is an intensification

[16] (Ramaekers & Hodgson, in press)

of a technical description of the parent-child relationship and the vision of the parent as a mere executor. Within this perspective the parent is no longer seen as a 'person' (i.e. grown ups, with views, values, uncertainties). In the quantified and datafied relationship the parent is *depersonalized*, an executor acting upon data and executing parenting tasks.

4.1.4 Visualization

We use here the concept *visualization* to refer to a very particular aspect of parenting apps because it "allow[s] users to interpret and visualize the health data collected through tracking devices, and to use these insights from the data to inform their health behavior choices" (Williamson, 2015b, p. 137). This indicates that apps visualize insights from the parent (i.e. through processes of datafication and self-tracking). Also, this means that apps are capable of generating a particular understanding of the parent-child relationship limited to the capabilities of algorithms and technological devices (e.g. surveillance). Parenting apps are distinctive from other social media because they often aim to inform the parent through visualized timelines, percentages, graphs, and trends of the child or the parent, based on their own data. The information is very personal because it is applied to their own situation and is showed at particular moments (e.g. milestones; parenting tips; notifications). In the analogue parenting culture it was obvious that the parent need to be informed. Here the concept of visualization indicates that parents are in need of visualized content of their personal situation to be a good parent. The following quote is there an illustration of:

> Wow Parenting app helps you solve these with over 100 classy short videos. Over 175 different Parenting articles with simple tips and tricks along with expert parenting advice, suggestions, and insights. You can get all your Parenting questions answered by Experts. Wow Parenting videos talk about various challenges in parenting and how to solve them. Each video has real-life examples and use cases on how you can learn about parenting and raise great kids. This app is a holistic Parenting guide to help you raise your children and have fun along the way. (WOW Parenting: Helping parents raise great kids!)

Parents are addressed as learning subjects who can learn from what is visualized and act upon the information (e.g. information videos on toothbrushing; compare information such as feeding times with other days).

Visualization of the personal data is often given in a statistical representation referring to medical and (neuro)psychological disciplines, as also seen in the concepts: datafication, surveillance and self-tracking. In this representation we see two things happening related to the parenting discourse. The discourse of scientization: parenting is seen as a scientific practice in which we need to measure, input evidence and gather data, then we know how to interpret the graphs, timelines, etc. And, the (neuro)psychologization according to which the 'right' things to do are understood. The parent is presented as quantified and datafied individual and childrearing is understood in a causal and linear process, as we found in the visualized information (e.g. graphs, testing scores). This is where the processes of datafication, self-tracking and surveillance come together in visualizing information about the parent-child

relationship, and thus are specific to parenting apps. It is a way of close monitoring the parent and parenting practices. A lot of data is gathered and made visible for the parent in order to stimulate self-tracking processes and self-government of the parent. Thus, parents are positioned as the external third person (cf. Ramaekers and Suissa) in relation to information/data they can't contest (i.e. depersonalization). This 'general' visualized information is problematic for understanding the parent-child relationship as an intergenerational relationship or what 'upbringing' is all about. In this perspective parents are not seen as moral agents in a social world with moral values and sensitivities (i.e. parents are not seen as grown-ups with views, values or uncertainties but as 'parenters' effecting optimal learning outcomes and minimise risks (cf. Daly, 2013).

> In contrast to this, our emphasis on the inevitability of an evaluative and moral background against which parents have to operate alerts us to the fact that what is at stake is not parents' agency, but the very idea of parents as moral agents, i.e. as beings who cannot, in the words of Seyla Benhabib, 'withdraw from moral judgment' on pain of 'ceasing to interact, to talk and act in the human community' (Benhabib 1992, p. 126). Whatever it is that parents do in the process of childrearing (even if this is taken to be something like enabling their children to experiment with taking a safe distance from them), this always involves judgements and values, and these decisions made by parents always (or at least always potentially) involve tensions due to competing frameworks of judgements and values. (Ramaekers & Suissa, 2011, p. 139)

Parenting apps seem not to have a moral background: parents' judgements, values or decisions cannot be competed, contested, debated or agonised, i.e. we don't see this possibility in the apps. It is too simplistic to reduce the parent-child relationship to visualized information or understanding the relation in a medicalized or statistical way. It lacks a recognition of whom the parent is or wants to be, his historical background, his intergenerational relationship with the child and his own values and judgments.

4.1.5 Responsibilization and personalization

In general we see in our analysis an intensification of the individual *responsibility* of parents in the apps compared to the analogue parenting culture because of the discussed concepts (i.e. datafication, surveillance, self-tracking and self-governing, and visualization). "A general tendency in these self-tracking practices is that they strengthen the role of personal responsibility and encourage individuals to take care of themselves" (König, 2017, p. 2). In the following quotes we see that apps appeal parents on their responsibility:

> Many young parents needs advices and guidance on how to care for and raise a new-born baby. They also need to learn about child health, baby milestones, and toddler's milestones. That's why they buy also baby or infant books. They want to learn more about their baby & toddler's milestones and what are the best baby activities for their kids. ('100 Baby Growth').
>
> Parenting is crucial as both the child and the parent learn it with the process. To make it healthy and effective, sometimes we need to get the right guidance and we are here to help you with that. We will let you know what changes are to be made in your parenting techniques with the growth of child and change in the environment. ('Parenting Tips').

This is also seen in the visualization: the parent is stimulated to interpret his personal graphs and timelines to evaluate himself (i.e. the parent as a vigilant).

We mark a shift from generalized advise offered by books, websites or personal advice from experts to the possibility of personalized content in the description of apps and the visualization (Ramaekers & Hodgson, in press). The content in parenting apps is based on disciplines as neurology, psychology and medicine, but also on the very personal data of the parent and the child (i.e. processes of datafication and self-tracking).

> Parents are part of a data-based relationship within the app that operates in a feedback loop, continually enabling new information as a resource for the parent and asking for more data from the parent. This means that *personalization* is built into the technology itself, by contrast to books or advice from experts. (Ramaekers & Hodgson, in press, p. 14)

Visualization, here, makes the quantified data even more visible and confronts parents with an image of themselves or their child (e.g. graphs; timelines; trends). Visualization can be seen as a mechanism of increasing the individual responsibility, because the graphics and timelines are made from the data of the parent himself and give feedback. Also, *personalization* is seen here as a mechanism of responsibilization, "that relationship of the self to the self in which individuals understand themselves in terms of learning needs for self-optimisation. The design of the apps orients parents to those parts of themselves they want to work on" (Ramaekers & Hodgson, in press, p. 14). Ramaekers & Suissa (2012) already mentioned that *responsibility* is taken in a very narrowed sense in current times (cfr. supra), here, the responsibility is not only a correct application of scientific knowledge but also of the tasks coming from the data of the parent. The parent is not only considered as a vigilant but also as an executor, willing to closely look at the development of the child and the own learning process, and willing to execute parenting tasks. "Tasks - are specially issued assignments for you and your child. Executing the tasks with your little one, you'll help him to acquire new knowledge and skills. Improve your parental level" ('Wachanga'). These are consequences from the scientization of the parent-child relationship but also from the datafication of the relationship in terms of self-tracking, surveillance and visualization.

For the parent-child relationship it means that the personal responsibility of parents is reduced in parenting apps to a causal interaction and to execute tasks for neurological development, behavioural corrections, basic needs, well-being, and so on. This indicates how (neuro)psychological discourses and medicine have become the basis for understanding parents (i.e. (neuro)psychologization). It is problematic for understanding the parent-child relationship as an intergenerational relationship, because the broader perspective of 'raising children' is limited and there no longer seem to be multiple ways of childrearing.

Thus, parenting apps intensify the 'responsibilization' and 'individualization' aspects of the analogue parenting discourse. "This stronger emphasis on individual responsibility forms an important basis for strengthening conditionality, individualizing protection from risks, and

legitimizing cutbacks in the welfare state based on the ideas of empowered and self-reliant patients who are enabled to care of themselves" (König, 2017, p. 2). According to the capacities of technological devices it became possible to monitor and coordinate individual behaviour and to put a higher emphasis on the personal responsibility in managing welfare risks.

4.1.6 Professionalization

The concept *professionalization* refers to addressing parents as in need of learning to carry out their role as a parent (i.e. analogue parenting discourse). For example: "They want to learn more about their baby & toddler's milestones and what are the best baby activities for their kids. … The parenting tips and advices in our app are very practical and applicable for every parent of new-born baby" ('100 Baby Growth'). "Parents everywhere need a handy parent guide to help them learn about positive parenting and give them good parenting tips'' ('Parenting Challenge Quiz'). Parenting apps contribute to this idea because algorithms offer very specific information and feedback based (i.e. processes of datafication and self-tracking). The 'need' for information and advice is in parenting apps also understood in terms of visualization. The image of the parent/child is very 'precise' and 'personal' (e.g. timelines, weight gain, graphs) to appeal the parent on his responsibility (e.g. responsibilization and personalization).

This was also found in the study of Thomas, Lupton and Pedersen (2018) that focused on the representation of fatherhood in apps: "Most of the apps descriptions that we examined, sought to present apps as pedagogical agents, providing essential information and advice for men about how they should behave as partner to pregnant woman and as new fathers" (Thomas, Lupton, & Pedersen, 2018, p. 762). This also implies that men have to learn specific information to become a good father or be a good partner (e.g. Are you sure that you know the best parenting tips and method? Are you truly ready for fatherhood and motherhood?, 'Parenting Challenge Quiz'). Parenting apps try to professionalize parents by informing them with great and legitimate resources of information (e.g. written by child development experts; experts in the field of pregnancy and baby psychology; panel of experts; top experts). Ramaekers and Hodgson (in press) already indicated in their analysis that a number of apps put emphasis on the reliability and veracity of the information. However, the validity and credibility of the information in parenting apps can be questioned. Lupton and Pedersen (2015) indicate that that there are "no industry standards in place to monitor the content of pregnancy- or any other kind of health-related apps" (Pedersen, 2015, p.370). King (2014) also argues that those technological devices "could easily mislead parents into believing that these are tested and certified medical equipment" (Leaver, 2017, p. 6). Also, information is categorized based on particular topics or age categories, it assumes that parents need particular information on particular times, making the assumption that just-in-time information is possible and thus suggests what parents need to do. So what does informing the parent mean here?

The information that parents get through parenting apps is often very medical, described in instructional language and limited to growth processes or playtime activities, changing diapers and feeding times. But can we give parents 'perfectly timed' information? What does 'perfectly timed' mean here or what does it imply?

There is some tension on the idea of responsibilization, personalization and professionalization of the parent. It seems that the parent is individually responsible for his own knowledge and skills but is depicted as if he cannot do it alone (Ramaekers, 2018; Thomas, Lupton, & Pedersen, 2018). Parenting apps present themselves as 'the right guidance' (Parenting Tips) or 'the smartest parental assistant' ('Hello Belly') and present themselves as 'assistant technology' that will guide parents through their challenging job.

> We understand that parenting is demanding, you need help that is flexible for your time schedule. We let you learn when you have time. From helps with laundry and personal finance to methods to make challenges easier every day, we have courses for you. ('Parenting Magic').

This exposes the underlying assumption of the parenting discourse, parents are personally responsible for the child but they are not addressed as being capable of doing it. They need support, or as the parenting apps indicate: 'assistance'. This assistance is not just temporary or once but for 'every step', and it is assumed that the app will and can tell you what is the right thing to do, treating the parent as an executor. "From taking great care of the new mum, to helping out with late night bottle-feeds, to learning how to bond with the screaming, eating, pooing mess that comes crashing into your life – you're covered" ('Quick Tips For New Dads'). This relates what we said about *depersonalization* of the parent because who the parent is, is not taken into account. The parent-child relationship is described in a very technical way, defined as completing particular tasks. It seems that the 'educator' can learn to raise the child to a defined end-point, but who the 'educator' is does not really matter.

What we described in this section contributes to the idea that the perspective of the parent within an intergenerational relationship seems to be lost. The current understanding of professionalization of parents is narrowed to disciplines as (neuro)psychology, psychology and medicine, with a focus on ensuring optimal developmental opportunities and to control the parenting process. In parenting apps, parents are seen as not capable of doing this alone and in need of assistance. The role of the 'educator' is oriented towards ensuring optimal learning outcomes in doing the right parenting tasks (i.e. depersonalization) rather than 'upbringing' children (cfr. supra: Schleiermacher, Cavell, Arendt) as a *parent*.

4.2 Culture of parenting apps

Parenting apps induce a clear idea about what parenting is. This is seen in the language of the description and the visualization. Parents are addressed as learning and datafied subjects. It is normalized to seek and study, monitor children, use and trade tips with other parents and

track as much data as possible, addressing parents as algorithmic assemblages and ‘calculable’ persons.

Sharing intimate information is seen as something that is inherent to the parenting practice. But parenting apps are capable of reminding which moments, information or milestones are important to share with a partner, family or friends. The apps put a high emphasis on particular ‘memorable’ moments that are important to capture. “Create the journal by the whole family, each on their own phone, and then share interesting moments of your child’s development with relatives and close friends” (‘Wachanga’) This need to share is also what we notice on other social media. But what does this mean? The app can recommend the parent a particular milestone, but it does not mean that the parent will share it. Maybe the baby is crying on the photo? Or the parent wants to share a particular photo to show to friends and family what he’s doing as a parent. Thus, what is shared is limited to what the parent wants to share and what the app is capable of sharing. Leaver (2017) argues in his research that “sharing pregnancy images publicly has become commonplace and can often reinforce a particularly narrow and normative notion of pregnancy and related practices” (Leaver, 2017, p.4). Parents only seem to share what looks attractive and happy (i.e. aestheticization of parenting) and when there is no visual evidence of something, it is assumed as not to have happened (i.e. scienticization of parenting). This sharing of pictures or other baby stuff narrows down the whole perspective where ‘upbringing’ is all about. Sharing prenatal information and media can be seen as processes of datafication and self-tracking for surveillance, “pregnancy as an administrative and calculable activity, valuing data over subjective experiences and changing the meaning of what it is to mother and to be a mother” (Leaver, 2017, p. 4). This sharing can be seen as an aspect of ‘responsibilization’ of motherhood (taking pregnancy apps into account), “in which access to greater information and data about pregnancy and the unborn simultaneously increases the expectation of specific ways of acting and self-policing the process of pregnancy and birth” (Leaver, 2017, p. 4). This example indicates what Leaver (2017) tries to articulate: “Receive perfectly timed information about what to expect throughout your pregnancy by simply entering your baby's due date (or you can use our pregnancy due date calculator to find it)” (‘Pregnancy Tracker & Countdown to Baby Due Date’). Parenting apps increase and reinforce the expectation of sharing information about prenatal experiences, but also about milestones and memorable moments. To Leaver (2017) it is clear that pregnancy apps “are part of a wider normalization of the sharing of prenatal, media, stories, and data, across a range of bespoke and general social media platforms” (Leaver, 2017, p. 4). In analysing parenting apps it is clear that the studied apps are also part of the wider normalization, and this normalization is not limited to information about pregnancy alone but all information that can be tracked and shared.

There is a typical 'community' discourse about these apps, which makes them different from other social media. In parenting apps: "The emphasis is placed on personal goals and challenges, 'life projects', personal discovery, motivational prompts and nudges, being rewarded for meeting or beating goals and using insights gained from data to make healthy lifestyle choices" (Williamson, 2015b, p. 138) (e.g. 'Parenting Challenge Quiz'). Lupton and Thomas (2015) describe the phenomenon of competition in apps as '*gamification'*: it means that game design elements are used in non-game contexts, such as badges, competition and rewards (e.g. 'Potty Trainer ++'). They found elements of *gamification* were evident in pregnancy apps, and a lot of apps use self-tracking of the pregnant body and of the foetus. Pregnancy in those apps is mostly understood as a 'miraculous nature' and self-tracking/self-transformation of the pregnant woman is promoted. Other pregnancy apps encourage women to track aspects of their physical activity, vitamin and fluid intake, diet, mood and symptoms beside visualizing those aspects. The authors indicate that there are some apps that even *advise* users how they *should* feel. Another feature of apps is that parents can manipulate images of their foetal ultrasound and share them on social media (e.g. figure 45).

> Like other forms of embodiment, pregnancy has increasingly become subject to representation via digital technologies. Pregnancy and the unborn entity were largely private, and few people beyond the pregnant woman herself had access to the foetus growing within her. Now pregnant and foetal bodies have become open to public portrayal and display. A plethora of online materials – websites depicting the unborn entity form the moment of conception, amateur YouTube videos of birth, social media postings of ultrasounds and self-taken photos ('selfies') showing changes in pregnant bellies, and so on – now ensure the documentation of pregnant and unborn bodies in extensive detail, rendering them open to other people's scrutiny. (Lupton & Thomas, 2015)

It is necessary here to be critical about this phenomenon of 'rewarding' desirable behaviour. This is not done neutrally, but by algorithms deciding which behaviour will be rewarded or not.

> Many of the algorithms enabling these devices and apps are proprietary to the commercial companies producing them, are variable in what and how they measure and calculate the data and are rife with embedded value judgments that rewards some activities and not others. (Williamson, 2015b, p. 143)

Those pregnancy apps clearly make us understand pregnancy and parenthood in a specific way. To become a good parent means that he has to start before the child is born. He has to 'monitor' the child and himself to make sure he can develop well. To become a parent is not only about *tracking* but also about *executing.* The app wants the parent to do something with the information that he gets in terms of executing his parenting tasks. He has to take care of his physical activities, his vitamin and fluid intake, his diet, mood and symptoms, sometimes with the help of visualized information. And do not forget to inform family and friends. This can be different from how you understand yourself as a parent before you started using the app. If a parent is pregnant with his first child, perhaps he didn't think about himself as a parent before: so how you come to understand what it means to be a good parent will be shaped by the app

and other sources of parenting advice, with less and less room for contesting such a view. It is about steering and changing the actions that parents take, based on the information of the parenting app for self-government. This perspective from parenting apps narrows and intensifies the perspective of the parenting discourse and disrupts the parent from an intergenerational relationship.

Placing childrearing to this background means that we understand childrearing in terms of 'goals' and 'challenges' and therefore we get a reward or score. Placing the emphasis on challenges and learning opportunities is different from understanding raising children in terms of an intergenerational relationship or for the purpose to enjoy parenthood. Parents do not have to make choices for what they present because the understanding of the community is narrowed to like-minded and competitive individuals and not used as a place where socio-cultural meanings can be contested. Parental representations of socio-cultural meanings seem no longer to be contested by others. Within apps there are 'like-minded' communities, sharing the same ideas and information or stories. This is argued by Ramaekers & Hodgson (in press) as *depoliticization*:

> We argue that parenting apps are not merely an intensification of existing (analogue) technologies of parenting (such as manuals, forums, face-to-face contact with parenting experts), but that they further problematise the understanding of the parent as pedagogical/political figure. (Ramaekers & Hodgson, in press, p. 4)

This means that the parent is no longer situated in a society and culture but situated in a created environment (that functions because of algorithms and data). The reference point for judgements is thus not society and culture but the app (and the data) – a self-generated environment that contains no contradictions. This indicates that there is a depoliticization of the figure of the parent, "in this context, raising children is a matter of proper (neurodevelopmental) stimulation, of producing the correct effects, then, in an ecological self-understanding, …" (Ramaekers & Hodgson, in press, p. 17). Our very embeddedness in a political community is left out in parenting apps. There is no enclosure of being a parent within a real-life community where raising children is seen as 'initiating them into a common world' that exists about language, rituals, values. In parenting apps the political community is left out but also the parent himself, as argued before in terms of 'depersonalization'.

Parenting apps are thus *creating* the culture, society and contexts we are part of and depoliticize the parent. "Both parents and children, then, are no longer asked (required) to relate to the historically embedded political community to which they inevitably belong as human beings" (Ramaekers & Hodgson, 2018, p. 7). This means that the parent is not seen as a grow-up with views, values and uncertainties (cf. Daly, 2013), or as a representational figure. Parents do not have to understand themselves within an intergenerational relationship or do not have to understand upbringing as a political event. "There seems no need for a past ('tradition') and its inherited (and, always in principle, contestable) truths, values and norms"

or parents who “invite their children to partake in the shared experience of exploring a common world” (Ramaekers & Hodgson, 2018, p. 7). Parenting apps create an environment where parents are understood as quantifiable and calculable persons put into statistical logics to make a representation of the parent-child relationship. The parent-child relationship is understood in scientific knowledge against which your data will be judged instead of being understood in a historically embedded political community.

Algorithms within parenting apps, the language that is used in the description and the visualization aspect are not neutral, or objective sources of knowledge. We may not underestimate how this influences the individual parent and how he understands the world and himself as a parent. What is at stake then for parents and their children in the culture of parenting apps? It “is the question of whether or not they have, as of yet, achieved the best they can, optimized their learning potential, and registered this to make it visible to themselves and others (within the app community)” (Ramaekers & Hodgson, in press, p. 7).

4.3 Algorithms in parenting apps

We combine the technological and social part of parenting apps to understand what algorithms mean in the presentation of the parent-child relationship. We try to offer a more detailed account of this by situating the parenting apps within Bucher’s (2018) wider discussion of algorithms and power. We try to articulate how the parent-child relationship is depicted, what good parenting looks like according to apps, how the parent is positioned in relation to the digital app and the child to understand what the role of the parent and the app is. The fact is that algorithms (in apps) respond to our interests, and this makes it impossible to ignore that it is affecting our encounters with the world and how we relate to each other. What pops up in apps, our computers or other devices is due to software and algorithms. They mediate, augment, produce and govern the network systems. But how ‘powerful’ are those algorithms in ‘controlling’, ‘shaping’ or ‘constructing’ our (social) lives?

Bucher (2018) demonstrates that there are different ways to *try* to understand ‘power’ of algorithms. It is an attempt to answer the question: do algorithms have power?

Do algorithms have *intrinsic* power? The power of the algorithm is located in the mechanism of the algorithm itself. The mechanisms of the algorithm exert power by “making decisions about the ways in which information is presented, organized, and indicated as being important” (Bucher, 2018, p. 34). Algorithms function as a sort of gatekeeper in our virtual world, they decide which information is included and excluded, e.g. information is organized based on particular topics in parenting apps. It is logic to say that algorithms include and exclude information because this is inherent to their working mechanism. They cannot use all information but need particular data. “Programmed sociality, then, is political in the sense that it is ordered, governed, and shaped in and through software and algorithms” (Bucher, 2018, p. 4). The programmed algorithms decide which gates are opened and which stay closed. They

generate information for the user but it always limited, it is adjusted to the online profile of the user.

"New forms of capitalist power as power *through* the algorithm" (Bucher, 2018, p. 34). This means that the algorithm cannot be distinguished from life itself, it is a form of power that does not operate over people but works from below. "Algorithms underpinning social media platforms have the capacity to shape social and cultural formations and impact directly on individual lives" (Bucher, 2018, p. 34). Algorithmic power comes from the capacity of the algorithm to 'shape auditory and cultural experiences'. In terms of Foucault's notion of power, algorithms can be understood as "an omnipresent feature of modern society in which power relations are not seen as repressive but as productive" (Bucher, 2018, p. 34). e.g. in chapter 3 we described that apps promote themselves as being part of the parents day to day life as assistant technology and create a particular reality for the parent. The app 'decides' which information is needed, what is normal to do or indicates which are possible problems. The algorithms in parenting apps based on the data of the parent shape this particular reality and produce this reality again and again.

Algorithms can also be seen as a form of *political, social and economic domination*. The algorithm is here comprehended as *having power* over somebody or something. The domination of power appears as a top-down or hierarchical form, where democratic potentials of the public are diminished. Algorithms are described as creating filter bubbles and manipulating information that is shown to the public. In this way of framing an algorithm as having power over someone, it does not take into account the human decision-making process and programming of an algorithm (Bucher, 2018).

However to whom or what the power belongs cannot be easily answered. We are asking the wrong question. Bucher (2018) arguments that "what can be examined are algorithms in practice, the places and situations through which algorithms are made present and take on a life of their own" (Bucher, 2018, p. 35). So, we do not examine if algorithms *have* power but *when* the power is active. *When* do apps shape the realities of parents and *how* do apps do this?

Bucher (2018) suggest that the power of the algorithm can be thought of as governmental technologies. "Extending the analytics of government to an understanding of the algorithmic power implies a concern for the ways in which things are arranged and managed to guide people in a certain way" (Bucher, 2018, p. 37). This indicates here that governing shapes our actions, thoughts and behaviour (König, 2017). It illustrates that power has now a *technological* dimension. Here the conduct of the conduct is achieved through various technical means. "Technology is never neutral but always embedded with certain biases, values, and assumptions" (Bucher, 2018, p. 35). Those algorithms implicate always certain assumptions and values about how the world works. It is logical to think about algorithms as

governmental technologies because they are part of the broader 'datafication' processes (cfr. supra). We noticed that parenting apps have a particular way of viewing the parent-child relationship and direct parents in a particular direction (i.e. developmental psychology and medicine with a high focus on the development and the health of the child). In the apps the assumption is made that we need or want to measure the progress of the child / parent, receive data, visualize trends, make progress continually and receive feedback on it. Parents are directed to look from a third person perspective and use the data to manage their own situation.

Here Bucher (2018) indicates that algorithms constitute 'technologies of government'. However, we cannot restrict algorithms merely to a *material* domain. Not only algorithms are shaping the conduct of individuals, also algorithms are shaped through feedback from individuals. Here, apps can be understood as 'technologies of government' that use algorithms to govern over people. The app does not force the individual but makes use of his personal information to construct and modify the self by himself, on behalf of his data. In apps algorithms shape the sociality of the individual but also they are shaped by the individual himself, through the data he puts into the device (i.e. individual feedback loop). The algorithm can only function if there are data to react upon. The individual will in response react to what the algorithm produces. In the apps, the parents are not only effected through the measuring and feedback (generated by algorithms) but also the use of particular forms of knowledge – developmental psychology and medicine – so how we know ourselves and children is restricted to these particular areas.

Algorithms are not just one singular object, they are multiple. This makes algorithms less identifiable. There are multiple algorithms at work when a user uses a device. Bucher (2018) and Lupton (2018) therefore suggest to look *when* algorithms or digital data come to matter in specific contexts and situations and how they affect human lives.

> What is at stake than in addressing the ontological politics of algorithm is not so much an understanding of what exactly the algorithm is or the moments in which it acts (although this is important, too) but, rather, those moments in which they are enacted and made to matter as part of specific contexts and situations. (Bucher, 2018, p. 40)
>
> How do things come to matter? To think about digital data as form of matter and to focus attention on the ways in which they affect human lives. The value of personal data for people's lives, and the ways they make sense of the data, involve complex interactions between embodied sensory knowledge and information that is generated from digital devices and online interactions. (Lupton, 2018, p. 6)

There are a lot of social media who make use of algorithms, such system does not use just one algorithm but several algorithms that work together. These algorithms have no defined end. They are constantly changing through the input they get. Bucher (2018) describes this as *eventful*, with an emphasis on processes of becoming rather than being. We need to ask questions about what algorithms *do* as part of specific situations rather than what algorithms *are*. "When algorithms become part of people's everyday lives, incorporated into financial markets or entangled in knowledge production, they do something to those domains" (Bucher,

2018, p. 50). We cannot see the social and technical as separate entities that can be considered independently from each other. Concepts such as *sociotechnical* and *sociomateriality* try to capture this interwovenness. In our further analysis of apps we will try to describe how algorithms *do* make parents understand themselves, this is what the app presents for the parent. How they make parents understand the world in specific ways.

Also according to Lupton (2018), human data can be thought of as 'lively'. There is a constant generation, circulation and recombination of data. People interact continuously with these data. It is changeable in itself. "Digital media users should, therefore be considered as co-creators of digital knowledge or as information intermediaries" (Lupton, 2016, p. 2). One of the implications here is that the child and the interactions between the parent and the child become a source of data. Not worthwhile in themselves but as a source of further knowledge and expertise about themselves or their children and how best to interact with them. The parent and the child ('s data) become part of the individual feedback loop within the app, enhancing the responsibility of the parent to work on himself.

Parenting apps contain some features of social media, e.g. sharing, following, but work like many other lifestyle apps, e.g. for exercise, diet, dating, saving money, and so on. What makes parenting apps distinct from other social media is that the parent becomes part of his own individual feedback loop. The apps shape the experiences of parents within a particular created environment based on the personal data of the parent himself. However, in the notion of personalization in parenting apps, it is the question if the 'person' of the parent still matters or who the 'person' of personalization is? In parenting apps the person seems to be reduced to data and so to what can be measured or stored and tracked (i.e. depersonalization).

How algorithms work and what they do on social media has often been investigated. But there is less research on *how* they work in apps, more particular *when* the algorithm is *active* and what it does with our social relations/social world. It is our concern how parents receive those algorithms and make an understanding of themselves in their particular situations, because all this happens within the (personal) family life. This means that the experiences and knowledge parents have, are derived from their situation and context.

Today we live in a context of digitized environments, "where knowing, addressing and seeking to shape the bodily/biological, emotional/psychological, and cognitive/neurological comportment of people through technologies are becoming key techniques of governing" (Williamson, 2016, p. 402). In parenting apps we see that emphasis is put on measurement of the child and the parent (e.g. growth, weight, sleep). Parents are asked to focus on the development of the child, the need to see and show themselves and others, and daily tasks. This relates to the movement of the parent from an organic to a datafied capital. The figure of the parent is presented in parenting apps in a particular way, but this does not mean that algorithms have power or possess power. We want to emphasize here that we draw from the

Foucauldian notion of governmentality, power is not held but produced through the conduct of conduct.. “Governmentality does not force people to do what the governor wants but, rather, works by assuring coercion and processes through which the self is constructed or modified by himself” (Bucher, 2018, p. 37). In parenting apps, it is the individual himself that maintains the feedback loop, or keeps up self-government. The parent is not forced but makes use of his own information to construct and modify the self, on behalf of his data. It makes sense to take care of themselves in this way in the wider socio-political context of learning and responsibilization. The information that parents need, seems to be self-tracked data, and will inform the parent how he can do better or ensure the development of the child. ‘Upbringing’ children is seen as an ongoing process of self-disciplining, self-regulating, and self-optimalization in order to meet the set standards. Parenting apps present the ongoing process of the parent through visualization (see chapter 3). Parents can see themselves (e.g. graphs) to evaluate if they meet the standards, parents get support and assistance for their process (e.g. tasks; information), or parents are reminded to read or learn knowledge (e.g. articles; must-know facts) in order to take action for self-optimalization.

> Advances in information and communication technologies enable more decentralized and individualized mechanisms for coordination and for managing social complexity. This has important consequences for the *role of conditionality* and *the idea of individual responsibility* in two seemingly unrelated policy areas. First, the changing information infrastructure enables an extension of conditionality in the area of welfare through greater activation, enhanced self-management, and a personalization of risks. Second, conditionality and personal responsibility also form an important ideational template and a legitimatory basis for facilitating value creation that is based on data as a raw material. (König, 2017, p. 1)

Like we questioned the influence of psychology, neuropsychology and behavioural and development psychology in the vocabulary of ‘parenting’, we need to question the influences of datafication and algorithms to understand how they influence parents’ self-understandings. Through influences of datafication those scientific disciplines enter the more private spheres of the parent-child relationship. The parent is made part of an individual feedback loop that is limited to the processes of algorithms but also to the knowledge from these disciplines. This means that the influence from the disciplines in the apps is more pervasive and evaluative than the one in books. The ‘idea’ of using algorithms and data or apps to ‘solve’ social problems is something to be very careful about, the aim to find the right system or set of algorithms. The underlying logic of [apps] could be: “used to recast all complex social situations either as neatly defined problems with definite computable solutions or as transparent an self-evident processes that can be easily optimized” (Williamson, 2017, p. 40). Because of the omnipresent of technological devices it is necessary to be critical about them, how they form our lives, and how they make us understand ourselves and govern us.

4.3.1 Encounters with algorithms, software and codes

It has already been mentioned before that “our lived experiences are not just permeated by media in general but, increasingly and more specifically, by the principle of the algorithm” (Bucher, 2018, p. 67). When we look at parenting apps we can see this principle at work. They operate via algorithms and personal data of parents. Otherwise they would be not capable of functioning. Personal family lives cannot be more permeated than by algorithms. It means that algorithms have a certain form of agency in the parent-child relationship.

The feature of a good algorithm for a corporation is one that succeeds in creating a value, one that makes good and efficient predictions and stimulates parents to engage and return to the platform time and again. There are subtle ways in ‘stimulating’ people to come back. You can ‘remind’ people, like remembering them of a birthday like Facebook does. You can generate a sense of belonging, to make people part of a community. And you can create ‘pop-up notifications’ to stimulate or to repeat something so that it becomes important to the user. In parenting apps the pop-up notifications are used to remember the parents at ‘parenting tasks’, ‘changing a diaper’, ‘milestones’, … in purpose of making the parent use the app and to create a value for the parent. It could be seen as the parent ‘needs’ to be remembered by the parenting app to fulfil his parenting duties. This is an example of how algorithms become part of the daily life of parents, regulate activities, behaviour, and so on. The pop-up notifications for parents are imbued with values and assumptions about a ‘good’ parent, information is presented that the parent ‘needs’ to know on particular times. Algorithms, apps and other technological devices become part of our daily lives and stimulate us to manage our activities. Within the learning discourse, the parent can and should manage his own learning process but also needs support and advice from others.

Therefore what is shown in apps can be seen in two ways. In one way the apps create an image of what good parenting is (progress, monitoring, learning) but in the other way the app can be an app for anything: the logic of time management and self-improvement are now applied to all areas of our lives, including parenting. It means that the power of software cannot be restricted to the technological part, if we speak about ‘governing software’, this suggests that codes and data processing algorithms are permanent in the daily lives of parents and capable of shaping parents’ social experiences. The parent himself is made aware of his own learning process through algorithms and their visualisations, that target the parent with particular information to enhance the child’s development or his own knowledge and skills. This means that parenting apps and the underlying algorithms show particular information to parents and reflect the underlying values and cultural assumptions about how the parent needs to understand himself, as a learning subject.

So software is a sociotechnical product, it can be an important social actor that can ‘govern and shape people’s lives’, in this case the family life. The algorithms ‘decide’ what is

seen in the app, what is presented to the parent and how it is shown. This decision making will influence how parents see the world and themselves because the algorithms make use of their personal data. They already apply to them and present them a 'reality' or a 'way' to look at their parenting situation. Also algorithms react upon the decisions of the parent and hold them responsible for these decisions (e.g. notifications). How much is left from the parent making his own decisions? In parenting apps there seems to be 'a best way' to raise children on behalf of a standard set of skills or tasks. It does not really matter who the educator, or the executor, is. The algorithms create a particular identity of how 'the perfect parent' should look like. This is understood in executing particular tasks and learning particular information coming from the discourse of psychologization. The 'parent' is appealed on his responsibility by statistical logic that totally ignores who the parent is.

> What matter is *what* is being done *in order to* reach the desired presupposed end-point. What matters are the procedures executed. What matters is that the pre-envisioned goal will be reached. It is of little matter *who* is doing it, i.e. the person of the grown-up performing or executing what needs to be done. (Hodgson & Ramaekers, 2019, pp. 14-15)

This means that parenting apps radically transform the way the understanding of upbringing as an act between a parent and a child. The parent is, here, ***depersonalized***[17]***,*** the parent-child relationship is reduced to a standardized set of practices to ensure optimal learning outcomes and who the parent is, is ignored.

4.3.2 The social world: how do we meet?

The algorithms need to be understood in a productive way. They shape the ways of thinking, talking, and feeling about them. The architecture and the working mechanisms of parenting apps have consequences for how sociality is given shape in the app and how parents understand themselves. Parents make an understanding of themselves based on the statistical logic, the presented topics and knowledge, of the parenting apps. In the apps the discourse of psychologization was often recognized in the language and the visualization that shape the sociality within those apps. The parent-child relationship is understood in a deterministic causal relationship, so what the parent does, will lead to certain outcomes, this implies the idea that childrearing can be done correctly. Therefore parents are addressed as an executor and a vigilant. They need to maintain the development of the child and execute the right tasks related to their parenting job. The generated outcomes in apps may be in conflict with how parents feel or see themselves but can also be an intensification of who the parent wants to be. Algorithms can have the capacity to steer parents in a certain direction that is created on the logic of the app and make parents believe how 'parenting' should look like.

[17] (Hodgson & Ramaekers, 2019) (Ramaekers & Hodgson, in press)

This is problematic for the understanding of the parent as a political and pedagogical figure, considering the parent as being part of a wider social and cultural context but also a representative thereof. The fact that the parent is embedded within a community of flesh and blood is different from the created and imagined world of the technological device, leaving out our inescapable obligations to our community, the weight of our sayings and doings have in the initiation of children into language and culture (Ramaekers & Hodgson, in press). In parenting apps upbringing seems to be no longer a political event, that parents "unavoidably represent the socio-cultural meanings that shape their lives and into which they introduce their children" (Ramaekers & Hodgson, 2018, p. 1). This means that the parent no longer lead the child towards a public of communal life but towards developmental outcomes. It is not that they can't – in some ways this is an inevitable part of what we do when we raise children, and no one is forced to use an app – but this is not part of the picture of what it means to raise children when conceived as 'parenting'. The representation of the parent is limited to the capacities of the algorithms and apps. Also the 'world' of the parent and the child is presented/visualized in the app, sometimes in a statistical way, and does not ask the parent to disagree. There is no option for resisting the information that is presented or visualized in parenting apps (at particular times) (cfr. supra: depoliticization).

The parent seems to move further way from an intergenerational perspective or to understand the parent as a pedagogical and political figure. The parent-child relationship is given meaning within a 'programmed sociality' that ignores the complexities of childrearing and stimulate particular mental models (e.g. development psychology and medicine). Thus, parenting apps shape a particular way of thinking and speaking about the parent-child relationship and leaves no room for other interpretations.

Conclusion

The main goal of the thesis was to understand how we talk about raising children and what it means to be a parent today, which was done through the analysis of parenting apps. The analysis wants to contribute to the critique coming from the field of philosophy of education, presenting a pedagogical account of raising children instead of focusing on the parenting culture in general. We used a sociology of technology perspective to look at the parent as a pedagogical figure within current digital times. The framework of the analysis is based on a postdigital description of the relationship between humans and technologies and on a governmentality perspective drawing on the work of Michel Foucault considering parenting apps as sociotechnical technologies and technologies of self-government. Parenting apps are viewed as parenting advice (technologies) that carries the wider influences coming from the cultural, historical, political and social context. The analysis draws attention to the way parents are addressed in apps, the language that is predominantly used in the technologies and what the apps visualize. The philosophical and sociological account is used to point to what is left out the parent-child relationship from an intergenerational perspective and what parenting apps mean for the understanding of the family life.

We started with an analysis of the contemporary parenting culture where upbringing children is reframed as parenting, something parents do, against the background of an intergenerational relationship to open up our thinking about the parent-child relationship (i.e. upbringing children as described by Schleiermacher, Arendt and Cavell). The parent is seen as a pedagogical figure and a representative of a particular world. We confirmed that in contemporary parenting culture the parent-child relationship is described in terms of scientific languages and professionalized, putting the parent as a pedagogical and representative figure at stake. The current conceptualization of childrearing and the parent-child relationship are characterized by universalism, standard family, (causal) logic of developmental psychology, the parent as a learning subject and neuroscience (Ramaekers & Suissa, 2012). General concepts try to help parents better understand the development of their child but put the parent in a third-person perspective and leave the insider perspective out. The parent-child relationship is understood as a linear process in terms of efficiency coming from psychological disciplines, such as neuroscience claiming that real knowledge is now possible and what parents do must be scientifically proven (i.e. psychologization). This way of framing the parent-child relationship leaves not much room for a certain openness in the experience of raising children and reduces parenthood to a mechanical process with predicated outcomes. There is no acknowledgement for the cultural or historical contexts or values coming from the parents themselves, leaving out their social world infused with meaning and complex interactions. These concerns formed the basis of our interest in investigating parenting apps.

Drawing on the work of Michel Foucault (2002a) (2002b), we tried to describe what makes raising children today different from other times. In our analysis we demonstrated that today there is a shift in the kind of capital that is used for governmentality, from organic to datafied capital. The understanding of the individual subject has changed because of the wider processes of governmentalization and educationalization. In modern times the government employed tactics for governing human species. In the writings on governmentality Foucault makes a distinction between technologies of power and technologies of the self. He however emphasizes that they function together. Life is seen as a matter of investment, a kind of organic capital for economic development. Later on the family becomes an instrument for intervention using biopower in order to govern society because the individual has been made a subject for explaining (social) problems and parents are seen as an instrument for solving them. In current times emphasis is put on learning from government and self-government and problems are now seen as learning problems. The solution lies in the enhancement of learning. All parents have become the specific focus of the government for risk prevention (i.e. surveillance). There is a shift from a collective responsibility towards an individual responsibility. The emphasis is no longer upon diagnosing society's and individual's problems but today's discourse of parental care is focused on a willingness to work on the self and facilitating self-optimization (i.e. professionalization). Here the responsibility of the parent is here taken in a very narrowed sense and parents are pushed in an outsider perspective to look at their situation in order to make the correct actions for the optimal developments of the child. In digital times, technologies are seen as a great way for doing this, e.g. parenting apps can be seen as technologies of the self that stimulate the parent as a learner to take care of, regulate and optimize his ongoing learning process but apps do this in a more natural way (i.e. softpolitics). The mechanism (i.e. algorithms) within parenting apps make it possible to gather a lot of data, monitor the parent and target them very personally with the information. Parents understand themselves as an ecological-environmental self[18] which indicates that information comes from the parent's own situation and is appealed directly to take action. The value and the legitimacy of the information are coming from the data of the parent himself. Personal data coming from parents is seen as digital capital to govern the digital society nowadays.

For the analysis parenting apps are treated as sociotechnical technologies, this means that the technical part (i.e. algorithms) interact with the wider influences coming from politics, culture, economic and social discourses. Algorithms are programmed in codes, and codes are inscribed in software which makes the parenting app work and do particular things. This indicates that what parenting apps show or how they constitute the parent is far from neutral,

[18] (Ramaekers & Hodgson, in press);(Simons, M. and Masschelein, J. (2008) 'From schools to learning environments: The dark side of being exceptional', *Journal of Philosophy of Education*, 42(3-4): 687-704)

but a representation of the data from the parent based on pre-programmed procedures and limited to the capacities of the technology. The way algorithms present our world makes us understand ourselves *in* the world. We use the information from algorithms to give meaning to our everyday lives. According to Bucher (2018) algorithms do not merely have power and politics but are capable of ordering our world. Therefore we need to look at *when* algorithms are activated. We consider the visualization within parenting apps as an activation of algorithms and showing a particular understanding of the parent-child relationship.

To come to an understanding of how parents are constituted in parenting apps, we looked at the language that is used in the description and pictures of parenting apps and what parenting apps visualize. In our analysis we established that how the parent is addressed in the datafied language relates to the parenting discourse. Parenting apps see parents as learners and datafied subjects that need to learn tips and advice and execute parenting tasks. The parent is addressed as a vigilant of his own situation (i.e. third person perspective). Parenting apps present themselves as assistant technology to help the parent take his individual responsibility towards the child. The algorithms help parents to focus on their daily routines and target them with personal information based on the idea that all parents can use advice and are in need of education. A statistical and visual representation of the parent is made which indicates where the parent needs to work on, to enhance self-government. This was made possible because of the processes of datafication, monitoring and coordinating the individual behaviour of the parent and making parents part of an individual feedback loop. The parent-child relationship is narrowed to disciplines such as developmental psychology and medicine drawing attention to particular aspects of the child (e.g. behaviour, development). High emphasis is put on the individual responsibility of the parent to take action based upon the data or the information (i.e. responsibilization). Also, the language shows that technologies are embedded within a wider context. In the apps influences from the economic context (e.g. the parent as a consumer) and, social and cultural context (e.g. need to share information; to be part of a digital community) have been found. Visualization in parenting apps is used to tell the parent wherefore he needs to take responsibility, what he needs to evaluate and it gives feedback to the parent applied to his personal situation. Also, visualization is used to make the app attractive for parents. In graphs the attention of parents is directed to developmental aspects such as milestones, weight gain, and so on, and the parent-child relationship is depicted in a statistical way (e.g. timelines, metrics). The parent is also addressed as an executor, this means that he needs to foresee in what the app indicates as important (e.g. basic needs; ensure growth). This is also seen in the parenting tasks and tools that are offered in the apps, introducing the idea that parenting needs to be seen as a kind of job. The given information in parenting apps indicates what is important for the parent to know (i.e. developmental psychology and medicine) and applied to their situation. Here, algorithms

‘decide’ when particular information is shown to the parent and parenting apps claim that it is perfectly timed. Sometimes information is categorized (e.g. age categories), suggesting a particular understanding of what the parent should do to raise his children (e.g. mealtime & playtime; must know facts). In parenting apps there are also articles, tips, advice, etc. to inform the parent, indicating that there is a correct way to raise children, that certain outcomes are desirable and achievable. In parenting apps sharing intimate information is normalized, i.e. the need to show yourself or the child with others. The app recommends what is ‘important’ to share (e.g. milestones). Also, communities within parting apps are understood in a particular way. The apps create a particular ecological environment for the parent where similar ideas and stories are shared.

To finalize our analysis we described our findings against the background of an intergenerational perspective in the fourth chapter to formulate what parenting apps mean for the figure of the parent and what is left out in the current understanding of the parent-child relationship. We used different concepts to point to what is at stake in the intergenerational relationship as seen in the parenting apps (i.e. datafication, surveillance, self-tracking and self-governing, visualization, responsibilization and personalization, and professionalization).

For the figure of the parent this means that the parent is understood as an algorithmic assemblage, reduced to measurable aspects (i.e. statistical logic) and narrowed to the capabilities of parenting apps. Also, the parent is understood as a learning subject that needs to acquire the right set of skills and knowledge to ensure the optimal learning outcomes and health of the child, the parent as a ‘parenter’ (cf. Daly, 2013). In the context of parenting apps, the parent is seen as a quantified self, learning form his data for self-optimization. The parent is addressed as a vigilant closely looking at the development of the child and his own learning process, and as an executor, executing his parenting tasks coming from developmental psychology and medicine. Thus, parenting apps are intensifying the responsibilization and individualization aspects of the parenting discourse because of the capacities of the technological devices (e.g. monitoring, coordinating, managing). However, the parent himself as a person no longer seems to matter in the parent-child relationship. Everyone can track and do the necessary tasks for the child in order to ensure the outcomes (i.e. depersonalization of the figure of the parent). The parent-child relationship is seen as a parent or educator, his network, the child and the tried and tested scientific knowledge against which your data will be judged. The parent is situated in a created environment where data is the reference point for judgements and thus not society.

Parenting apps are capable of creating a particular context wherein parents understand themselves in a particular way. Apps can do this because of the algorithms they make use of, but this does not mean that algorithms have power. It is more like a kind of agency in shaping a particular reality that is produced again and again (e.g. push notifications), including or

excluding particular information, stimulating particular behaviour of the parent confirmed by the self-tracking and datafication processes of the parent. This means that algorithms can only produce the reality if there is data from the parent. Algorithms can be described as *eventful*, because they are capable of changing and are a product from the individual. In terms of governmentality this means that the individual maintains the continual feedback loop of the algorithms to keep up self-government. The parent himself is not forced to do this, but makes use of his own data to construct and modify the self (i.e. individual feedback loop). Parenting apps enter in the more private spheres of family lives, and thus are more pervasive and evaluative than books.

Constituting the parent in this way means that the complexities of the parent-child relationship and the potentialities that parents have are left out in the algorithmic system. Parenting apps narrow down the perspective of the pedagogical relationship, even more than the analogue parenting culture. This is problematic for understanding the parent as a pedagogical and political figure because parents are decontextualized and seen as link-minded individuals sharing the same ideas and stories. The parent is not seen as a moral agent within a social world (i.e. as a grown up, with views, values, uncertainties), and an historical background. His own values and judgements are ignored. In this logic parents no longer make choices for what they present and the representations of socio-cultural meanings are not contested by others (i.e. depoliticization of the figure of the parent).

To conclude, the perspective of the parent within an intergenerational relationship seems to be lost in current digital times as seen in parenting apps. The role of the 'educator' is oriented towards ensuring optimal learning outcomes in doing the right parenting tasks rather than 'upbringing' children (cf. Schleiermacher, Arendt, Cavell). The parent-child relationship is presented as a quantified and datafied relationship with only a few options to challenge the predictions that are made by the algorithm.

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