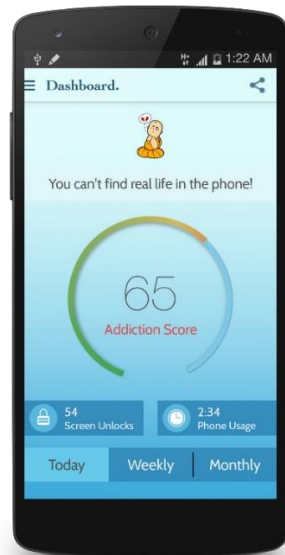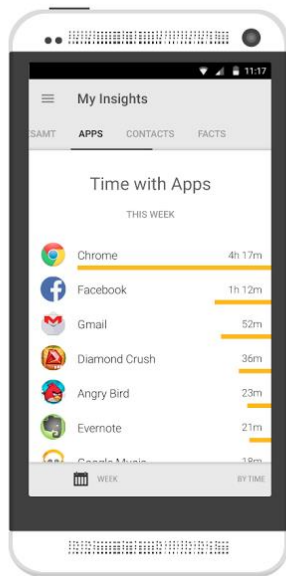# Smartphone addiction? *There's an app for that!*

How "smartphone addiction apps" frame smartphone addiction through discourse and affordances

- Chloë van Dosselaar -

(OFFTIME)

Find out what apps are keeping you from peace and productivity

Whenever you want to focus on your work, plant trees

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Abstract

There seems to be a recurring trend surrounding media consumption: after a new medium is introduced, discourses of critique and addiction emerge. Smartphone addiction applications - smartphone apps claiming to help you solve your smartphone addiction- are a symptom of this tendency. However, these apps are problematic because they point to a limited (solutionist and instrumentalist) understanding of smartphone addiction; their simplicity seems contradictory to the complexity of smartphone addiction. Moreover, they entail a problematic paradox; solving smartphone addiction by using a smartphone.

This thesis therefore engages with three smartphone addiction apps - *BreakFree, OffTime* and *Forest*- to understand how they frame smartphone addiction, from the perspective of media studies and sociomaterialism. Such apps are products of human decision-making and are therefore not neutral; they are underpinned by assumptions, norms and discourses already circulating in society (Lupton 2014). Hence, both a textual discourse analysis and affordance analysis are used to uncover how the apps frame smartphone addiction explicitly and implicitly through discourse (verbal rhetoric) and affordances (form/function and interface). In order to do so, I established a theoretical framework that outlines how (smartphone and internet) addiction is commonly understood in academic discourse. It also includes the notion of procedural bias, derived from procedural rhetoric (Bogost 2007), to uncover biases present in the apps' affordances. Moreover, the logic of quantification and gamification is outlined in order to criticize how these practices help to frame smartphone addiction in a restricted manner.

The analysis shows that the app developers overgeneralize smartphone addiction by creating juxtapositions between smartphone use and smartphone abstinence, and that they frame smartphone addiction as being caused solely by the technology instead of also the user. Moreover, the apps quantify smartphone addiction and imply that addiction is solely related to overuse, neglecting other (personal) factors. Lastly, the analysis shows that the apps implement affordances that contradict the aim of the apps themselves, such as the implementation of social buttons and push notifications, which again highlights the developers' lack of understanding smartphone addiction.

I argue that the apps are created by developers that do not have an elaborate understanding of smartphone addiction, hence creating apps that are unsuitable for the assessment, understanding and treatment of smartphone addiction. Moreover, this thesis adds to the academic discourse on three levels. On the discursive level, my research shows that the discourses of design and pathology in the case of the addiction apps are separated and need to be intertwined in order to develop valuable addiction apps. On a media-historic level, it demonstrates that the development of smartphone addiction apps is indeed a symptom of a recurring trend in media consumption. On the level of media studies, this thesis shows the value of applying the notion of procedural bias to the analysis of smartphone applications, in order to uncover how biases are expressed through affordances and how this creates meaning.

Keywords: affordances, discourse, gamification, instrumentalism, procedural rhetoric, quantification, rhetoric, smartphone addiction, smartphone application, sociomaterialism, solutionism

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1. Introduction

1.1 Smartphone addiction apps as a reaction to smartphones

In America, 77% of the population now owns a smartphone, comparing to 35% in 2011.[1] In the Netherlands, this was 69% in 2013 and 85% in 2015.[2] The introduction and the subsequent popularity of smartphones gave rise to a new discourse of critique: that of smartphone addiction (figure 1).

Figure 1: Amount of search queries for "smartphone addiction" in Google (worldwide) from February 2007-2017. Generated with Google Trends.

The fact that the introduction and development of smartphones generated a discourse of smartphone addiction is nothing new. Even in the nineteenth century there was a pathologization of reading, since reading did not correspond to bourgeois virtues; it was regarded as idle, dangerous and even deadly (Aselmeyer 2016, p.440). A more recent example are video games, which also brought with them narratives of violence and addiction (Lister et al. 2009, p.286). They are often seen as a threat to everyday life, encouraging anti-social play in violent and morally dubious computer environments and narratives (p.287).

Hence, there seems to be a recurring trend: after a new medium is introduced, discourses of critique emerge. In reaction to the issue of smartphone addiction, several app developers designed special smartphone applications to help people control their smartphone behaviour. These "smartphone addiction applications" as I would like to call them, seem to be a symptom of this tendency. This thesis is also a reaction to the discourse of

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[1] PewResearchCenter, "Record shares of Americans now own smartphones, have home broadband", January 12, 2017, http://www.pewresearch.org/fact-tank/2017/01/12/evolution-of-technology/.

[2] Telecompaper, "Groei smartphonepenetratie in Nederland vlakt af, nu 85%," March 4, 2016, https://www.telecompaper.com/nieuws/groei-smartphonepenetratie-in-nederland-vlakt-af-nu-85--1131643.

smartphone addiction, seen from the discipline of media studies which - unlike most studies- is not focused on the effects of smartphones. The focus will be more on the rhetoric of the smartphone addiction apps, since they entail an interesting but seemingly problematic paradox; solving smartphone addiction by using a smartphone. The aim of this thesis is therefore to critically analyse how these apps frame smartphone addiction, and to subsequently see if and in which way they are problematic and/or valuable.

More specifically, this thesis engages with these apps from a sociomaterialist perspective based on the work by sociologist and researcher in media studies Deborah Lupton. Sociomaterialism centres on humans' intertwining with technologies and goes beyond the emphasis on language and discourse to acknowledge the role played by material objects in social life and in concepts of selfhood and embodiment (Lupton 2016, p.32-33). These apps are sociocultural artefacts and are therefore not neutral (Lupton 2014). They are products of human decision-making, underpinned by tacit assumptions, norms and discourses already circulating in sociocultural contexts in which they are generated, marketed and used (p.607, 610).

Smartphone addiction apps include different elements such as text, visuals, sound, interface and functions, that have been implemented because of certain (un)conscious assumptions. Each of these elements can thus play a part in how smartphone addiction is framed. Sociologist Deborah Lupton (2014) therefore stipulates the importance of analysing apps both in terms of content (text and visuals) and affordances, since they can tell us about what is considered important and what strategies are privileged to treat the medical condition (p.611).[3] However, although Lupton emphasizes that the affordances of apps structure the way in which the apps are used and the meanings that are ascribed to them, she does not elaborate on how exactly the affordances work to create specific meanings and rather focuses on verbal and visual rhetoric (ibid.).[4] So, Lupton's research also highlights the need for more precise research on the affordances of apps, especially in relation to verbal rhetoric. I therefore chose to use both a textual discourse analysis and an affordance analysis to uncover how both verbal rhetoric and affordances (together) frame smartphone addiction. The main question that will be at the centre of this thesis is therefore: *How, and in which ways, do the smartphone addiction apps BreakFree, Forest and OffTime frame smartphone addiction?*

The main research question has been answered through the following sub-questions:

1. How does the verbal rhetoric of the apps and their developers frame smartphone addiction?

2a. How do the affordances of the apps in terms of form/function frame smartphone addiction?

2b. How do the affordances of the apps in terms of interface frame smartphone addiction?

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[3] Lupton investigates the developers' representation of ten popular medical and health apps in order to illustrate what assumptions, norms and discourses are present in - and created by- these apps in regard to social, cultural and political dimensions. Within each app description, Lupton looks at the included approaches, appeals to authority, use of text, use of imagery, and details provided about the developer. By doing so, she for instance discovered the lack of information about data privacy and security, and uncovered the discourse of healthism that was reflected by the many health and fitness concerns addressed by the apps.

[4] Lupton does address how affordances create meaning in her article on sexual and reproductive self-tracking apps (2015). For example, she uncovers that these apps primarily use numbers to present bodily knowledge, which reduces sexual activity to numbers (p.446). However, in this article Lupton barely touches upon the verbal rhetoric used within the apps, except for briefly mentioning the verbal rhetoric that is used to promote the apps. Again, this article shows the potential but also the need of connecting affordances with verbal rhetoric in order to better understand how apps create meaning.

So, this research looks at three distinct smartphone addiction apps: *BreakFree*, *Forest*, and *OffTime*. In order to interpret and evaluate the way these apps frame smartphone addiction, the first part of the theoretical framework (chapter 3.1) describes how smartphone addiction, internet addiction and addiction in general, are often understood in academic discourse to highlight the shortcomings of the smartphone addiction apps. The framework also describes procedural rhetoric in more detail (chapter 3.2). Moreover, I use the concept of procedural rhetoric in a more specific way; not as a general mode of expressing something through procedures (Bogost 2007), but as the creation of certain biases through procedures. This will also be discussed in the framework (chapter 3.2). The framework also outlines the logic that is often part of self-tracking applications, specifically in relation to gamification and quantification (chapter 3.3), which helps to criticize the role of these practices in the framing of smartphone addiction.

The thesis statement central to this research is that the all three apps frame smartphone addiction in a simplistic and overgeneralized way, making these apps unsuitable for the assessment, understanding and treatment of smartphone addiction. Instead of fostering a profound understanding of smartphone addiction, they perpetuate a solutionist and instrumentalist logic that is part of our zeitgeist. Moreover, especially through quantification and gamification other aspects of the addiction, such as the situation of the user, are neglected.

In conclusion, this thesis adds to the academic discourse on three levels. On a discursive level, I show that discourses of design and pathology in the case of addiction apps are separated and need to be intertwined in order to create more valuable addiction applications. On the level of media studies, I demonstrate that the notion of procedural rhetoric is not sufficient to describe and interpret media, like smartphone applications. Instead, the notion of procedural bias is more useful as it is a more specific approach and helps to understand how certain affordances entail biases which implicitly help to create meaning. On a media-historic level, I argue that there is indeed a recurring trend where every time a new medium or technology is introduced, discourses of critique and addiction emerge as a reaction, which the smartphone addiction apps are part of.

1.2 The problem of smartphone addiction apps

It is necessary to analyse these smartphone addiction apps, because they are problematic in different ways. First, the issue of solving smartphone addiction is addressed by app developers instead of society, which is problematic because these apps are created out of commercial interests and - as the analysis will show- are developed by people who only have knowledge about app design.[5] Hence, it is expected that these apps do not foster a profound understanding of smartphone addiction which makes them unsuitable for treating smartphone addiction.

Second, smartphone addiction is really complex and so the simplicity of smartphone addiction apps seem contradictory to the complexity of the addiction itself. Such apps thrive in our current *technopoly:* a society

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[5] This might be because addiction has not yet been fully recognized as a pathological problem in western countries. For example, the government in The Netherlands does not intervene with smartphones users, while other addictions such as smoking have led to several regulations, including smoking zones. In South Korea however, the problem of smartphone addiction is taken more seriously; the government developed a monitoring app called "Smart Sheriff" that smartphone users under the age of nineteen have to install so that their web activity is monitored and their parents can control their smartphone usage. For more information, visit: http://www.bbc.com/news/technology-33091990.

in which the culture seeks its authorisation in technology, finds its satisfactions in technology, and takes its orders from technology (Morozov 2014, p.323). According to professor in gambling studies Mark Griffiths, smartphone addiction is rare: "Just because something is very important in your life, and you carry it everywhere, and when you forget it, you feel like your left arm's missing, that does not mean that you're addicted."[6] In regard to academic research, Min Kwon et al. (2013) were the first to develop a self-diagnostic scale to measure smartphone addiction which differentiates between six elements of addiction: daily-life-disturbance, positive-anticipation, withdrawal, overuse, tolerance and cyberspace-oriented relationship. Before the age of smartphones, Bianchi and Phillips (2005) already developed the Mobile Phone Problem Use Scale (MPPUS) which highlighted the interrelations between problematic mobile phone use and extraversion, self-esteem, gender, and age. Similarly, the research by Bian and Leung (2014) pointed to a connection between smartphone addiction and personality (shyness and loneliness), as well as social capital. These researchers, among others (Kim 2013; Choi et al. 2014; Yu-Hsuan Lin et al. 2015; Pearson and Hussain 2016), show that smartphone addiction is not only related to overuse, but to many other factors, which makes it also complicated to solve. Hence, smartphone addiction apps seem problematic because they point to a solutionist and instrumentalist understanding of smartphone addiction, assuming that complex human problems can be recast as neatly defined problems with definite, computable solutions (Morozov 2014, p.5).

Third, research on solutions for smartphone addiction is limited, and research on smartphone addiction apps is dominated by the app developers themselves. Hyunna Kim (2013) is the only one within academic research who looked into treatment for smartphone addiction, and argues that because smartphone addiction often includes both physical and psychological problems, both exercising as well as psychological/cognitive treatments can help to beat smartphone addiction. Michael Savic et al. (2013) and Nicole Wisser et al. (2015) are one of the few who did research on other addiction apps, such as apps aimed at beating drug addiction. Their research gave some insights in the functions, focus points and user experiences of such apps. Still, Markus Löchtefeld et al. (2013) are the first within academic discourse to recommend a smartphone addiction app to solve smartphone addiction. This is no surprise, since they are the designers of the smartphone addiction app "AppDetox". It is problematic that the academic discourse of smartphone addiction treatment is both limited and dominated by the developers of smartphone addiction apps, because they most likely frame smartphone addiction (apps) in ways that serve their interests as app developers.

Hence, it is important to be more critical towards these smartphone addiction apps and analyse the rhetoric used by these apps to see if they indeed lead the discourse of smartphone addiction in a particular direction, and in which way. In doing so, this research adds to the discourse of smartphone addiction apps and smartphone apps in general; it shows how such apps are creating specific meanings- explicitly and implicitly - through both discourse and affordances. Moreover, Lupton (2014) highlights the need for more research on the practices and tacit assumptions of app developers and designers, and the companies that commission apps (p.618). By looking at how smartphone addiction is framed in the apps, this thesis also provides insight into the assumptions of the app developers concerning smartphone addiction.

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[6] Digital Trends, "Is smartphone addiction real? We ask the experts," November 1, 2015, http://www.digitaltrends.com/mobile/is-smartphone-addiction-real/.

2. Methodologies and methods

The main method used to answer the research question is a comparative textual analysis, since this thesis compares three different smartphone addiction apps which are understood as texts. A "text" in this case means a cultural artefact that is used to make sense out of our lives (Brennen 2012, p.193). A textual analysis is based on a similar notion to Lupton's sociomaterialism, because it assumes that these texts provide traces of a socially constructed reality (ibid.). Hence, a textual analysis helps to evaluate the meanings found in a text and how these help to create our social realities (ibid.). So, in this thesis the apps are understood as texts that create a certain representation of smartphone addiction.

More specifically, this comparative textual analysis combines a textual discourse analysis with an affordance analysis. The former is used to answer sub-question 1, the latter is used to answer sub-questions 2a and 2b. Although I first executed a preliminary research in which each of the two methods were used separately, the two methods were combined to form the actual analysis.

2.1 Textual discourse analysis

2.1.1 Methodology: language as an active and constructed tool

The first sub-question on how smartphone addiction is framed through verbal rhetoric has been answered through a textual discourse analysis; an approach of discourse analysis rooted in the discipline of linguistics which focuses on how the specific use of language functions to make meaning (Gee 2010, p.8). This approach is based on the building tasks of language by socio- and psycholinguist James Paul Gee (ibid.) and can be understood as part of the first level of Norman Fairclough's three-dimensional model of communication; the text (1992). This approach lends itself for my research question because it solely focuses on the analysis of verbal rhetoric, which enabled me to interpret the language the developers use in more depth, in order to see how they both explicitly and implicitly frame smartphone addiction. This approach does not consider the relation to larger discourses (intertextuality and interdiscursivity), nor the relation to social structures and power, which is also not part of the research question and the aim of this thesis.

Discourse analysis in general is based on Foucault's notion that knowledge and our truth are not reflections of reality but discursive constructions (Jørgensen and Phillipps 2002, p.13). In *The Archeology of Knowledge* (1972), Foucault actually states that discourse consists of "practices which systematically form the objects of which they speak" (p.54). Discourse analysis therefore tries to uncover how certain meanings are created and shaped, instead of uncovering "the truth". This thesis is thus based on the assumption that choices made by speakers are (un)consciously principled and systematic, and are ideologically based (Júlia Todolí et al. 2006, p.9). Language is not a passive medium, but an active and constructed tool that co-constitutes the world around us (Littlejon and Foss 2009, p.313). Accounts of reality are necessarily selective and should therefore be understood as constructions rather than reflections (ibid.). The building tasks by Gee (2010) together with several rhetorical devices mentioned by Todolí et al. (2006) and Baker and Ellece (2011) were used as a method to

structurally analyse the verbal rhetoric of the apps. Although I am not a linguist and this thesis does not go into all linguistic details of the texts, these rhetorical devices offered a way to structurally find and interpret what- and especially how- meanings are created.

2.1.2 Method: building tasks and rhetorical devices

Gee (2010) discerns between seven "building tasks" (or functions) of language: *significance, practices/activities, identities, relationships, politics, connections, and sign systems and knowledge.* Each of these areas can be looked at within a discourse analysis, because they are concerned with how language creates certain areas of reality, such as identity. This thesis focuses on four of them, because they proved the most relevant during the preliminary research (see appendix 7.2). *Significance* has to do with the way language is used to make certain things significant (or not), and in which ways (p.17). This for instance helped me to see what aspects of smartphone addiction are deemed (un)important. *Politics* has to do with how language creates a certain perspective on social goods (p.19). "Social goods" in this case means anything a person or group in society wants and values (p.211). It is concerned with what is taken to be "normal", "right", "valuable", "the way things ought to be", et cetera. This for example showed me how the apps frame themselves as a social good, which pointed to a solutionist and instrumentalist perspective on smartphone addiction. *Connections* is concerned with how language connects or disconnects things in order to make one thing relevant or irrelevant to another (p.19). This helped me to uncover how smartphone usage is juxtaposed to smartphone abstinence, which subsequently frames smartphone addiction as a problem. *Sign systems and knowledge* refers to how language (dis)privileges specific sign systems or different ways of knowing and believing, or claims to knowledge and belief (p.20). This enabled me to see that the apps regard quantification as more insightful than human knowledge and reflection.

Next to these building tasks, I drew on the rhetorical devices as described by Júlia Todolí et al. (2006) which are derived from the work of Fairclough, and rhetorical devices as described by Baker and Ellece (2010). This enabled me to analyse the texts in more depth and helped me to find specific examples of how certain use of language helps to frame smartphone addiction. These devices also helped to answer the questions related to the four building tasks. As with these building tasks, not all rhetorical devices proved to be relevant for the analysis. One aspect I did look at is *vocabulary* (p.12) which entails the use of metaphors and words with specific connotations. This for instance enabled me to see how metaphors and words with positive and negative help to create an opposition between smartphone use and smartphone abstinence. I also looked at *mood/modality* (Todolí et al. 2006, p.13) which is concerned with the "mood" of the sentence: declarative, imperative, or interrogative. This can point to certain propositions, for instance on how something should be, using words such as "should", "will", "must" and "shall". It is also relevant to look at what *presuppositions/assumptions* (p.13-14) are made that are not explicitly stated and which are thus taken for granted. This can point to certain ideologies within a text (Fairclough 1995, p.6). For instance, this helped to see that especially OffTime and BreakFree presuppose that smartphone addiction can be quantified. Furthermore, I also looked at *agency* (Baker and Ellece 2011, p.4-5) which is concerned with the representation of how characters or objects are represented in relation to each other. Who is represented as the Agent (someone who carries out an action) and who is represented as an object/goal. This enabled me to see how Forest and OffTime, in contrary to BreakFree, frame the user as having

control over the smartphone addiction instead of solely the app. Last but not least, it is important to look at certain topics that we might expect to find but are not mentioned. These *absences* (p.1) can show how certain (important) aspects are omitted, which highlights aspects that are deemed (un)important in regard to smartphone addiction. For example, absences in the discourse of all three apps show that the personal situation of the user is not touched upon. It is important to note that these rhetorical devices as well as the building tasks are not strict categories but often overlap and create meaning together, which is reflected in the analysis.

2.1.3 Limitations

The limitations of a textual discourse analysis is that it cannot provide answers as to why texts are produced the way they are, because a discourse analysis cannot show causal relationships. This research could therefore benefit from an ethnographic research that interviews the developers behind the apps to gain insights into the reasoning behind their rhetoric, and to better understand why the apps are the way they are.

Moreover, textual discourse analysis involves a lot of interpretation. The outcomes of the analysis are based on my (cultural) background and are thus influenced by me. However, there is no such thing as an "objective" analysis of a text, since our ability to know what is "there" is inevitability limited and partial (Fairclough 2003, p.14). The questions we ask necessarily arise from particular motivations (p.15), which are clearly described in the introduction chapter. Also, other researchers can check if they find similar things by consulting the matrices I set up to flesh out my analysis (see appendix 7.2).

Moreover, the goal of this discourse analysis, and this research in general, is not to present a truth but to provide new perspectives through the use of specific theoretical and methodological foundations, which hopefully stimulates further research into the analysis of (smartphone addiction) apps and smartphone addiction. The limitations of this thesis will further be mentioned in the discussion chapter (6.1).

2.2 Affordance analysis

2.2.1 Methodology: technologies are not neutral

In order to answer to the second sub-question on how the affordances of the apps frame smartphone addiction, three addiction apps were analysed using an affordance analysis. Affordances provide a critical lens to analyse what (implicit) assumptions are present within the design of smartphone addiction apps.

It is important to look at affordances of technologies, because as sociologist Bruno Latour stipulates, technologies are not neutral instruments (1991). Latour gives the famous example of the bulky hotel key which - because of its clumsy size- stimulates the hotel guests to bring the key back to the hotel manager (p.104). The term was coined in 1977 by psychologist James J. Gibson. He describes *affordance* as "that what it offers the animal, what it provides or furnishes, either for good or ill" (2014, p.56). With this concept, Gibson could describe the relationship between animals (humans) and the environment.

In order to specifically analyse the interaction between humans and technologies, designer Donald Norman (1990) elaborated on Gibson's definition. He placed the concept of affordances in the context of design

and by doing so highlighted the perceptibility of affordances. According to Norman, affordances (implicitly) point to the perceived and actual elements of a "thing", mainly the fundamental properties that determine how that thing could be used (p.9). His notion of affordance is thus design-centred and focused on how technologies can be designed to stimulate and/or limit certain behaviour.

However, it is important to note that affordances do not determine certain behaviour, but instead are functional and relational aspects which frame the possibilities for behaviour (Hutchby 2001, p.444). Hence, affordances point to the relationship between properties of the environment and the possibilities for action it allows (Gaver 1992. p.18). For instance, the Forest app implements a leaderboard (the property) which allows for competition between users (action). This, then point to the implicit assumption that smartphone addiction is comparable and hence that it does not relate to personal aspects.

In contrary to Norman however, professor in communication design William W. Gaver (1991) highlights interaction instead of perception, by stating that affordances are independent of perception; they can exist whether the perceiver cares about them or not, or whether they are perceived or not (p.80). Gaver therefore differentiates between hidden affordances and perceptible affordances, and stipulates that affordances are primarily facts about action and interaction, not perception (Gaver 1996, p.114). This is because a perceptible affordance can indicate a new affordance, which Gaver calls "sequential affordances" (Gaver 1991, p.82). This perspective on affordances is important, because it shows that in order to analyse how affordances create meaning, these affordances have to be interacted with. This is especially important in relation to procedural rhetoric, since procedures are created through a number of actions provided by affordances. That is why I used all available option in each app for several days in order to "actively explore" the affordances. Hence, this thesis is focused on the perceptible affordances that I perceived by both looking at and using the functions and interface of the apps.

2.2.2 Method: form/function and interface

The affordance analysis in this thesis starts as what Bucher and Helmond (2017) call a "low-level" or "feature-oriented" affordance analysis, which is based on Norman's design-centred understanding of affordances (p.12). This means that I first set up a matrix in which I describe the affordances of each app and what each of these affordances imply (see appendix 7.2). This then helps to create what Bucher and Helmond call a more abstract or "high-level" affordance analysis (ibid.), in which I analyse how and in which ways the affordances frame smartphone addiction (chapter 4).

The affordance analysis is based on the six-dimensional model of media by Nick Montfort and Ian Bogost which is part of Platform Studies (2009b). Similar to Lupton's aforementioned sociomaterial perspective, platform studies recognizes that not only the user's experience, but also interface, form/function, code, and platform of a medium, are fully embedded in culture (p.4-5). However, Montfort and Bogost focus on the programmability of platforms and how software affords this programmability as a way of becoming a platform, which is not relevant for this thesis. Still, their description of how a medium such as an app is built up, showed me which affordances are available for me to analyse and which affordances need to be analysed in order to answer my research question. These are the affordances on the level of form/function and interface.

Montfort and Bogost recognize five levels of a digital medium, which are: *the platform, code, form/function, interface* and *reception/operations* (2009a, p.145). The form/function is the level dealing with the core of the program and includes the rules, the nature of the simulation and the abilities of the computer-controlled opponents (p.146). Hence, I applied the notion of procedural bias to analyse how such rules and functions create processes that entail particular biases, and which help to frame smartphone addiction in a particular way. This will be further explained in the theoretical framework (chapter 3.2). So, by looking at the form/function of the apps, I was able to analyse how affordances implicitly frame smartphone addiction.[7]

The interface is the level on top of the form/function and entails the relation between the user and the core of the program, as it sits between the two (ibid.). The interface communicates the information of the system to the user through a (primarily) graphical overlay, and acts as a control scheme (Mandiberg 2012, p.61). Hence, the interface is the representation element, constituted from text, sound and/or graphics, which presents the system information or explains the system behaviour, which allows the user to interact. Thus, the interface offers perceptible affordances as it presents information about objects which may be acted upon (Gaver 1991, p.81). It is therefore important to also look at affordances in terms of interface.[8]

2.2.3 Limitations

A limitation of my specific approach to affordance analysis, is that this method cannot say anything about how the apps are actually used (the reception/operations level) and therefore cannot make any claims about the effects of such apps. However, looking at the effects of the apps is not the aim of this thesis. The focus is on how these apps can and cannot be used, where emphasis is placed concerning usage, and how creates certain (implicit) assumptions. This may then can point to a certain framing of smartphones and smartphone addiction.

Because the affordance analysis is based on perceptible affordances that I perceived by both looking at and using the functions and interface of each app, the analysis is influenced by my own usage and interpretations. This is also stipulated by Gaver (1991): "the actual perception of affordances is determined in part by the observer's culture, social setting, experience and intentions" (p.81). However, the introduction offers clear insights into my motivations and reasoning, and the analysis is based on theoretical foundations from previous research. Moreover, I added the matrix I used for the preliminary research of the affordances in the appendix (7.2), so researchers can check if they find similar things. The limitations of this thesis will be further touched upon in the discussion chapter (6.1).

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[7] For example, the Forest app contains a rule that the user gains credits through smartphone abstinence. Combined with the function to plant a virtual tree with these credits, the app creates a significant procedure. This procedure implicitly frames smartphone use negatively as something destructive and disturbing, and contrasts this to nature.

[8] For instance, BreakFree and OffTime use scores to represent the user's smartphone behaviour, which frames smartphone addiction as an integral quantity instead of something that is constituted from several interlocking (personal) factors.

2.3 Case study: "smartphone addiction apps"

In order to get an elaborate understanding of how smartphone addiction applications frame smartphone addiction, I chose to analyse three apps: *BreakFree, OffTime* and *Forest.* This allowed me to compare the rhetoric and see if there are overarching patterns and discourses present within these apps. Analysing different apps also helped to provide an even more nuanced view of how such apps frame smartphone addiction in different ways. I chose these three apps because they are all very different from each other, which helped to find more diverse and interesting outcomes.[9]

- *BreakFree* by Mrigaen and Nupur Kapadia (India): I chose this app because it explicitly states that it is aimed at beating smartphone addiction and because it is a very popular app with over 15,000 ratings on the Google Play Store. *BreakFree* measures an "addiction score" in real-time based on the number of "unlocks" and the duration of smartphone use. This score is divided into three levels of addiction: green, yellow and red. The user can review the average device usage time and addiction scores of each day, week and month, in the form of column charts. The user can earn achievements by maintaining a low (green) addiction score. *BreakFree* affords the user to block notifications, disable internet connection, reject phone calls, send auto-texts, and whitelist specific apps. These functions can be scheduled. It is the only app that uses a character, which acts like a coach by sending reminders about the user's smartphone behaviour. This app is the least extensive of the three, as it contains less functions than Forest and less data visualizations than Forest and OffTime.

- *OffTime* by OFFTIME GmbH (Germany): This app was chosen because with its 12,000 ratings on the Google Play Store it can also be considered a popular app, and because it offers way more insights into behavioural data than BreakFree. The user can view data visualizations of his/her app usage, device usage and "OffTime scores". These can be viewed for each day, week and month. The app also provides the user with a (short) summary of the user's behaviour of that day. Similar to Forest, the user can set or schedule an "OffTime" (smartphone abstinence session) during which the smartphone cannot be used and certain functions are blocked according to the choices of the user (block certain calls and push notifications, send auto-text messages, et cetera). As with Forest, OffTime allows to set a specific profile/tag to each session, such as "family time". Unlike Forest and BreakFree, OffTime provides the user with a list of missed smartphone activity to prevent FOMO (fear of missing out). Similarly to BreakFree, the app calculates an "OffTime score" also based on the amount of unlocks and the total device usage time. The user can also set a goal/daily limit of smartphone minutes during which the app sends reminders about excessive usage. Similar to Forest, OffTime offers the user a comparison of data from other app users. Unlike the other two apps, OffTime does not make much use of gamification.

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[9] In the appendix (7.1) you can find a table with all smartphone addiction apps that are available to download for your smartphone, including a short description from the Google Play Store and the number of ratings.

- *Forest* by ShaoKan Pi (Japan): This app is the most popular with more than 41,000 ratings in the Google Play Store. I regard this app as a hybrid between the other two apps, because it makes use of gamification like BreakFree, and offers the user a lot of data visualizations like OffTime. Similar to OffTime, the user can set a "planting session" (smartphone abstinence session). For each session, the user will be able to plant at least one virtual tree that he/she can plant in a virtual forest that renews every day. Hence, during each session the user cannot use his/her smartphone, otherwise the growing plant will wither and the forest will show a dead tree. The user earns credits with each planting session, which allows the user to unlock new plant species and ambient sounds. The user can even spend credits to let a special organization plant a real tree in Africa. As with OffTime, the user can block certain functions of the smartphone during the session. However, the user cannot schedule sessions. Forest also provides data visualizations of each day, week, month and year, showing the average smartphone usage duration, and the times one has been present and absent. The user can set a tag/profile and a note to each planting session, which the user can review and filter in the data summaries. The user can share his/her forest via other apps and add friends. The app also makes use of global and friend-based leaderboards, as well as achievements.

Because all three apps contain very little text (of which most of it is part of the interface) I chose to analyse the verbal rhetoric of the corresponding websites, which contains more detailed information. I chose not to analyse the app descriptions because they are almost identical to the content on the websites and are less extensive. As the information on the Forest website was also limited, I used the app's description in the Google Play Store instead, containing some extra useful information. On the other hand I did not take the description of the app's functions in consideration because they will be touched upon in the affordance analysis. Hence, the app description of Forest is limited comparing to the content of the websites from BreakFree and OffTime, which resulted in less interpretations on Forest's verbal rhetoric.

Within these texts, I only analysed the textual/verbal rhetoric and disregarded visual rhetoric, such as images and videos, because a textual discourse analysis only focuses on text.[10] In regard to BreakFree, only the homepage describes the app, so only this webpage was analysed. In regard to OffTime, I analysed both the homepage and a second page called "Big Picture", which provides more general information about the context in which the app was developed.

In regard to affordances - as mentioned earlier- I focused on the form/function and the interface of each app, since it is impossible to get information about the software and the main research question is not concerned with the reception/interpretation of the apps. The hardware of the smartphone I used will also not be touched upon, because this research is focused at affordances related to design instead of materiality.

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[10] The affordance analysis (in terms of interface) will touch upon some visual aspects.

2.4 Approach and preliminary research

Each app was installed and used on an Android smartphone (OnePlus 3 with Android 7.0), since most apps were not available (in full version) on iOS. For all three apps I purchased full access to all features. Since I do not own an Android smartphone myself, the apps were mostly used by my friend who owns the Android smartphone on which the apps were installed. Hence, his behavioural data is not representative of the behaviour of someone who is actively using the app and trying to solve his/her smartphone addiction. Still, I actively explored all functions of the app myself, which did provide clear insights into how the affordances frame smartphone addiction.

To structure the analysis and because I did not know from the start what text and affordances were going to be relevant, I started with a preliminary research (appendix 7.2). In order to do so, I set up two types of matrices based on the rhetorical devices, and the distinction between form/function and interface. I also added an extra row for serendipitous findings, so that my analysis would not be constrained by these choices.

The first matrix is based on the first sub-question: how the verbal rhetoric of the apps frame smartphone addiction. The rhetorical devices were placed in the first column. In the second column I wrote down the particular word or (part of) the sentence in which I saw something interesting and/or relevant. In the third column I wrote down a quick interpretation. It is important to note that not all texts explicitly referred to smartphone addiction. Nevertheless they helped me to uncover how smartphone addiction is framed implicitly.[11] After filling the matrix, I began highlighting salient and important topics in different colours. Because I used this matrix for each app separately, this allowed me to easily compare the three apps and highlight the most important themes in the analysis itself.

The second matrix is based on the second sub-question: how the affordances of the apps in terms of form/function and interface frame smartphone addiction. In the first column I wrote down all functions I perceived by using the app. In the second column I wrote down the interface element(s) that are connected to the functions. However, some functions and some interface elements were interpreted separately because they created meaning "on their own", while others were not. Still, although I wrote down the affordances in separate rows, it is important to note that affordances often create meaning together. I therefore highlighted overlapping themes in order to see how affordances work together to frame smartphone addiction, and to easily compare the three apps. Similar to the verbal rhetoric, not all affordances might directly point to a framing of smartphone addiction, but were still described and to see how smartphone addiction is framed implicitly. This also helped me to not restrict my research outcomes. Moreover, in the actual analysis I focused on the limitations of the apps' affordances, since Bogost (2007) states that procedural rhetoric also refers to the actions that cannot be performed (p.4)

The matrices allowed me to quickly identify similarities and differences between discourse and the affordances of each app. In the end, not all interpretations within the matrices were used in the analysis itself. The interpretations that I specifically refer to in the analysis are highlighted in the matrices by a thick black border. The outcomes of this preliminary research were further fleshed out in the main analysis, where I paid more attention to connecting the rhetoric of the apps with my theoretical framework and the buildings tasks.

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[11] For instance, the juxtapositions of technology and humans in general eventually pointed towards a simplistic and overgeneralized framing of smartphone addiction.

3. Understanding smartphone addiction apps

3.1 Understanding (smartphone) addiction

In order to be able to interpret and criticize the ways in which the smartphone addiction apps frame smartphone addiction both through discourse and affordances, this chapter gives a short description of how addiction in general, internet addiction and smartphone addiction are understood in academic discourse. This chapter provides a way to place the addiction apps in current discourses in order to analyse and criticize the way these apps frame smartphone addiction.

3.1.1 What is "addiction"?

It is not easy to define what addiction is, because there are a lot of different types of addictions, which are being studies in various disciplines, such as psychology, media studies and law. However, the goal of this chapter is not to give one definition of addiction. It is to provide a more profound understanding of addictions, by looking at different elements that can cause and are caused by addiction, how addiction differs from heavy use, and how addiction is framed differently in different contexts.

Philosophers and psychiatrists Sinnott-Armstrong and Pickard (2013) try to tackle the question of what addiction is, and start by stating that addiction takes on many forms: there is a wide variation in who is addicted, what they are addicted to, and the precise form, health effects, and motivations for the addiction (p.851). People can get addicted to substances such as drugs, but also to certain forms of behaviour such as (online) shopping, gambling, and smartphone addiction. In regard to who gets addicted, addiction occurs across levels of socioeconomic status, intelligence, and education, but also age, childhood abuse, stress, psychiatric disorders (such as personality disorders), and religion (p.851-852). However, the analysis shows that both the verbal rhetoric and affordances of the three smartphone addiction apps reflect a lack of understanding smartphone addiction in relation to the user.

Because there are many variations of addiction, there are also many definitions. Sinnott-Armstrong and Pickard stipulate that the dictionary definitions are often useless or misleading, because they can be very loose and vague (p.852). For example, the dictionary often explains addiction in terms of "common usage" which is often not equal to addiction as I will explain later in this chapter. When looking at the addiction of a substance, such as drugs, the authors describe seven elements of addiction of which at least three have to occur within one year time: tolerance; withdrawal; using more than was intended; persistent desire or unsuccessful efforts to control use; a great deal of time spent obtaining, using, or recovering; reduction in other important activities because of use; and continued use despite knowledge of it causing persistent physical or psychological problems (p.853). These aspects come from the *Diagnostic and Statistical Manual of Mental Disorders* (2000), which is often referred to in academic research, and as we will see also forms the basis for most academic research on internet and smartphone addiction.

Because the addiction can entail several different symptoms, the treatment for addiction is symptom dependent (p.854). For example, a drug user who develops withdrawal and experiences anxiety, is likely to require management of withdrawal symptoms, and medication and/or cognitive behaviour therapy for anxiety. Hence, ideally smartphone addiction apps should offer various options to treat specific elements of smartphone addiction.

What is also important when understanding addiction, is to know the difference between heavy use and addiction, as already stipulated by Mark Griffiths in the introduction. Sinnott-Armstrong and Pickard argue that the difference is control, which can be identified in three of the seven elements of addiction stated above: using more than was intended, persistent desire or unsuccessful efforts to control use, and continued use despite knowledge of it causing a persistent or recurrent physical/psychological problems (p.856). By control in this context the authors mean lacking the degree of control that we normally expect people to have over their behaviour (ibid.). Hence, they state that addiction is a strong and habitual want that significantly reduces control and leads to significant harm (p.860). The authors emphasize that control and harm come in degrees; addicts have some control over their choices and actions, but they do not have full or normal control and therefore less control than non-addicts. (p.862).

Another important point is that the line drawn between addicts and non-addicts differs per context, as various people have various purposes (p.862). For example, courts draw the line relatively high in order to count fewer people as addicts and thereby hold more people responsible for crimes (ibid.). Private citizens might draw the line relatively low in order to count more of their friends as addicts so that they can find more ways of maintaining good relations and offering care and support (ibid.). This highlights the importance to keep in mind that the smartphone addiction apps are made by (independent) developers that made the app to make money, by which lowering the line would seem relevant.

Thus, the context in which the apps are made provides some reason why these apps frame smartphone addiction in a more general and simplified way. However, although the authors argue that this variation in drawing the line between addict and non-addict is legitimate, it is still important to be explicit about how we understand addiction, and avoid temptation to ask and answer overly simplistic questions about whether or not a person is really an addict (p.862-863). Hence, although it makes sense that the smartphone apps might draw the line between addiction and non-addict relatively low, they should also recognize that addiction comes in degrees (in terms of control and harm).

3.1.2 Internet addiction

Because of the multimediality of smartphones, smartphone addiction is closely related to other addictions, such as internet addiction, game addiction, or social network addiction. This section focuses on internet addiction in particular, because research that has been done on smartphone addiction so far is largely based on internet addiction research. By describing internet addiction in more detail helps to critically analyse the way the smartphone addiction apps frame smartphone addiction.

The research of Kimberly S. Young (1999) offered the first insights into criteria for internet addiction and forms the basis for a lot of later research concerning addictions. In her article, Young describes components of

Internet addiction and subsequently describes how you could treat the addiction. She identifies four types of triggers that can cause internet addiction: applications, feelings, cognitions, and life events.

Internet addiction is often caused by a particular application. Young therefore suggests that the clinician needs to determine which applications are most problematic for the user (p.7). This can be done by looking at the extent of use of particular applications. However, it is also necessary to ask the person what application is regarded as the most and least important, and what specific elements of the application itself are liked (ibid.).[12]

Furthermore, internet addiction can be caused by the mental pleasure that it offers the user, such as feelings of excitement, euphoria and exhilaration (p.8). Hence, the clinician should ask how the user feels when he/she is offline, in order to review the responses and determine if these are mostly negative, such as "worried" and "lonely" (ibid.). This could then be compared to the answers on the question of how the user feels when he/she is online. If these are mostly positive, this indicates that the Internet alters the user's mood. The user could also keep a diary to better express and understand the emotions. However, my findings show that the smartphone addiction apps do not pay much attention to the feelings of the user and his/her reflection on it.

Deeper cognitive problems can also cause the addiction, such as low self-esteem and clinical depression (p.9). Young suggest that clinicians should therefore evaluate if the user maintains deep core beliefs about him/herself, such as "I am no good" or "I am a failure", in order to determine if these may contribute to their internet addiction (ibid.). Again, the smartphone addiction apps analysed in this thesis do not pay attention to these "internal" problems that differ per user, but rather focus on external problems such as (hyper)connectivity.

The life situation of the person can also cause internet addiction, such as the feeling of a lack of satisfaction, the absence of intimacy or strong connections to other people (ibid.). Hence, Young suggests understanding the current situation of the user in order determine if the internet is used to avoid unhappy situations, to eventually evaluate if he/she is addicted or not. As my research demonstrates, external factors that stand in relation to the user are not touched upon by the app developers and are not taken into account into the affordances of the apps.

Young furthermore stipulates that treating internet addiction is not the same as treating other (substance) addictions, because internet use is an integral part of our everyday life - both at work and at home- which cannot be ignored completely. Hence, abstinence is not a solution for internet addiction and instead the treatment should focus on moderation and controlled use (p.10). Young suggest seven methods based on previous research (p.10-14): let the user disrupt his/her normal routine and re-adapt new time patterns of use in order to break the habit; use external stoppers, such as setting session times or using an alarm; set goals, for instance by scheduling internet use; abstain from a particular application; use reminder cards to stay focused on the goal, for instance by listing major problems that were caused by the addiction and listing the major benefits; develop a personal inventory of what he/she had to cut down on because of the addiction; enter a support group; and family therapy. The analysis shows that some of these features, such as external stoppers, are implemented into the design of the apps, but other (more reflective) features are lacking.

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[12] Hence, the fact that BreakFree and OffTime afford the user to block specific apps point towards an understanding of smartphone addiction as something that is caused by specific applications. However, the user is not asked to reflect on this. For instance, reflecting on what elements of the app exactly are addictive, or reflecting on the good elements of the app, could help to better understand and treat the addiction.

3.1.3 Smartphone addiction

As mentioned in the introduction, Kwon et al. (2013) developed the first self-diagnostic scale for measuring smartphone addiction: the SAS-scale. This scale is largely based on the Korean self-reporting internet addiction scale (K-Scale), because as multiple academics highlight (including Kwon et al.), internet addiction is very similar to smartphone addiction. The K-scale is based on Kimberly Young's research on internet addiction as described above in section 3.1.2.

The SAS-scale consists of 48 questions related to 48 different aspects, such as feeling tired, conflicting with family members during smartphone use, et cetera. These aspects were divided into seven overarching subscales: *daily-life disturbance, positive-anticipation, withdrawal, overuse, tolerance* and *cyberspace-oriented relationship* (p.6-7). Daily-life disturbance includes missing planned work, having a hard time concentrating with work, and suffering physically (blurred vision, wrist pain, back pain, et cetera). Positive anticipation refers to being excited about smartphone use and getting rid of stress with smartphone use, and feeling empty without a smartphone. Withdrawal involves being impatient, fretful, and intolerable without a smartphone, constantly having one's smartphone in one's mind even while not using it, never giving up using one's smartphone, and becoming irritated when interrupted while using one's smartphone. Cyberspace-oriented relationship includes questions about the feeling that one's relationships with friends obtained through a smartphone are more intimate than relationships obtained offline. Overuse refers to the uncontrollable use of one's smartphone, preferring to conduct searches using one's smartphone to asking help from other people, always preparing one's charging pack, and feeling the urge to use one's smartphone again right after one stopped using it. Tolerance refers to always trying to control one's smartphone use but always failing to do so.[13]

In regard to mobile phone overuse, Adriana Bianchi and James G. Phillips (2005) highlight in their research the interrelations between problematic mobile phone use and extraversion, self-esteem, gender, and age (p.45-46). Similarly, the research by Bian and Leung (2014) shows that smartphone addiction is indeed connected to personality (shyness and loneliness), as well as social capital.

Choi et al. (2015) emphasize, like Griffiths and Young, that it is difficult to simply class habitual smartphone usage as an addiction-like behaviour (p.818). This is because most of these behaviours are performed under conscious control to fulfil one's social, functional, and psychological needs (ibid.). When a behaviour brings a satisfaction, it is actively continued and habituated (ibid.).

Apart from a lot of popular media articles that give tips on how to beat smartphone addiction, Hyunna Kim (2013) is the only one within academic research who looked into treatment for smartphone addiction. Kim looked at previous research on internet addiction treatments to find solutions for smartphone addiction. Because smartphone addiction often includes both physical and psychological problems, she argues that both exercising as well as psychological/cognitive treatments, such as motivational interviewing, can help to beat smartphone addiction. She also recommends complementary treatments, like therapeutic recreation, or art and music therapy.

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[13] As I will demonstrate below, some aspects like daily-life disturbance and overuse, are present in the discourse by the smartphone addiction app developers and are reflected in the affordances of the app. On the other hand, an aspect like positive anticipation is not touched upon. For instance, all three apps claim that when you stop using your phone, this will bring you peace. They however do not take into consideration that to a lot of people using a smartphone means getting rid of stress and eventually gives peace.

3.2 From procedural rhetoric to procedural bias

The second sub-question, how the affordances of the apps frame smartphone addiction, is closely related to the concept of *procedural rhetoric* (Bogost 2007). In his book *Persuasive Games* (2007), Ian Bogost introduces us to the concept of procedural rhetoric which is based on Janet Murray's (1998) argument that computers are different from other media because of their procedurality: they can execute a series of rules. Bogost combines the concepts of "procedurality" and "rhetoric" to describe a new type of persuasive and expressive practice that is at work in software systems, like video games.

From the perspective of Bogost, rhetoric refers to effective and persuasive expression; to change opinion or action (p.3, 29). Procedurality refers to the methods, techniques and logics that drive the operation of systems; the rules of execution, tasks and actions that can and cannot be performed (p.4). The procedurality thus connects to the affordances of a medium in terms of form/function as described in the method chapter. Hence, procedural rhetoric entails making arguments with computational processes and unpacking computational arguments others have created (p.3).

One example that Bogost gives to illustrate the concept is *The McDonald's video game* (p.29-30). Bogost explains that the rules of this game stimulate the player to make choices that seem unethical or not right - like destroying villages or using growth hormones on animals- since these actions result in rewards. Through this procedurality that is created through the rules and the interaction of the player, the video game tries to make the player aware of the corruptions in the global fast food business. Thus, producers of interactive technologies such as smartphone apps can make statements through using specific rules and simulations that make certain behaviour (im)possible or favourable.

Although procedural rhetoric is normally applied to video games, it can also be applied to smartphone applications, since the affordances of the apps can create procedures through certain functions enticed by the user, which in turn can create meaning. It is important to note that procedural rhetoric not only stands in relation to affordances in terms of form/function, but also in terms of interface, since the interface can be a representation of these procedures. For example, the functions of all three apps are mostly related to changing the smartphone itself instead of the user, and similarly the interface only provides insights into the user's smartphone behaviour instead of other aspects related to the user. Hence, both the functions and interface of the apps frame smartphone addiction as being caused by the technology instead of personal factors.

In the context of this research, I apply the notion of procedural rhetoric in a different and more specific way than Bogost. Bogost understands "rhetoric" as persuasive expression to change opinion or action. However, it is not likely that the smartphone addiction apps are intentionally designed to change the user's opinion or action regarding smartphone addiction. The affordances of the apps rather implicitly and unintentionally frame smartphone addiction in specific ways. So, in the context of this research I regard procedural rhetoric as the unintentional creation of meaning through processes. Moreover, in this thesis I define procedural rhetoric in a more specific way than Bogost, since he refers to a general mode of expressing something through procedures, which is mostly aimed at video games. Contrary to Bogost, I look at smartphone applications and focus mainly on how such procedures create certain biases in regard to smartphone addiction. This procedural bias helps to

criticize the way the apps frame smartphone addiction in limited ways and highlights the shortcomings of the apps' developers.[14]

An important element of procedural rhetoric apart from rules, are the actors - such as users of smartphone addiction apps- who enact the processes that are present (p.9-10). However, Bogost highlights that interactivity guarantees neither meaningful expression nor meaningful persuasion, but sets the stage for both (p.45). This is because the interpretations of procedural rhetoric - like other rhetorical forms- depend on how the user uses the system and interprets it. Procedural rhetoric often entails the operation of cultural, social, and historical systems (p.8), such as the colours green-yellow-red used by BreakFree and OffTime. The interpretation of these systems depends on the user, since each user has a different cultural background and different knowledge. Thus, as mentioned in the method chapter, it is important to realise that the affordance analysis is based on my own interpretations, guided by theoretical foundations and specific motivations outlined in the introduction.[15]

3.3 The logic of self-tracking applications: quantification and gamification

Because a smartphone addiction application is a specific type of self-tracking app, it is important to briefly outline the logic of self-tracking applications, especially in terms of quantification and gamification, as these are often part of such apps. This section provides a way to interpret and criticize the logic that the smartphone addiction apps carry in terms of their affordances, which in turn helps to better understand how these affordances frame smartphone addiction.

Evgeny Morozov (2014) explains that self-tracking apps are often focused on the practical instead of discursive consciousness of the user (p.333). While discursive consciousness is characterized by great reflexivity about our own actions and the social conditions in which we do things, practical consciousness is characterized by routine and habitual interaction referring to the everyday knowledge we have about how to do things (ibid.). According to Morozov, self-tracking apps often lack explanation of why we should or need to do things, and only focus on how we can do things. This is especially so, because such apps often use data visualizations which are often not put in context. Lupton emphasizes the importance of taking into account the contexts in which numbers are created, because context can frame data in a much more insightful way (2016, p.79).[16]

Moreover, self-tracking apps - including the three smartphone addiction apps- often include quantification, which can tell us much about underlying assumptions. This is because statistics, measurement practices, and classification schemes that apps often use, "are never just a benign assessment of the world, but change our conception of the world and our understanding of ourselves" (Whitson 2014, p.352). Quantification

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[14] The analysis uncovers several biases present in the apps' affordances. For example, all three apps privilege quantification over features related to context and reflection, and privilege features aimed at changing the smartphone instead of changing the user. Moreover, gameful elements are favoured over playful elements, and the user's engagement with the app is preferred to total smartphone abstinence.

[15] You can read more about the limitations of the affordance analysis in the method chapter (2.2.3) and the discussion chapter (6.1).

[16] As demonstrated in the analysis, the affordances of all three apps show a lack of context and thus reflection, framing smartphone addiction in a simplistic way by neglecting personal factors.

practices tell us what is important to measure, how we should measure it, and indicate how we should change it (ibid.).[17]

Gamification is prominent in many self-tracking applications, including the three smartphone addiction apps. Simply put, gamification is the use of game design elements in a non-game context (Deterding et al. 2011, p.10). Gamification differs from serious games in that it only entails making use of some games elements, instead of being a fully-fledged video game (p.2). In contrast to playful design, which is centred on a free form of play without rules, gamification makes use of rules that relate to a goal, such as solving smartphone addiction and increasing productivity (ibid.). Gamification aims at creating a more fun and engaging experience in order to increase motivation and user activity. This is often done by the implementation of badges, levels, achievements and/or a point system (BLAP) (Nicholson 2012), but also through the use of narrative, characters, virtual environments, et cetera.

Besides the different techniques of gamification, more important for this thesis is the logic behind gamification, which helps to better understand and criticize the apps' rhetoric. Gamification is related to gamefulness rather than playfulness, since it focuses on the more structured and goal-oriented, experiential and behavioural aspects of play (ludus), instead of on a more open and improvisational manner of play (paidea) (Llagostera 2012, p.13). Gamification is therefore often rather a mechanistic instead of playful approach to things. Miguel Sicart (2011) therefore stipulates that gamification limits play as negotiation, play as appropriation, and play as expression, resulting in the "player" not being able to (fully) explore his/her relation with what the "game" proposes by means of their values (ibid.).[18]

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[17] For instance, the analysis shows that the data visualizations of all three apps are solely focused on the user's smartphone behaviour, which implies that smartphone addiction is solely related to overuse and therefore should be solved by limiting the user's smartphone use. This also points towards the quantification of smartphone addiction.

[18] For example, although addiction is strongly related to personal factors, the smartphone addiction apps do not afford the user to negotiate on why and how the user should solve the addiction.[18] Instead, the apps solely provide the user with static functions that work the same for every user, such as mechanistic scores and achievements. These game elements are bound to specific rules and are (therefore) not specifically related to each individual user. Hence, the apps impose a particular understanding of (solving) smartphone addiction on the user, instead of implementing more playful affordances that afford the user to understand the addiction in relation to him/herself.

4. Analysing smartphone addiction apps

4.1 Overgeneralizing smartphone addiction through juxtapositions

Looking at the verbal rhetoric of the app developers in specific, exposes a simplistic framing of smartphone addiction which is created through three building tasks of language that strongly connect to each other: significance, connections and politics (Gee 2010, p.17, 19). The developers of all three apps render "offline life"/smartphone abstinence more significant than "online life"/smartphone use, by making oppositions and by using metaphors and words with certain connotations. These oppositions make a disconnection (p.19) between technologies/smartphone use, and humans/smartphone abstinence, framing the former as a social good, while denying the latter as a social good (ibid.). This juxtaposition creates the assumption that we are addicted to our smartphones, while this might not be the case at all. The apps thus frame smartphone addiction in a very simplistic and more general fashion.

We see several examples of this stark juxtaposition in all three smartphone addiction apps. For example, the OffTime website states that "We spend more time interacting with screens than real people" (appendix 7.2.5, p.61). The word "screen" carries negative connotations and highlights the materialism of the smartphone, hereby emphasizing the "mindlessness" and "non-humanness" of the technology. The word "real" on the other hand, carries positive connotations emphasizing the "humanness" of people and hereby implying a contrast between humans and technology. BreakFree also uses the world "real" to induce this opposition. The app itself shows the message "You can't find real life in your phone!" when the user has a bad addiction score (appendix 7.2.1, p.48). Similarly, their website states: "(…) when you could be spending time with a real human being (…)" (ibid.). Even an achievement in BreakFree that the user gets when maintaining a low addiction score, is called "living life" (ibid.), which suggests that when you use your smartphone you are not living your life (to the fullest). Forest also makes similar statements in their app description: "Put down your phone and focus on what's more important in your life", hereby assuming that time spent on your smartphone is less valuable (appendix 7.2.3, p.54). Besides all these oppositions, even the name of the BreakFree app itself suggests a problem; that we are controlled by our smartphones and therefore need to break free from them.

More specifically, smartphone use is connected to disturbance while smartphone abstinence is connected to peace, hereby again simplifying the concept of smartphone addiction. For example, the slogan of Forest - "Stay focused, be present" (ibid.) - entails the assumption that when you are using your smartphone, you are not engaging with others around you, let alone your own life. Similarly, the OffTime website uses the metaphor "unplug" multiple times, as well as "(re)connect" and "(hyper)connectivity" (appendix 7.2.4, p.61). These metaphors also entail the assumption that smartphones are intrusive, thus framing smartphone use as a disturbance in life. The developers of OffTime also use some rather aggressive words to describe smartphones: "Mobile technology (…) infiltrate our homes, and graft itself onto our very bodies", and even use the imperative "Tame the chaos" (p.61). They also highlight the notion of peace by stating on their website that the app offers you to "relax at home" and allows you to "enjoy some peace of mind". In regard to BreakFree, the character Sato represents a Buddha, which also places emphasis on peace. The Buddha carries positive connotations of peace

and balance. And because he is the coach of the app who tells how the user is doing, this character implicitly frames smartphone abstinence as peace and smartphone use as a disturbance. This is similar to the Forest app which uses bright green and brown visuals, as well as ambient sounds, to emphasize the beauty and peace of nature. The fact that the app affords the user to unlock different types of plant species and ambient sounds stimulates this even more. Especially because Forest offers the user to hand in credits to let a special organization plant a real tree in Africa as an incentive, translating the idea of nature to the real world. Even some descriptions of the plants the user can unlock, express this almost "romantic" sense of nature (appendix 7.2.3, p.54). BreakFree and Forest embody the concept of mindfulness as part of contemporary beliefs, hereby emphasizing the presupposed difference between being online-offline even more, and framing smartphones negatively as a disturbance of peace (see figure 2).[19]
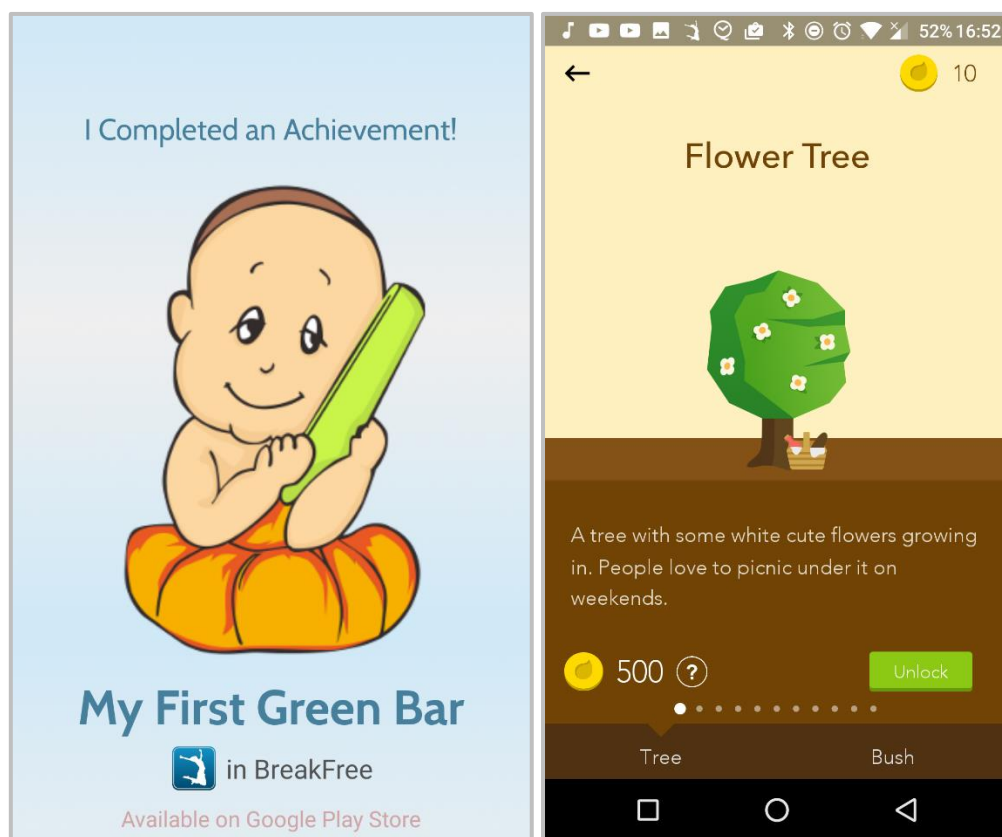

Figure 2: BreakFree and Forest emphasising mindfulness.

The apps further frame smartphone use negatively such as being unsocial, a distraction, a loss of time and attention. For example, the OffTime developers mention on their website that smartphone abstinence (stimulated by their app) offers the user to "do the things that matter", and to bring them closer to the things that "really matter" (appendix 7.2.5, p.62-63). Again, presupposing that what you do on your smartphone is less valuable. But

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[19] Mindfulness is concerned with focussing on the present to create peace, be more productive and become healthier. It is part of our zeitgeist. For example, employees of Google take mindfulness training called "Search Inside Yourself". Another example, is that The Department of Education in the United Kingdom is setting up trial lessons for children from the age of eight to teach them mindfulness, breathing and relaxation techniques. For more information, visit: http://www.dailymail.co.uk/news/article-4306696/Young-pupils-taught-mindfulness-government-trial.html.

who are they to judge what matters and what not? Playing a simple video game on your smartphone can also be an important way to relax, or using FaceTime with friends via your smartphone can be a good way to keep in touch. Thus, smartphone use is framed negatively and in a very broad way, which creates the idea that there is the problem of smartphone addiction, which for a lot of people will probably not be the case.

4.2 Smartphone addiction: caused by smartphones, solved by smartphones

But what is also problematic, is the fact that this presumed problem of smartphone addiction is implied to be caused solely by smartphones, neglecting other (social) aspects. This is shown by the aforementioned negative representations of smartphones, but also by the absences within the apps' discourse. The absences show that the life situation of the user is not touched upon, although smartphone addiction often is strongly related to personal factors. This also goes for the societal context. For instance, what rules are set by the government in relation to smartphone use, if any? And are smartphones not just an important medium in our modern society in which multitasking and responding quickly is expected of everyone? Hence, smartphone addiction is framed as being caused by the technology itself, instead of also by social factors.[20]

Apart from the creation of oppositions by OffTime, BreakFree and Forest, OffTime makes certain presuppositions to make significant (Gee 2010, p.17) that smartphone addiction is caused by technology. For example, on their website the developers state that "with the mobile revolution things dramatically changed", and therefore "we have changed", causing "smartphones [to] gatecrash the best moment of our lives" (appendix 7.2.5, p.62). They especially focus on the problem of hyperconnectivity (caused by smartphones), which is mentioned multiple times on their website. Hence, the developers presuppose that smartphones have a great (negative) influence on us, framing smartphone addiction as being caused by technology instead of (also) social aspects.

However, the developers of OffTime do highlight the responsibilities of humans instead of solely blaming technologies, mainly through the use of imperatives. For example, their website states that "we should begin thinking about how we might construct and maintain our boundaries with technology" (p.63). Moreover, they say that "we also need to consider how technology might improve our well-being without taking anything away" and that "We need to become aware of when we want to engage with technology and social media, and identify the times that we do not" (ibid.). These imperatives place emphasis on our own responsibilities - how we engage with technology- which points to the assumption that the problem of smartphone addiction also lies with us.

Still, the affordances of OffTime do not reflect this. All three apps entail a procedural bias in which affordances aimed at the smartphone itself are privileged over affordances aimed at the user. So, in terms of solving smartphone addiction, changing the technology (smartphone) is privileged over changing the user. In

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[20] We see a similar framing with video game addiction, which is often presented as being caused by the violent and addictive properties of the video games themselves, such as the reward and feedback systems that games use (Griffiths 2010) or the simulation abilities (Lister et al. 2009, p.288). Less attention is paid to the mental health and life situation of the gamer. On the other hand, smoking addiction is considered more a societal problem. Solving the problem is therefore also aimed at society instead of the cigarettes themselves, such as through the prohibition of smoking in certain public areas and the creation of smoking zones. So, the discourse of smartphone addiction is similar to that of video game addiction; the critique is more about the technology than its social aspects. The reason why treatment for smartphone addiction is mostly sought within technology (limiting smartphone functions by using an app) rather than society (governmental regulations).

terms of functions, the apps usually offer the user to change certain functions of the smartphone, such setting a smartphone abstinence session, stop notifications and auto-reject calls (see figure 3). This is the least prominent in Forest, since this app only offers the user to whitelist apps, but does not offer the user to schedule smartphone abstinence, block calls, et cetera. In terms of interface, the apps only offer the user insights about the smartphone usage, such as the average device time and the specific apps used.
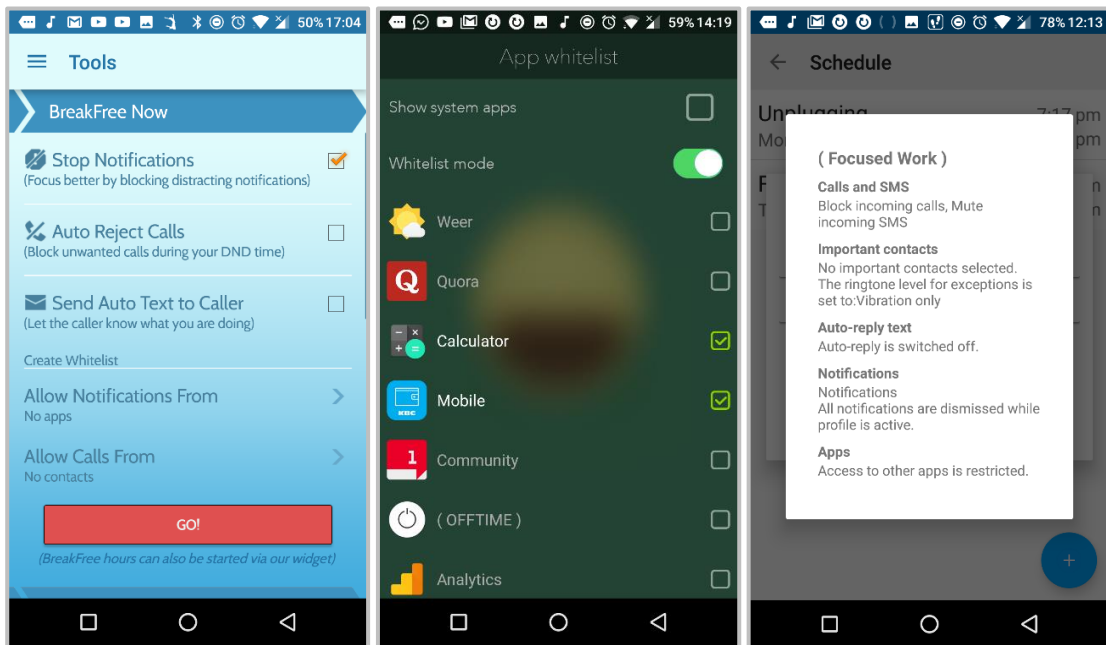

Figure 3: The functions of all three apps are mostly concerned with the smartphone itself, instead of the user.

Moreover, these affordances are quite static, since they do not relate to the specific characteristics and problems of the individual user. They are the same for all users. For example, the apps do not offer the possibility to create a diary for self-reflection, nor do they include a questionnaire that asks questions related to the user's situation which could then help to better understand and treat the smartphone addiction. Reflection is especially important in the case of smartphone addiction, because treatment for addiction in general is symptom dependent (Sinnott-Armstrong and Pickard 2013, p.854), and strongly relates to the situation of the user.[21] Hence, the procedural bias points to an incorrect framing of smartphone addiction: it is solely caused by the technology and therefore should also be solved by changing that technology.

But what is even more problematic, is the paradoxicality of the smartphone addiction apps: they frame smartphones negatively as the cause of addiction, while simultaneously framing the app itself as the solution to the addiction. In regard to the building task of significance (Gee 2010, p.17), BreakFree and OffTime make their app significant as a treatment for smartphone addiction by emphasizing the unique capabilities of their app. Especially the quantification abilities of the applications are praised, as we will further see in the next chapter. For example, OffTime states on its website that the app provides you with "intuitive analytics of your phone usage", and that thanks to smart app blocking, communications filters and insights into smartphone usage, the app helps you to focus and unplug (appendix 7.2.5, p.62). Similarly, BreakFree highlights that the app is a "revolutionary mobile app" that uses "a highly advanced algorithm" (appendix 7.2.1, p.49). BreakFree also states that the app lets

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[21] The lack of reflection will be further discussed in chapter 4.3.

you make "informed decisions" and lets you "use your time wisely" (ibid.). Forest also explicitly mentions in its app description to be "the best cure for phone addiction" and "an interesting solution to beat your phone addiction" (appendix 7.2.3, p.54). Hence, in regard to the building task of politics (Gee 2010, p.19), the developers frame the smartphone addiction apps as a social good, which points to an instrumentalist and solutionist framing of smartphone addiction. This again highlights that the apps create an incorrect and simplistic understanding of smartphone addiction.

An app as the solution to smartphone addiction is further made significant by BreakFree in terms of agency. Using the verb "help" implies that the app is the agent and therefore has control over the user, which again highlights the instrumentalist assumption that the app is a solution to smartphone addiction. For example, the website of BreakFree states that the app helps maintaining a healthy digital life style, helps you maintain a controlled digital lifestyle and helps you make informed decisions (appendix 7.2.1, p.49). On the contrary, OffTime rather places emphasis on the user as (also) having control, and in a more explicit way. The developers of OffTime state on their website that the app "lets you control you connectivity", "improve self-control" and that "you decide what's important" (appendix 7.2.5, p.62). This points to the assumption that it is also the user who has to make choices in regard to smartphone use, instead of (solely) the app itself. Hence, framing smartphone addiction rather as something that can be solved by the "addict" him/herself.

4.3 Quantifying smartphone addiction: lack of context and reflection

Another problematic aspect is that the apps frame smartphone addiction as something that can be quantified, which also creates a simplified and incorrect understanding of the (presumed) addiction. Instead of fostering a profound understanding of smartphone addiction, the apps embody an instrumentalist and solutionist logic, framing complex human problems as a neatly defined problem with definite, computable solutions (Morozov 2014, p.5).

Smartphone addiction is framed as something that can be quantified through both verbal rhetoric and affordances. As mentioned earlier in the analysis, BreakFree and OffTime praise the tracking and quantification abilities of their app. This relates to the building task of sign systems and knowledge (Gee 2010, p.20), because this shows that data is privileged over humans when it comes to knowledge and thus points to the assumption that smartphone addiction can be quantified. However, this does not apply to Forest; neither their website nor the app description mentions quantification. Instead, the app description emphasizes the playful aspects of the app and the self-motivation that is enticed by these playful elements. Still, as we will further see in this chapter, these "playful" elements are rather mechanistic and also frame smartphone addiction in an oversimplified way. Moreover, the absences in the discourse of all three addiction apps show a lack of information about other (complementary) features that are less focused on quantification and more on reflection. More specifically, both BreakFree and OffTime make on their website certain presuppositions that explicitly frame smartphone addiction as something that can be quantified. For instance by claiming that the app "tracks how addicted you are" (appendix 7.2.1, p.48) or by stating that the app helps you to "get to know yourself" (appendix 7.2.5, p.62). So in regard to the building task of connections (Gee 2010, p.19), the developers connect quantification to knowledge

through these assumptions, hereby creating the false idea that data is objective and therefore meaningful and useful for understanding smartphone addiction.

But especially the affordances help to frame smartphone addiction as something that can be quantified, and more specifically as an integral quantity instead of something that is caused by a several interlocking factors. This is reflected in the affordances of both BreakFree and OffTime: both present the user with a score that is based on his/her smartphone usage (appendix 7.2.2, p.50; appendix 7.2.6, p.66). This mechanistic game element casts the complex behaviour and situation of the user in a single score, framing smartphone addiction as a problem that can be neatly defined and which therefore can be easily solved (by using the app). For example, the scores provided by both BreakFree and OffTime are based on the duration and intensity of usage (device usage and screen unlocks), but neglect contextual aspects, like the type of app used, the activities performed while "offline", and the user's personal aspects. For example, smartphone usage can be productive, while smartphone abstinence can be unproductive. It depends on what the user does both on- and offline. This can also create a false idea of progress/decline. Thus, these scores frame smartphone addiction in a simplistic way as being solely related to smartphone usage. However, the OffTime app does provide the user with extra information about how the score is calculated and what it entails, and also states that the developers "plan to expand the score and include some personal factor in its calculation" (appendix 7.2.5, p.64). Hence, OffTime does recognize that smartphone addiction is also related to personal aspects.

But overall, we see that there is this other problematic aspect of quantification; it is at the expense of context and therefore also reflection. As Lupton (2016) states, it is the context in which numbers are created that are important, because context can frame data in a much more insightful way (p.79). However, the data provided by the apps only contains little context, preventing the user to fully reflect on this data in order to understand his/her behaviour. This makes these apps unsuitable for both understanding and treating smartphone addiction.

The lack of context is especially reflected by the procedural bias present in all three apps, where data takes precedence over context and reflection: the only way for the user to get insights into his/her behaviour is via numbers, data visualizations and summaries of behavioural data. Moreover, these affordances do not offer the user much context and therefore limit the possibility for reflection. For instance, BreakFree affords the user to view the average phone usage time and addiction score, but in terms of context only provides the dates on which this information was gathered (appendix 7.2.2, p.52) (see figure 4 on the next page).
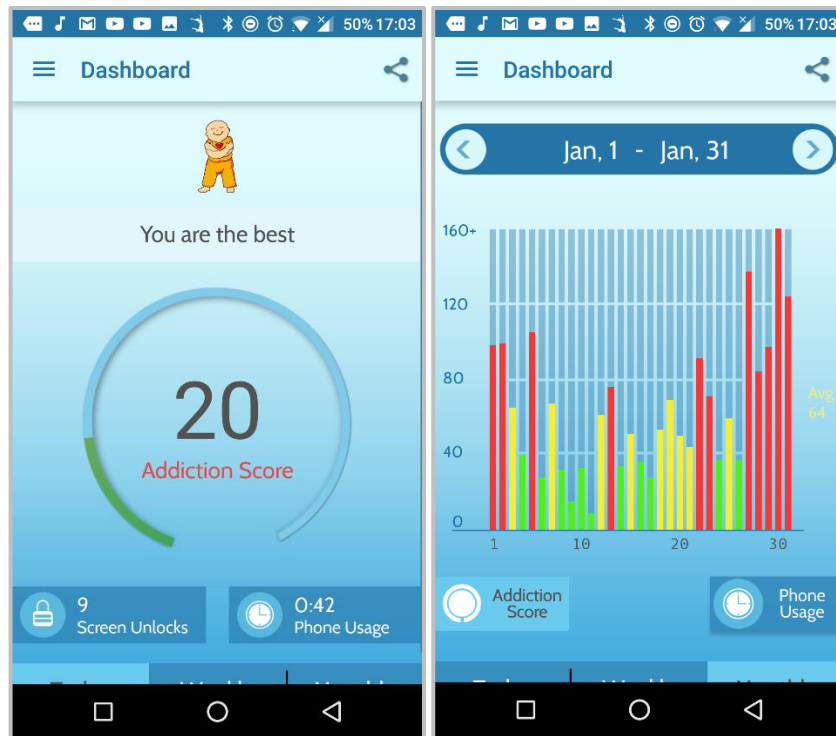
Figure 4: BreakFree using quantification with non-contextual data.

This neglects the more in-depth questions and information that are also important, such as what specific applications were used each day, how long were they used, and especially why were they used? The user can view the five most used apps of the day in another screen, but this data is not linked to the data visualization. The graph only shows the addiction scores, the date and the average addiction score. Also, not taken into account is what the user has done each day. It would make sense that on a day the user is on holiday, he/she will use the smartphone more than when at work. But this does not necessarily indicate a bad habit, let alone a smartphone addiction. Hence, quantification frames smartphone addiction in a vague and simplistic way.

Similar to BreakFree, OffTime also presents the user with graphs about the user's score and the user's total phone usage/device time. But OffTime additionally provides the user with specific insights with respect to app usage and communications (phone calls and text messages). OffTime also offers a summary of the user's behaviour during each day, week or month, where separate data ("highlights") are assembled. This gives the user a more specific insight into his/her behaviour than BreakFree.[22] But, like BreakFree, the data is not put in context with the individual dates, making it difficult to interpret this data and thus meaningless to the user (see figure 5 on the next page).

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[22] Note that a summary of different data can also result in the user making incorrect correlations between data, leading to wrong interpretations of the user's behaviour.
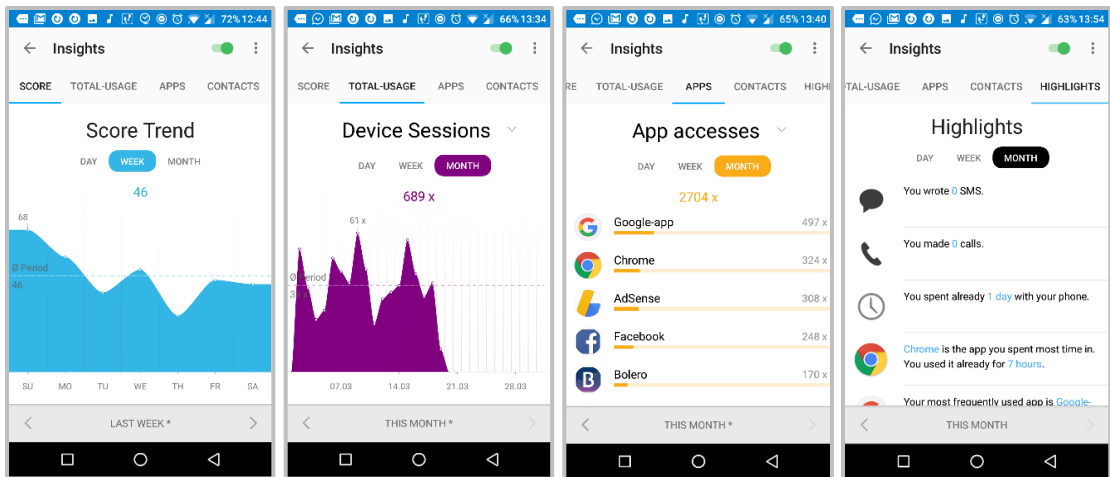
Figure 5: OffTime using quantification with non-contextual data.

For example, checking a certain app a few hundred times per month may seem more than it actually is, and may lead to think that the user is addicted which might not be the case at all. Also, the example in the third screenshot of figure 5 shows that OffTime indicates that the Google and Chrome apps are used the most. However, it does not give the user any insight into what actions were performed within these applications. According to Kimberly S. Young (1999) this is important, because specific applications are often the cause of (internet) addiction. It is therefore important to understand what application is regarded as the most and least important to the user, but also what specific elements of the application itself are liked the most (p.7).

Although Forest is also limited in this respect, this app does offer the user to manually add more contextual information to the data. The user can set a specific tag and attach a note to each "planting session" (smartphone abstinence session). Each session is presented by a virtual tree in a forest, and each tree can be reviewed anytime by clicking on the forest, so that the user can review and interpret each session. For example, the user can filter all sessions under the tag "work", which will show a summary of the sessions under this tag, including the notes attached to each session (see figure 6).
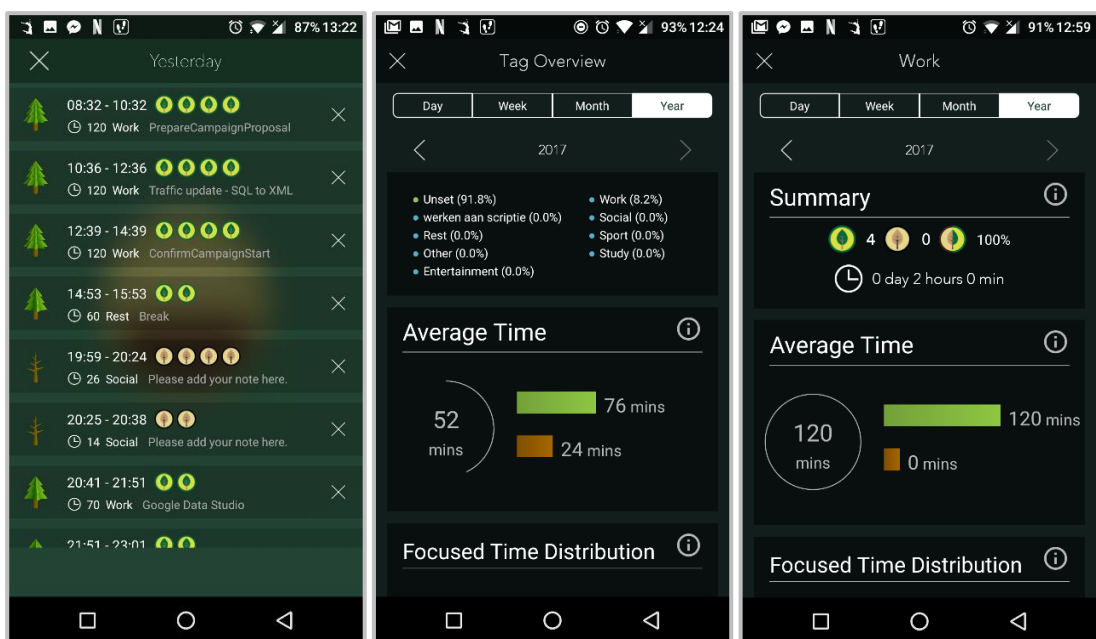

Figure 6: Forest affording the user to enter contextual information (tags and notes) next to the behavioural data, which the user can review in (separate) data summaries.

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So, the manual contextual information (tags and notes) that can be attached to certain sessions helps the user to better interpret his/her behaviour. Hence, the affordances of Forest show a less simplistic understanding of smartphone addiction than BreakFree and OffTime because context is taken more into consideration.

The possibility for reflection is further limited through gamification. Although smartphone addiction is closely related to personal factors, all three apps use mechanistic game elements that do not offer the user to deeply engage with how smartphone addiction relates to him/herself. This is because the game elements are bound to specific rules (which are also not personal), and with that impose a particular behaviour and understanding of smartphone addiction to the user. Also, these game elements create simplistic representations because they lack context. Hence, the apps entail another procedural bias in which game elements are privileged over playful elements. A more playful approach could stimulate the user to explore his/her relation with what the app proposes by means of the user's own values (Sicart 2011.).

One example is the addiction score that BreakFree calculates. Within this score, the app differentiates three levels of smartphone addiction, represented by three distinct colours: green, yellow and red. The user is in the green zone when he/she has an addiction score of 0-40, in the yellow zone with a score of 40-70, and in the red zone with a score of 70+. These three levels imply a threshold. However, the app does not explain on what these thresholds are based. The app only states that the total score is calculated from the device usage and phone unlocks. But on what specific factors is each zone based? What is the exact difference from being in the yellow zone to being in the red zone? These scores are also not related to the personal aspects of the user. Hence, the gameful instead of playful elements do not afford the user to negotiate on why and how the user should solve the addiction, but instead provide the user with static functions that work the same for every user. The user cannot reflect on what specific elements of his/her behaviour are good or bad, and especially why, which limits the apps' potential to help the user understand and treat smartphone addiction.

The achievements that BreakFree and Forest use in their app also reflect this rather mechanistic instead of reflective approach on smartphone addiction. The achievements in BreakFree are the same for every user and are only aimed towards maintaining a good addiction score and using the app's scheduling tool. Although the Forest app seems more playful than OffTime and BreakFree because the user can choose where to spend his/her rewards (credits) on and with that can customize his/her own forest, most elements are still gameful rather than playful. Similar to BreakFree, the achievements in Forest are mostly related to the number of planting sessions, scores and the use of functions within the app (e.g. adding a friend, sharing the app through social media). So, the achievements do not provide the user with more elaborate information about his/her smartphone use, especially in relation to the specific characteristics of the user him/herself.

Moreover, the interface of both Forest and OffTime provide the user with comparisons between the behaviour of the user and all other users. OffTime presents the number of device sessions, total device usage and total "OffTime" (smartphone abstinence) of that day, and compares it to the same data of all other app users. The comparison is presented as a horizontal scale that changes from light green to orange to red, and shows how the data of the user relates to the average of all other users (figure 7 on the next page).
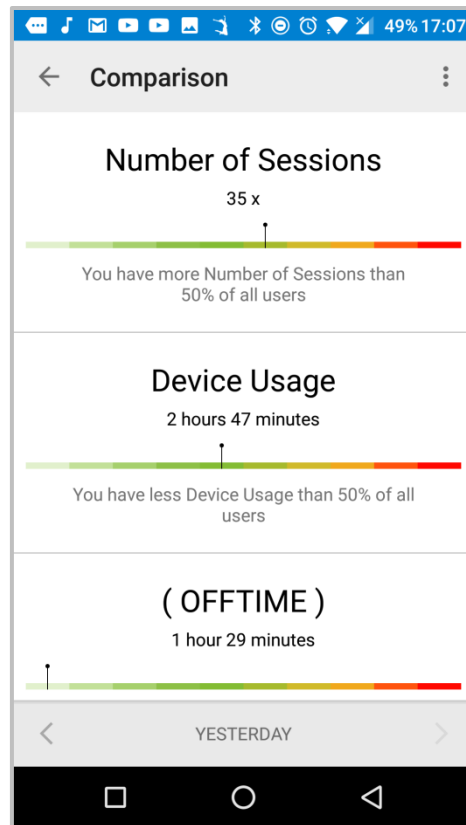
Figure 7: OffTime comparing the user data to "all users".

Below the scale calculated percentages are shown, indicating the differences between the user and all other users. This implies that the developers treat smartphone addiction as something that can be assessed by only three numbers that relate to device usage and smartphone abstinence. Similarly, Forest implements a leaderboard in which all users and their score (i.e. the total time of smartphone abstinence in minutes) are listed. Hence, both apps neglect the fact that addiction strongly related to personal external and internal aspects, like social capital and personality traits. Thus, OffTime and Forest frame smartphone addiction as something that does not relate to personal aspects and therefore can easily be compared to each other.

Another issue with these comparisons is that they also lack context and therefore can create a false understanding of the user's behaviour. For instance, it is not clear what the OffTime app exactly means by "all users". Against how many people is the user's data compared? This has a big influence on how the user's scores are presented. Moreover, it is not clear what type of users they all are; maybe they are all very addicted, making the user's score and therefore behaviour seem more positive than it might actually be. In the case of Forest, the fact that the user has a top high score does not necessarily mean he/she is more productive or less addicted, because this relates to other factors as well. For instance, the things you do when you are not using your smartphone also needs to be taken into account. Furthermore, the fact that the scores (total time of smartphone abstinence) of the Forest users is represented only in minutes, instead of hours and minutes, also makes the user's achievement appear bigger than it actually is (figure 8 on the next page). This gives a false impression of the user's progression/behaviour.
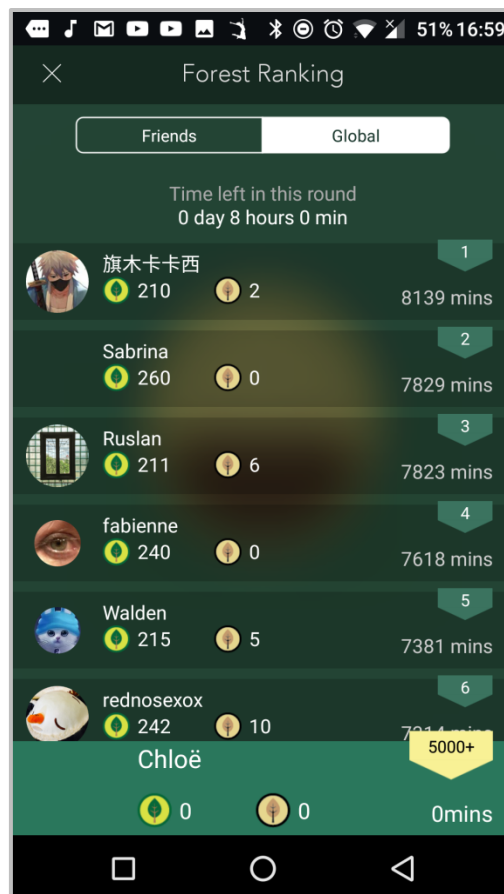
Figure 8: Forest's leaderboard showing smartphone abstinence in minutes.

So, the game-elements in the smartphone addiction apps do not provide the user with clear feedback, but instead foster a vague and simplistic understanding of smartphone addiction. All three apps entail a bias which favours quantification over reflection and context. Hence, the apps are focused on the practical instead of discursive consciousness of the user, which is often the case with self-tracking applications (Morozov 2014, p.333). Especially because of the use of quantification and gamification, the apps lack explanation of why we should or need to do the things the apps propose. Instead of also problematizing the addiction, they solely focus on solving the addiction.

Moreover, the apps perpetuate the problematic dominant contemporary belief that data is objective. This is especially remarkable in regard to OffTime, since on their website the developers highlight that we need to think about how we engage with technologies. They even claim to have collaborated with Humboldt University's department of Psychology in research on mobile technology use, which gave them an "informed scientific foundation" for their own app (appendix 7.2.5, p.64). So all in all, quantification and gamification are not enough to fully understand and solve smartphone addiction. This is mainly because smartphone addiction relates to many personal factors and because treatment for smartphone addiction is symptom-dependent. The apps should therefore implement more playful and reflective elements that are more focused on context and the situation of the user.

4.4 Smartphone addiction ≠ smartphone overuse

In chapter 4.1 we read that smartphone addiction is overgeneralized and framed in a very simplistic way through juxtapositions. This simplistic framing of smartphone addiction is further reflected by the fact that all three apps frame smartphone addiction as smartphone overuse. But as Kwon et al. (2013) state, overuse is only one of seven aspects that relate to smartphone addiction. Similarly, several other academics (Young 1999; Sinnott-Armstrong and Pickard 2013; Choi et al. 2015) emphasize that overuse/heavy use is not equal to addiction. Hence, the apps frame smartphone addiction incorrectly, creating the false impression that we are addicted while this might not be the case.

This becomes clear when looking at the verbal rhetoric of the apps. The website of BreakFree places emphasis on smartphone usage and connects this to addiction. One of the sub-titles says: "Are you addicted?", continued by a paragraph about how many times we check our smartphones. Similarly, the app description of Forest includes the sentence: "Have you ever been addicted to your phone and just cannot put it down?" (appendix 7.2.3, p.54). Hence, both apps show a focus on smartphone (over)use, which is connected to addiction. Also, the absences in the discourse of all three apps show a lack of talking about aspects other than smartphone overuse, such as personal factors or withdrawal and tolerance.

Choi et al. (2015) highlight that it is difficult to simply class habitual smartphone usage as an addiction-like behaviour (p.818). This is because most of these behaviours are performed under conscious control to fulfil one's social, functional, and psychological needs (ibid.). When a behaviour brings a satisfaction, it is actively continued and habituated (ibid.). Hence, the fact that someone uses his/her smartphone a lot to satisfy certain needs does not indicate an addiction per se. Young (1999) states that in order to find out, the clinician (in this case, the app) should use reflective features. However, as we could read in the previous chapter, such features are not implemented in the apps.

The fact that smartphone addiction is framed as overuse is also implied by the affordances of all three apps which reflect another procedural bias: affordances are mostly aimed at limiting smartphone usage and are thus favoured over other (reflective) features. Because the developers understand smartphone addiction in terms of overuse means that the affordances of the apps are also aimed at overuse. The apps mostly include what Young (1999) calls "external stoppers", such as setting session times and alarms. These are directly aimed at smartphone use. OffTime and BreakFree afford the user to schedule smartphone abstinence and all three apps offer the user to abstain from particular applications. Moreover, the data visualizations that all three apps use to represent the user's smartphone behaviour mostly concern with the amount of smartphone sessions and duration. Thus, like Jennifer Whitson (2014) states, these quantification affordances indicate what should be measured and how we should change it (p.352). In the case of smartphone addiction, they imply that the addiction is related to overuse and should be solved by measuring the user's smartphone behaviour, thus allowing the user to limit this behaviour. Unfortunatelye, these kind of apps have their limitations when it comes to dealing with smartphone addiction, because they neglect features aimed at other factors, such as withdrawal, cyber-oriented relationships, and tolerance. (Kwon et al. 2013).

For example, in regard to withdrawal (being impatient, fretful, and intolerable without a smartphone), the apps offer no solution. The apps only try to control smartphone overuse, but what happens during smartphone abstinence? How does the user control his/her behaviour and mood while being away from the smartphone? Moreover, the apps clearly neglect the aspect of tolerance (always trying to control one's smartphone use but always failing to do so). This is reflected by the "whitelist" function that is implemented in all three apps (see figure 9).
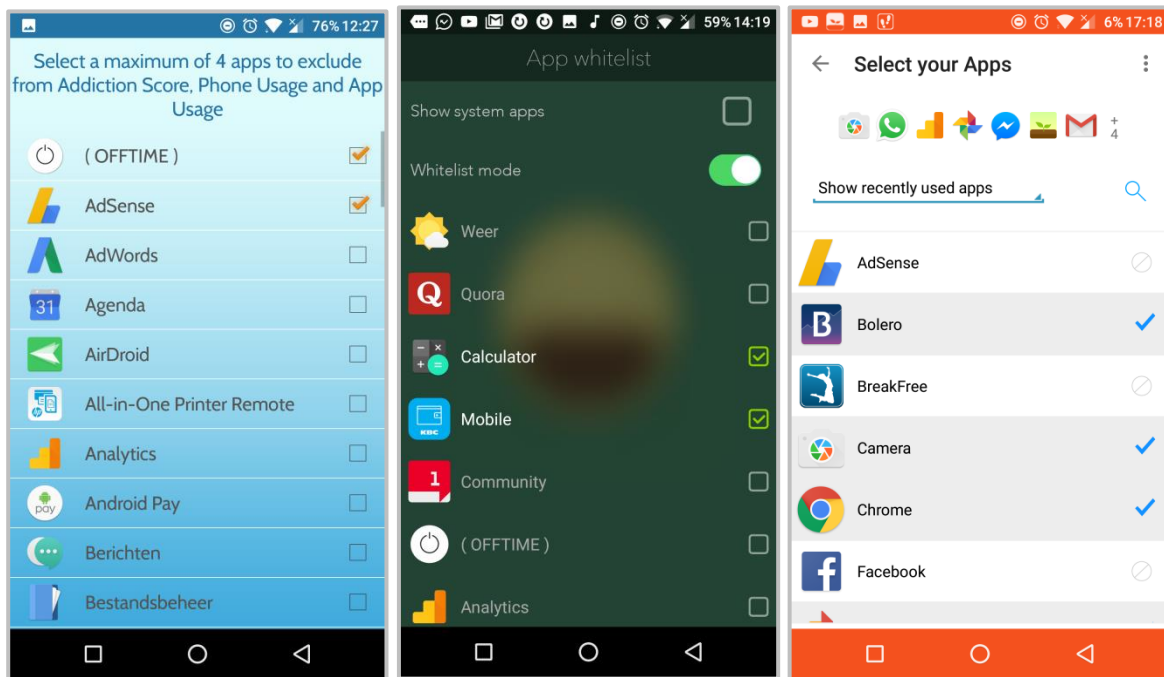

Figure 9: The option in all three apps to exclude specific apps from the system.

This option affords the user to exclude certain smartphone applications that will not be counted in the addiction score and data visualizations (OffTime, BreakFree), or will not cause a tree to wither (Forest). So, using the whitelist the user can still use the smartphone applications that he/she wants, without having to see the consequences. Young (1999) does claim that internet addiction is often caused by certain applications (p.7), which could be the same for smartphone addiction. However, the whitelist-option also gives the user a false sense of security, which can actually help to create more risk since the user can exclude certain apps that might not seem addictive, but are.[23]

Moreover, Sinnot-Armstrong and Pickard (2013) stipulate that the difference between common usage and addiction lies in the difference of control and harm (p.860). Addiction is a strong and habitual want that significantly reduces control and leads to significant harm (ibid.). This is also emphasized by Kwon et al. (2013) who state that tolerance (control) and daily-life disturbance (harm) are often elements of smartphone addiction. Therefore, the smartphone addiction apps should implement features to help the user to reflect on aspects of self-control and harm, should try to implement elements to help the user gain more control over him/herself, and should help the user to address daily-life problems.

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[23] This would be a new example of risk compensation; the user adjusts his/her behaviour in response to the perceived level of risk, becoming less careful if he/she feels more protected.

These are only a few examples of the limited affordances of the smartphone addiction apps. Hyunna Kim (2013) stipulates that smartphone addiction often includes both physical and psychological problems and should therefore be treated using physical and psychological/cognitive treatments. Similarly, Young (1999) states that internet addiction is often caused by mental pleasure, deeper cognitive problems and the life situation of the user. These, among other factors, are not taken into account by the three smartphone addiction applications. Thus, the apps do not foster a profound understanding of smartphone addiction and therefore also do not offer enough useful features to treat the addiction.

4.5 Contradictory affordances

That the developers of the apps have and therefore foster a limited understanding of smartphone addiction is also reflected by some affordances that contradict the aim of the app itself. One example is the sharing button that is implemented in all three apps. Clicking the sharing button, the user can for instance share his/her addiction score in BreakFree, share his/her "OffTime" or "planting session" to other applications, including social network sites, WhatsApp, and e-mail. The affordance to share contradicts the goal of the apps (limiting smartphone use) because the functions create connectivity and can stimulate the user to continue interacting with his/her smartphone.

Also, the fact that all three apps implement push notifications that show the user information about his/her smartphone behaviour contradicts the apps themselves, because push notifications help remind the user of his/her smartphone and can stimulate the user to pick the smartphone up. A woman who talked in The Guardian about beating her smartphone addiction, highlighted the importance of opting out entirely by buying a "dumbphone" so she could get rid of reminders and interruptions.[24] For example, when the user of Forest completes a planting session, Forests sends a push notification to announce that a new plant has been planted because the session finished (figure 10 on the next page).

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[24] The Guardian, "How I quit my smartphone addiction and really started living," February 11, 2016,
https://www.theguardian.com/technology/2016/feb/11/smartphone-technology-addiction-facebook-twitter.
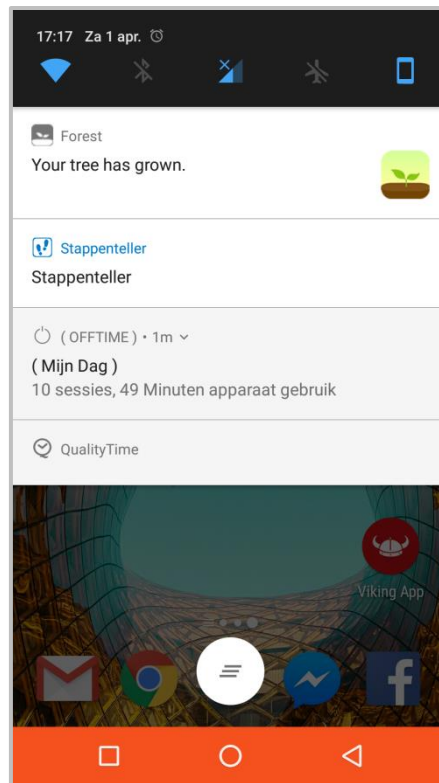
Figure 10: The Forest app sends a push notification when a planting session is completed and a plant has been planted.

This stimulates the user to pick up the smartphone and view the plant in the Forest app, while if the user had not gotten this notification, he/she would probably still be away from the smartphone. Hence, the push notifications that the apps use seems to impede their goal of stimulating self-control. These two functions are especially in contradiction to the discourse of OffTime, since their website focuses on (hyper)connectivity- enabled by the technology of smartphones- as the main cause for smartphone addiction. However, opting out entirely can be hard to some people. Young (1999) claims that total abstinence is often not the solution because the internet (as well as smartphones) is such an integral part of our everyday life (p.10). Treatment should therefore focus on moderation and controlled use. OffTime does recognize this importance of connectivity and the fear of missing out, because the apps includes a function that affords the user to review the notifications, calls and messages that were blocked during the smartphone abstinence session.

Another very contradictory affordance is implemented in the Forest app. Forest offers the user to set a planting session of a maximum of two hours. The different specifies of trees and bushes the user can unlock cost at least 500 credits, credits which the user earns after a planting session. However, the user only receives around 21 credits per hour, which means that in order to unlock a new type of plant, the user has to stay away from his/her smartphone for at least a day in total.[25] But the fact that the user is only able to set a planting session of maximum of two hours, means that the user has to come back every two hours to plant a tree and create a new session.

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[25] The user can earn extra credits (200) by unlocking achievements.

This is further stimulated by the fact that the user can not only unlock new plant species, but also ambient sounds that play when the user views his/her virtual forest. These sounds stimulate engagement with the smartphone because they can only be listened to within the app. This is also encouraged by the fact that the virtual forest in which the user plants virtual trees/bushes earned through smartphone abstinence, is reset every day. So, the user has to stay engaged with the app in order to create and enjoy the lush forest every day.

Thus, these affordances express a contradictory procedural bias in which engagement with the smartphone is privileged over long smartphone abstinence. This again highlights the developers' lack of understanding of smartphone addiction and shows that the apps are not very valuable for solving smartphone addiction.

5. Conclusion: findings and implications

5.1 Framing smartphone addiction in a broad and simplistic way

This thesis started from a sociomaterial perspective on technologies (Lupton 2012, 2014), assuming that the smartphone addiction applications are not developed from a neutral perspective, but more from the explicit and implicit opinions of the developers. It is therefore important to not take such technologies for granted and analyse what role they can play in our understanding of smartphone addiction. This led me to the main research question: *How, and in which ways, do the smartphone addiction apps BreakFree, Forest and OffTime frame smartphone addiction?*

My research demonstrates that analysing both discourse and affordances helps to provide critical insights into the rhetoric of smartphone (addiction) applications. Firstly, the textual discourse analysis was especially useful in uncovering how the developers create stark oppositions between offline (smartphone abstinence) and online (smartphone use), hereby framing smartphone addiction in a very simplistic and overgeneralized way. In doing so, they create the false impression that we have a problem with our smartphone usage, and we need to control this (through using their app). The fact that they presuppose a problem of smartphone addiction is problematic, since smartphone addiction is much more complicated as highlighted in the theoretical framework.

Secondly, I uncovered that smartphone addiction is framed as being caused solely by smartphones, hereby neglecting other (social) aspects relate to this. Hence, the procedural bias in the apps show an emphasis on changing the technology instead of user behaviour. This then pointed to a problematic paradox: the apps frame smartphones negatively as the cause of the addiction, while simultaneously framing it as the solution for the addiction. This is problematic in two ways: framing smartphone addiction as being caused by the technology itself neglects social factors that also relate to addiction. Furthermore, the fact that the apps (especially BreakFree and Forest) present smartphone addiction as something that can be cured by using an app perpetuates the simplistic instrumentalist and solutionist logic which is often part of self-tracking applications (Morozov 2014, p.5).

Thirdly, I uncovered that especially the affordances highlight the fact that the apps privilege quantification over context and reflection, and are therefore focused on the practical instead of discursive consciousness of the user. Instead of also problematizing the addiction, the apps solely focus on solving the addiction. Moreover, quantification and gamification prevent the user from making meaningful interpretations about his/her smartphone behaviour, making the apps unsuitable for understanding smartphone addiction specifically in relation to the user.

Fourthly, my research shows how the apps frame smartphone addiction as smartphone overuse, which is only one aspect of smartphone addiction. Also, because the affordances are only aimed at smartphone overuse, other important treatments for smartphone addiction - especially in relation to reflection and the specific characteristics of the user- are neglected.

Last but not least, comparing the discourse of the apps with the affordances helped me to uncover a number of contradictory affordances, such as the implementation of social buttons and push notifications. This

again emphasizes the developers' limited understanding of smartphone addiction and the fact that the apps are unsuitable for smartphone addiction treatment.

5.2 So, what does this mean?

My research adds to current debates about smartphone addiction and smartphone apps on three different levels. On a media-historic level, my research has shown that there exists a recurring trend in media consumption, of which smartphone addiction apps are a symptom. Hence, it is not surprising that such apps are a reaction to the relatively new discourses of smartphones and smartphone addiction.

On a discursive level, I have shown that a dominant discourse exists which regards apps as *the* solution to human problems. The emphasis on quantification and gamification which is embedded in all three apps clearly reflects that these apps are indeed products of human decision-making, underpinned by assumptions and discourses already circulating in society (Lupton 2014, p.607, 610). Especially through quantification and gamification, these apps perpetuate the solutionist and instrumentalist logic that is dominant in our technopoly (Morozov 2014, p.323), instead of providing the user a more profound understanding of smartphone addiction. I therefore argue that these apps are unsuitable for the assessment, understanding and treatment of smartphone addiction. Hence, I stipulate the importance for future app developers to challenge dominant discourses and practices such as instrumentalism and quantification. This is necessary because they currently foster an understanding of our relation with technology that is too simplistic and utopian.

More specifically, on a discursive level I have uncovered that the apps reflect a gap between the discourse of design and pathological discourses, while they should be intertwined in order to make a valuable addiction app. Sinnott-Armstrong and Pickard (2013) argue that the line drawn between addict and non-addicts differs per context, as various people have various purposes (p.862). Hence, it makes sense that when looking at the context of these smartphone applications - made by independent app developers- that they are framed in a limited way. This also raises the question whether developers need to make such apps in the first place. Both technology and designers have their shortcomings. The apps are limited because the functions primarily focus on mechanistic game elements and quantification, rather than context, reflection and the specific characteristics of the user. The shortcoming of the designers is that they show no profound understanding of the addiction, and only have an understanding of smartphone application design. So, smartphone addiction applications should be developed by designers who have more insight into this addiction, and have more knowledge of various disciplines, such as psychology and media studies.

On the level of media studies, I have demonstrated the value of applying the concept of procedural bias to the analysis of smartphone applications. Procedural rhetoric refers to a general mode of expressing something through procedures, which is often applied to video games. Procedural bias however, enables us to see how affordances of smartphone apps create certain (unintentional) biases in regard to smartphone addiction. Moreover, my research shows how implicit and explicit meanings of smartphone apps can be analysed by looking at both discourse and affordances. By doing so, I have highlighted that technologies are often embedded with certain (unintentional) biases and that we therefore need to be more critical towards these technologies.

6. Discussion: reflection on method and future research

6.1 Reflection on method: usefulness and limitations

Both methods were very useful in answering the main research question. In regard to the textual discourse analysis, the rhetorical devices helped me to interpret the texts in more detail, while the building tasks allowed me to step back and see how some of the rhetorical devices create meaning together. This enabled me to interpret the verbal rhetoric of the apps more thoroughly, and get more insight into how smartphone addiction is framed both explicitly and implicitly. The affordance analysis specifically helped me to see how the apps frame smartphone addiction implicitly.

The combination of the two methods has proven to be very valuable for analysing rhetoric of new media, as it allows to uncover how affordances and verbal rhetoric create meaning together. Both methods enabled me to analyse and interpret the apps on a deeper level, bringing out many implicit meanings that normally would not have been noticed. Combining these two methods also enabled me to uncover contradictions between the two, as explained in chapter 4.5.

However, there are some limitations to these methods, which I addressed earlier in the method chapter. One important point is that both the textual discourse analysis and the affordance analysis cannot provide answers as to why the apps are developed the way they are. This research could therefore benefit from an ethnographic research that interviews the developers behind the apps to gain more insights into the reasoning behind the specific affordances, claims and assumptions.

Moreover, both methods require a lot of interpretation. Hence, the outcomes of the analysis are mostly based on my (cultural) background and are thus influenced by me. This however does not make my research less valuable, as the analysis is based on theoretical and methodological foundations, and my motivations and perspective are clearly stated in the introduction. Furthermore, the matrices in the appendix (chapter 7.2) offer insights into the reasoning behind the analysis, and will allow other researchers to easily check for similarities.

A limitation of the affordance analysis is that it does not enable me to find out how the apps are actually used by the users and whether they are indeed unsuitable for solving smartphone addiction, or on the contrary offer users help with their addiction. But looking at the effects of smartphone addiction apps was not the goal of this research. My focus was on critically analysing the rhetoric and value of such apps from a media studies perspective.

In terms of the corpus, the amount of text within the apps and their corresponding website was limited. However, this was compensated by looking at both the verbal rhetoric as well as the affordances of three different apps. Unfortunately, because of the limited scope of this thesis, I was not able to analyse and address all elements I wrote down in my preliminary research. But limiting myself to the most prominent themes resulted in stronger arguments and a more focused thesis.

6.2 Recommendations for future research

Although this thesis is quite extensive when it comes to how smartphone addiction apps frame smartphone addiction, there is still enough room left for further research. The introduction and theoretical framework highlight that although smartphone use is a dominant discourse and issue in many countries, there is still a lack of academic research on smartphone addiction (treatment). I also discussed the problematic fact that until now, research on smartphone addiction applications has only been addressed by the developers of these apps (Löchtefeld et al. 2013). Hence, more research into (solving) smartphone addiction is necessary, especially by combining different disciplines, including pathology, psychology, technological design and media studies.

Furthermore, because the analysis shows that developers have a lack of knowledge when it comes to understanding addiction, future research should focus more on the developers and their motives behind creating the app and the chosen affordances. Some relevant questions would be: How do the developers define (smartphone) addiction? How do they see our relation to technology in general? What are the expectations of the developers? Are they conscious of the limitations of their app? What meanings or biases were created intentionally? Also, how far does nationality of the developer play a role in the way smartphone addiction, and our relation to technology, is understood? For this thesis I researched apps from three totally different countries, but I did not investigate whether the nationality of the developers might have had an influence in the way the apps frame smartphone addiction.

Last but not least, future research could look at the reception of these smartphone addiction apps, which would be similar to the research on other addiction apps by Michael Savic et al. (2013) and Nicole Wisser et al. (2015). This would provide us with a more critical insight into the value of these smartphone addiction apps; although they might not foster an understanding of smartphone addiction, they might still be of use to some people, and in different ways.

7. Appendix

7.1 Smartphone addiction application descriptions

Application	Description	Ratings
BreakFree	BreakFree is the best Android app for monitoring and taking control of your smartphone usage habits and your digital life. It helps you check your addiction levels and also helps you unplug and disconnect from your smartphone. With BreakFree you can focus on what's important. If you think you are spending an unhealthy amount of time on your smartphone and getting distracted or are are feeling addicted, BreakFree will help you take control of your life and and help you focus and spend time with the people you care about. BreakFree is a revolutionary app that will help you maintain a controlled digital lifestyle. It monitors phone and app usage. With visually appealing characters, graphs and statistics, the app guides you on how you can control phone usage. It also gives you a set of customizable tools which help you disconnect from your phone during your off time. Use these tools to get unplugged and disconnect from your phone, get some much needed time off.	16,000+
OffTime	OffTime for Android lets you create profiles that block your calls, texts, and notifications. You can even restrict access to any apps and limit your phone usage (digital detox), so you can make sure you can focus, do not get distracted, break free and have some quality time. Make exceptions for the people important to you, or send out custom auto-replies that let others know when you're back on the grid. And you won't miss a thing- check out the activity log for a comprehensive list of everything that happened while you were in your zone. Our intuitive analytics give you insights into your phone and app usage, so you can identify your habits.	12,700+
Forest	Have you ever been addicted to your phone and just cannot put it down? Forest provides an interesting solution to beat your phone addiction. You can plant a seed in Forest. In the following time, this seed will gradually grow into a tree. However, if you cannot resist the temptation and leave this app to check Facebook or play a game, your tree will wither away. With this interesting mechanism, the sense of achievement and responsibility will drive our users to stay away from their phone with no pain.	44,000+
QualityTime	QualityTime is a fun, visually engaging and easy-to-use Android app that allows you to monitor and get real time reports on how much time you spend on your smartphone and on your favourite apps. QualityTime offers a unique and in-depth analysis of your smartphone activities by tracking total usage, screen unlocks and individual apps with hourly, daily and weekly summary reporting options. The app provides the ability to curb your habits by using actionable features allowing you to set your own time restrictions like 'alerts', 'take a break' and 'scheduled breaks'.These features can help you manage and control your usage when needed. You can create different QualityTime profiles to customize how you wish to unplug from your smartphone during "take a break" or "scheduled breaks" to minimize distractions during those periods. QualityTime profiles provide options for you to block notifications and reject phone calls with auto reply text messages. You can also define exceptions to allow incoming calls from important contacts and permit access to specific apps during those restricted periods. You can also connect to the Internet of Things (IoT) to set alerts that tell you when you are overusing your phone!	7,800+

	You can use QualityTime without signing up. However, by creating a QualityTime account, you will be able to see detailed device usage history for up to 6 months, and the usage information will be securely backed-up in the Cloud.	
AppDetox	Get more social time for your life, and spent less time on the phone! AppDetox helps you to calm down your mobile app usage, and take a digital detox. You are able to set your own rules for your apps to detox from some heavy usage and stop procrastinating and phubbing. Lock your apps with this applocker. Every time you violate one of your own rules, AppDetox will remind you to take a break and stop your heavy app usage. You can also keep track of these violations in a log. Some people are using AppDetox for parental control of their kid's screen time. Get your dose of AppDetox now!	1,400+
Moment (iOS only)	Track how much you and your family use your phone and tablet each day, automatically. • See what apps you use the most too! Moment is the first and only app on the App Store to do this. • Set daily limits on yourself and find a balance for the screens in your life. • Monitor all of your family member's screen time too. - Look at your entire family's day from the comfort of your own device. • Start screen-free family dinner time, which means for the next 60 minutes, every time a person in your family picks up their phone or tablet, an annoying alert will go off and everyone will hear it. How embarrassing! - You can decide how long each family dinner time will last. - Everyone in your family can start family dinner time, including your children. - Schedule it for the same time every day. • Change a family member's daily limit and force them to put down their phone when they're over that limit.	-
AppBlock	AppBlock - Stay Focused is android application that helps you (its users) to block temporarily distracting applications on his mobile so that you can stay focused in school or your work. The blocker app can get activated for a precise time and date, and once the pre-set time duration gets over, the barring gets automatically over.	3,800+
Menthal	In the following study we would like to scientifically assess, how often people are actually using their mobile phones. When do we go online for the first time a day, when do we first check for new email and when do we receive the first call? Additionally, it is the aim of the study to find out how differences in smartphone usage can be explained. In this context we would like to take into account classic self-report inventories from personality psychology (e.g. recording the self-perceived anxiety or sociability). More specifically, the phone shall ask questions from short versions of scales for personality assessment from personality psychology (e.g. "I am anxious" with possible answers ranging from "agree strongly" to "disagree strongly"). These single items will appear on the screen to very manageable extent (not more than one item per day). You can, of course, dismiss the request. Because your smartphone contains very private information, we would like to explain, what information the software stores and which it does not. It does not record any personal content from emails, SMS or chat messengers (e.g. WhatsApp). Of course it does not record, what internet addresses you visit or with whom you are talking over the phone. We are interested in quantitative variables - how long are you online per day, when do you look on the phone for the last time in the evening and how big is your social network (how many different phone numbers are there, but not what phone numbers are in your phone book)? Quantitatively, this means further, that content or email with regard to the size of your vocabulary can be assessed and be sent to our servers (e.g. vocabulary is made up of 3430 words). Again: it is not possible to gain any knowledge about the original email's content from this information. Subsequently, we elucidate what information we record, what the study's design looks like and how we secure your data.	7,300+

App Usage	App Usage is the easiest to use but powerful application management app. It provides the following key features: • Show app usage history: gather the usage time about apps that you used • Check phone history: gather counts of you checked the phone • Show activity history: gather the time that you open apps • Over-use reminder: remind when you spend on phone or apps for a long time • Most used apps - show most used apps on widgets or a notification • Track all installs: keep track of all installs and uninstalled app • App install reminder: notify when apps installed and the summary of daily installed app • Manage apps: 1-tap to uninstall apps, sort apps by various options	2,800+
Keep Me Out, App Locker, ClearLock	Apps aimed at limiting distraction and creating productivity by blocking specific apps or the smartphone as a whole.	-

7.2 Preliminary research (matrices)

List of apps analysed:

OffTime. OFFTIME GmbH, Germany, 2012, http://offtime.co/.

Forest, ShaoKan Pi, Japan, 2014, forestapp.cc.

BreakFree, Mrigaen and Nupur Kapadia, India, 2014, http://www.breakfree-app.com/.

Legend 1: Textual discourse analysis

Creating a paradox

Creating an opposition

Aspects of smartphone addiction/use

Praising of quantification

Creating a problem

Features/possibilities of the app

Creating a limited/simplistic understanding of smartphone addiction/use

User is framed as passive/active (agency)

Relates to affordances

Boxes outlined with thick borders are (explicitly) referenced in the analysis.

Legend 2: Affordance analysis

(Lack of) context and/or reflection

Quantifying smartphone addiction

Aspects of smartphone addiction/use

Creating a limited/simplistic understanding of smartphone addiction/use

Treatment/method (e.g. scheduling, external stoppers)

Gamification

Contradicts the aim of the app

Relates to verbal rhetoric/discourse

Personal (internal/external) aspects

Boxes outlined with thick borders are referenced (explicitly) in the analysis.

7.2.1 BreakFree: Textual discourse analysis

BREAKFREE - TEXTUAL DISCOURSE ANALYSIS		
"Rhetorical device"	Description	(Quick) interpretation
Vocabulary (metaphors, connotations)	WEBSITE: "…a *real human being*…"	This pleonasm creates a strong distinction/opposition between people you have contact with in "real life" and people you have contact with online. This creates the idea that there is a problem (we are not social), and which therefore needs to be solved (using the app).
Mood/modality	APP: "You *can't* find real life in your phone!"	This imperative sentence creates a degree of certainty and creates an opposition between a "real/good life" and a "digital/bad life". This helps to frame smartphone usage in general in a negative way; as an addiction/problem, although this might not always be the case.
	WEBSITE: "*How many times a day do you think you check your phone? Once every hour? Once every 30 minutes? You most likely are wrong.* Study shows…"	The developers presuppose that we check our phone more often than we think, and thus need help because we do so. It also points towards the fact that the developers assume that the amount of phone "checks" is an important cause/part of smartphone addiction.
Presuppositions/ assumptions *(strongly overlaps with other rhetorical devices)*	WEBSITE: "*…tracks how addicted you are…*"	The assumption is made that tracking user data provides insight/knowledge that will help limiting smartphone usage. Smartphone addiction is thus framed as something that has mostly to do with duration of use, and is framed simplistically as something calculable.
	WEBSITE: "…helping you maintain a *healthy digital lifestyle*." "…maintain a *controlled digital lifestyle.*"	The developers assume that smartphone use is not bad when controlled. But what does "controlled" entail exactly? This shows an absence of what they exactly mean by "good/controlled smartphone use", creating a limited understanding of (how to solve) smartphone addiction.
	WEBSITE: "…doing something *constructive*…"	They assume that checking your phone is not constructive, which easily frames smartphone use as bad/an addiction.
	WEBSITE: "…*helped* over half a million people *reclaim personal time.*"	The developers assume that your smartphone takes away personal time; the things you do on your phone are thus not equal to personal time. Also, the assumption is made that smartphone addiction is caused by this lack of personal time. This create the idea of a problem while there might not be one, since you can also have personal time on your smartphone. Again, the opposition between offline and online life is created, which helps to easily create the idea that we all are addicted to smartphones.
	APP: "*Living life*" (ACHIEVEMENTS)	You get this achievement when you maintain an average addiction score of 40 in one month (the "green zone"). "Living life" assumes that when you use your phone you are not living life, which again creates the opposition between real life and offline life, framing smartphone use in a very simplistic way.
	WEBSITE: "… and *tracks how addicted you are.*"	Smartphone addiction is framed as something that has mostly to do with the time you use on your phone. Again, the assumption is made that behavioural data gives accurate insights/knowledge, and that smartphone addiction is framed as something calculable. However, the affordances and visual rhetoric show that the app does not

		make it clear what smartphone addiction entails exactly and how to solve it.
Agency	WEBSITE: "helping you", "helped over half a million people", "help you".	The developers place emphasis on the app "helping you to…". Hence, the app is framed as active (Agent) and the user is framed as passive rather than active (in control), which presents the app as more powerful, framing smartphone addiction as something that can be (better) solved with the use of an app.
Absences	BOTH: There is no mention of different elements that can cause the addiction, apart from the smartphones themselves.	Smartphone addiction is framed as something that is caused solely by the technology itself, instead of also being related to other social aspects. Not mentioning other aspects of the addiction acts as a veil for the things the app itself cannot solve easily, because this would present the app as something that is not the right solution for the addiction.
	BOTH: The app and its developers do not mention how the addiction score is calculated, and what the addiction score exactly entails.	An understanding of smartphone addiction is not fostered through the app. The app only presents vague numbers and a categorization of "green", "orange" and "red". (See affordance analysis).
	BOTH: The app and its developers do not mention other treatments/solutions, besides quantification.	This highlights the developers' limited understanding of smartphone addiction, because they regard smartphone addiction as something that can be quantified. Other (more reflective) methods or complementary treatments are neglected.
Other	WEBSITE: "Using a *highly advanced algorithm*", "*revolutionary* mobile app", "*healthy digital lifestyle*", "…could be spending time with a *real human being.*"	The developers praise the quantification abilities of the app. This points towards a paradox in the framing of the relationship between humans and technology. On the one hand, the opposition is made between a 'good/real life" and a "bad/digital life", which frames technology (smartphones) as bad. On the other hand, the app as a technology is framed as more insightful than humans because of the tracking and calculation abilities. This paradox highlights the interests of the developers and creates a very simplistic but confusing representation of (our relation with) technology.
	APP: The name of the app itself (BreakFree)	The name of the app suggests that we are controlled by our smartphones, which implies that there exists a problem (which needs to be solved by the app).
	WEBSITE: "*informed decisions*", "use your time *wisely*"	This highlights the significance of the app's properties; the app apparently helps you to make the right decisions and to help use your time well. This helps to frame smartphone addiction as something that can be solved with the help of the app.
	WEBSITE: Statistics of the amount of app downloads, users, and ranking of the app.	By doing presenting these numbers, the developers represent the app as something profound and useful, framing the app as the solution for smartphone addiction.

7.2.2 BreakFree: Affordance analysis

BREAKFREE - AFFORDANCE ANALYSIS		
Form/function	**Interface**	**(Quick) interpretation**
Option to set up an auto-text message or auto-reject calls (TOOLS)	-	The developers claim on their website that the app helps you to be more social by limiting smartphone use, but auto-texts and the rejection of calls can also cause the user to be less social. This affordance also points towards to the assumption that smartphone addiction has to do with connectivity and can therefore be solved by limiting social contact.
The duration of phone usage and amount of phone "unlocks" changes the addiction score; the longer the phone is used the higher the addiction score. (DASHBOARD)	The app presents an addiction score between 0-160+ in a large font in the center of the screen, framed by a circle of which the colour connects to the score (green, yellow or red). (DASHBOARD)	Smartphone addiction is framed as having solely to do with smartphone usage in terms of duration and amount of unlocks. However, the academic discourse of smartphone addiction shows that heavy usage is not the same as addiction. Hence, the app assumes that there is a problem, while this might not be the case at all. Moreover, the app does not differentiate between what things you do on your smartphone and for what purpose. For instance, if you use your phone for an hour for work or school, or you need to unlock your phone several times to reply to important issues regarding your work, you will still get a score that tells you, you are addicted. Thus, the score neglects the context which frames smartphone addiction in a generalized and biased way. Moreover, the addiction score is also biased because it presents smartphone addiction as an integral quantity that can be understood in terms of numbers and categories. Such a score thus neglects other (external) factors that can be part of smartphone addiction, such as cognitive problems the user might have.
The user is given a "bar" each day, which is coloured green, yellow or red according to the average addiction score of that day. Green is 0-40, yellow is 40-70 and red is 70+. (ACHIEVEMENTS)	The app shows three dots (green, yellow, red) together with a number that represents the amount of bars the user has within each category of addiction. (ACHIEVEMENTS)	Similar to the addiction score, the fact that the app presents the level of smartphone use and addiction in three colour categories frames smartphone addiction as something that can be quantified. It also frames the addiction as something that comes in degrees. However, the app does not clarify what the thresholds between green-yellow and yellow-red mean, besides from the fact that it is connected to the addiction score. Thus, both the addiction score and colour coding only provide a limited understanding of what causes smartphone addiction and what the differences between different levels of addiction are.
If the user has, or maintains, a low addiction score (green), he/she is given an achievement. E.g. If the user gets an average of 40 or less, in a month. (ACHIEVEMENTS)	-	This means that a low addiction score, which the user gets from using his/her smartphone sparingly, is regarded as good. This again frames smartphone addiction in a simplistic way; as solely being related to overuse. However, "overuse" is only one aspect of smartphone addiction according to the SAS-scale (Kwon et al. 2013). The app thus let people assume that they are addicted, while this might not even be the case.
If the user uses the scheduler tool with which the user can choose when certain functions on the phone are being	-	The app encourages the user to use the schedule tool. This points towards the assumption that smartphone addiction is understood as an addiction that can be solved by limiting smartphone functions. It also is also assumed that

restricted, he/she is given an achievement called "smooth scheduler". (ACHIEVEMENTS)		(limiting) smartphone use depends on the situation/context, and therefore that the user has to take his/her own decisions.
If the user is using his/her smartphone for ... minutes, he/she is shown a push notification with two options: to turn off the screen or to click away the notification. (EXTERNAL) The user can also decide to switch off these notifications or to decide after how many minutes the notification prompts (from 1 to 60 minutes). (TOOLS)	The notification shows the character Sato and offers the user to choose between two options in the form of a button: "Snooze" and "I know what I'm doing". (EXTERNAL)	-
The user can choose which apps and/or which persons' phone calls are excluded from tracking. (SETTINGS)	-	The app does take into consideration that smartphone addiction is often caused by particular applications (Young 1999, p.7) and that smartphone use does depend on context. For instance, if the user is often calling with his/her boss does not mean that the user is addicted. Or if a user uses a productivity app to help with school work, this should not be regarded as smartphone addiction. However, the option to whitelist certain apps can create a false sense of safety and can therefore create more risk.
The options for changing the app to the user's personal needs is very limited.	-	This points towards the assumption that smartphone addiction is the same for everyone and has nothing to do with personality traits, personal problems, age, gender, et cetera. The app could for instance implement different functions/options according to the type of user. For instance, if the user has social anxiety and only has cyber-oriented relationships, the app could focus on limiting use of social apps and on helping make social contact offline.
The user has the option to let the app automatically allow/block certain calls, or to reject all calls. (TOOLS) The user has the option to let the app allow/block notifications from certain apps, or to stop all notifications. (TOOLS)	-	The app presupposes that not all calls or applications are the same and contribute to smartphone addiction, and that blocking certain aspect are useful methods for solving smartphone addiction. However, it is also important to reflect on why a certain app is important for someone, the app may contribute to the addiction without the user knowing. For instance, a social or game app can provide mental pleasure such as exhilaration and might feel too important to reject.
The user can schedule a "BreakFree session" during which the user can choose to auto-reject calls, stop notifications and send auto-text messages. The user has the option to choose the duration from 1 hour to 24 hours, and the specific day(s). (SCHEDULE)	-	This points towards the assumption that scheduling is a useful method for the addiction and that smartphone use differs per context. However, this context is not taken into consideration in regard to the smartphone addiction score and the corresponding data visualizations.
The user can share the BreakFree app, his/her addiction score and achievements via social media	-	This seems contradictory towards the goal of the app (beating smartphone addiction by limiting smartphone functions), since the connectivity with other apps, especially social networking sites, is often a cause for smartphone

and other applications (e.g. WhatsApp, Gmail).		addiction. Although this option is probably implemented to motivate the user, it can also be problematic in regard to controlling smartphone use. Hence, this points to the developers' limited understanding of addiction.
-	Data visualization of addiction score per week or month. Uses three colours that connect to the addiction score: green, yellow and red. It also shows the average addiction score and presents the addiction score on the y-axis. (DASHBOARD)	Again, the app differentiates between three distinct levels of smartphone addiction, but does not clarify on what thresholds these are based and what the numbers/addiction score exactly entails. Also, the data are not put in context, although it is the context in which these numbers are created give them meaning (Lupton 2016 p.79). Hence, if the user would get more contextual information about each specific day, this would provide more context to the data: e.g. what apps were used, for how long and why. The only context the app provides is the date. However, it is hard to remember what you did on each date. Thus, the data visualizations only provide a limited understanding of the (presumed) addiction and frames smartphone addiction again as something easy definable and as something that can be quantified.
-	List of the top 5 most used apps of the day, including the total usage time. (APP USAGE)	The app does recognize that smartphone addiction is often caused by specific apps and that abstaining from a particular application can help (Young 1999, p.7). However, it does not provide an understanding of what elements of the applications in specific are (dis)liked. Because it might not be the app itself that is addictive, but a specific element which can be part in several apps.
-	Listing of call usage of the day. (APP USAGE)	-
-	The app uses a character called "Sato" which is presented as a Buddha. He gives you "friendly" notifications, for instance if you have used your phone over an hour.	Sato as a Buddha carries connotations of peace, which is also reflected in the verbal rhetoric of the app developers and implicitly frames smartphones/smartphone use as something disturbing and negative.
The user can start a "BreakFree session" in which the app applies the settings the user chose, such as specific calls that are rejected. The user can set the duration of this time from manual to 23,5 hours. (TOOLS)	The app displays a red button that says "BreakFree now!"	"BreakFree now" assumes that we are controlled by our smartphones and need to be freed, creating a very negative notion of smartphones/smartphone use. Together with the function, the app implies that you can get back in control by limiting functions on your phone. However, this "treatment" is only regarded towards overuse, which is only one small aspect of smartphone addiction. Again, this shows that the app understands smartphone addiction mostly in terms of overuse and therefore also only implements functions that are aimed towards limiting smartphone use. Other (external) factors such as personal problems are disregarded. The app for instance does not include any options for self-reflection, like the option for a diary or chat with an expert.

Sato displays a message according to your addiction score (e.g. A good addiction score means a positive message). (DASHBOARD)	"Hey you are so beautiful without your mobile" (Sato) (DASHBOARD) "I think you've got it now" (Sato) (DASHBOARD) "You are awesomeness personified" (Sato) (DASHBOARD) "Man, are we taking it easy today" (Sato) (DASHBOARD) "Get a life. Stop checking your phone!" (Sato) (DASHBOARD)	-
The app sends push notifications when the "BreakFree session" is active, informing you of how many apps/calls BreakFree blocked for you.	"BreakFree blocked: … notifications." (PUSH NOTIFICATION)	This seems contradictory towards their aim of limiting smartphone use and the other functions of the app, namely to restrict push notifications from other apps. This is also contradictory to the aspect of "withdrawal" that is often part of smartphone addiction (Kwon et al. 2013); constantly having the smartphone in one's mind. Push notifications will stimulate this instead of solving this.

7.2.3 Forest: Textual discourse analysis

FOREST – TEXTUAL DISCOURSE ANALYSIS		
"Rhetorical device"	Description	(Quick) interpretation
Vocabulary (metaphors, connotations)	WEBSITE: "focus" (used 5 times)	The developers of the app assume that when you are using your phone, you are not focused on the things around you. They create the idea that smartphones are a distraction and are limiting productivity (and sociality).
	APP: "A tree with *some white cute flowers* growing in. People love to *picnic under it on weekends.*" (TREES)	These sentences use words that carry positive connotations and emphasize natural and sociality, which implicitly creates a contrast between offline (nature/humans) which is positive, and online (technology) which is negative.
Mood/modality	APPSTORE: "*The best cure for phone addiction.*"	This declarative sentence shows an instrumentalist thought on solving smartphone addiction, framing the addiction as something easy definable and solvable.
	APPSTORE: "Forest *provides* an interesting *solution* to beat your phone addiction."	This declarative sentence shows that developers think that smartphone addiction is solved by the app, which again shows the instrumentalist and solutionist thought of the developers. The emphasis is placed on the things the app can do, instead of on what the addiction exactly entails and how it is caused (and therefore, how it could be solved in different ways).
	APPSTORE: "...the sense of achievement and responsibility *will* drive our users to stay away from their phone with no pain."	This declarative sentence implies that the app's focus is on self-responsibility and motivation, instead of limiting functions, which makes the app seem playful. However, the affordances are still mainly focused on limiting smartphone functions, and most game-elements are mechanistic rather than playful (Sicart 2011).
Presuppositions/ assumptions *(strongly overlaps with other rhetorical devices)*	WEBSITE: "Put down your phone and focus on *what's more important in your life.*"	Similar to OffTime and BreakFree, the developers presuppose that the things you do on your phone are less important than the things you do in "real life", which creates a simplistic division between on- and offline. This helps to create the idea that using your phone is problematic, while this not might be the case.
	WEBSITE: "Stay focused, *be present.*"	Similar to OffTime ("unplug") and BreakFree ("break free"), this sentence (their slogan) entails the assumption that when you are using your phone, you are not focused on your "real" life and therefore not living your life to the fullest. Again, this creates the idea that there is a problem which needs to be solved (through the app).
	APPSTORE: "*Have you ever been addicted to your phone and just cannot put it down?*"	Here, smartphone addiction is framed in a very simplistic and overgeneralized way; if you cannot put your phone down, you are addicted.
Agency	APP: "*Develop your pattern.*", "*Develop* a "no smartphone" pattern to speed up your productivity."	The user is framed as the Agent (active) who has the possibility to develop a pattern, instead of the app itself that choses the pattern/options for the user. This shows that the developers understand smartphone addiction as something that can differ per person; each person needs a different pattern, and therefore needs to be able to control this him/herself. However, as the affordance analysis shows, the options that are offered are still limited and aimed towards a general public instead of specific types of users.

	APPSTORE: "*Forest provides* an interesting solution to beat your phone addiction."	The app is framed as the Agent, which points towards the assumption that the app is the solution for the addiction.
Absences	ALL: Similar to OffTime and BreakFree, there is no mention of the exact elements/causes of smartphone addiction.	The app developers frame smartphone addiction in a very simplistic way. The app does give you a few options to stimulate productivity and limit smartphone use, but no information is given about the addiction itself.
	ALL: No distinction is made between not being productive and being addicted.	It is not clear where the threshold between unproductivity and addiction lies, which creates a very general and vague understanding of smartphone addiction. Not being productive does not necessarily mean you are addicted. This creates the idea that we are addicted and need the app to help us, while the only problem there might be, is unproductivity.
	BOTH: There is no mention of other (reflective) treatments/methods, besides quantification and "playful" elements.	Although Forest, in contrary to the other two apps, highlights the "playful" elements of the app, besides quantification, the developers still do not mention reflective methods as a way to treat the addiction. Hence, the developers still show a limited understanding of (treating) smartphone addiction.
Other	ALL: There is no mention of quantification, although this is a big part of the app's affordances.	Unlike the other two apps, the developers do not emphasize the quantification abilities of the app, but rather focus on the "playful" elements. However, in regard to affordances, the app does provide several data summaries and visualizations. So, this is present in the affordances, but not in their discourse.
	APP: "We partner tree planting organization to plant real trees on Earth. When a user spend virtual coins on planting real trees, Forest team donate our partner and create an order of planting. Our previous partner, WeForest had helped us plant over 7,500 real trees in India and Zambia. Now, we partner Trees for the Future to help us plant more trees in more countries. Please notice that the locations to plant are based on the current projects our partner is working on. Thus, the locations cannot be assigned by users."	-

7.2.4 Forest: Affordance analysis

FOREST - AFFORDANCE ANALYSIS		
Form/function	**Interface**	**(Quick) interpretation**
When the user does not use his/her smartphone during a "planting session", the user is can plant at least one tree in a virtual forest and is given a "living tree credit" which can be used to unlock new plant species. If the user uses his/her smartphone during the "planting session", a dead instead of living tree will be planted and the user is given a "dead tree credit".	The app shows the total number of credits of the user and differentiates between credits that represent living trees, and credits that represent dead trees. The planted trees are presented on a square green platform that represents the forest. (FOREST)	Through these rules, Forest connects smartphone abstinence to planting virtual trees which is further emphasized through the visualization of the trees; the living trees are green and lush, while the dead trees are brown and look sad. (This is also implied by the achievements which are focused on planting different types of trees). These affordances help to frame smartphone use as something negative and smartphone abstinence as positive. It implies that we need to control ourselves in order to create a better world. Similar to their verbal rhetoric, smartphone use (technology) is put in opposition to smartphone abstinence (nature/peace). Moreover, the fact that the only way to earn credits/achievements is through total smartphone abstinence points towards the fact that limiting smartphone use is understood as the best/only method to solve smartphone addiction, which is the same with BreakFree and OffTime. Also, the fact that a dead tree does not lose you credits shows that the feedback/metrics of the app are mostly positive and focused on reward and engagement, instead of punishment.
The user can spend his/her credits to unlock different types of virtual trees (12 trees and 4 bushes), which cost a minimum of 500 credits. The user can click the question mark icon to see more information about the price tiers. (TREES)	Each type of plant is presented at the center of the screen together with the price, a question mark icon, a green unlock button and a short and "fun" description (e.g. "Take a nap in the coconut hammock? May the helmet be with you."). The user's credits are shown at the top right of the screen. (TREES)	This is the main/central function of the app, which again shows that the app makes a connection between smartphone abstinence and nature/saving the Earth. This also shows a more playful approach than OffTime and BreakFree, since the user can choose where to spend his/her credits on and create his/her own forest. However, this playfulness is limited because the user is still bound to many rules of the system which the user cannot change. The app also does not differentiate between users. Apart from the division between dead/living trees, the app is less focused on making judgements in regard to the user's smartphone behaviour, in contrary to BreakFree and OffTime who place certain usage in specific "zones" or compare it to the average use of other users. It takes a lot of abstinence time in order to unlock a new tree that costs at least 500 credits. E.g. 40 minutes will only give you 12 credits. This implies that the user should be abstinent from his/her smartphone quite a lot (a couple of hours). However, this is contradicted by the fact that the user can only set a planting time of a maximum of 2 hours. This seems contradictory towards the aim of the app, since the user has to come back to the app at least every 2 hours; the app stimulates the user of the app itself.
The user is awarded extra credits when receiving an achievement.	-	-

After each planting session, the user is shown a pop-up with the earned credits. The user can then tag the trees from this session and set a note, which can be reviewed anytime. The user can also share this the completed session via other apps (e.g. WhatsApp, Gmail). (HOME)	The pop-up shows the amount of credits and a green OK-button. In the background it says "Congrats!" or "Oops! You can do better next time!", and shows a living tree or dead tree. It also shows the buttons that the user can click on to tag the tree and share the achievement. (The button with the alarm clock did not work for me). (HOME)	The option to share seems contradictory towards the aim of the app, as it provides the user connectivity, which is often a factor that can cause smartphone addiction. The fact that the user can tag each tree and put a note to it helps to put each tree/smartphone abstinence session in context. The user can then view each tree whenever he/she wants to in order to interpret these sessions. OffTime and BreakFree do not have this function.
The user can spend his/her credits on a real tree which will be planted by a special organization. This is more expensive than the virtual trees (2500 credits). The user can click the question mark icon for more information. (REAL FOREST)	The app shows a large slideshow of photographs of people planting plants in Africa. Clicking on the information icon provides more information about planting a real tree. The user can view how much real trees he/she planted, and how many real trees are planted by other users in total. (REAL FOREST)	-
The app counts the total duration of the user's smartphone abstinence time.	The total minutes of smartphone abstinence is presented in minutes instead of hours and minutes. (FOREST > FOREST RANKING)	Presenting the time of smartphone abstinence in minutes instead of hours and minutes (or even days) makes the user's achievement appear bigger than it actually is. Even when the user has dead than living trees, the total amount of smartphone abstinence in minutes will still be shown. This might create the assumption that the user is doing well, although this might not be the case.
The user can choose to view the global ranking, which refreshes after each round (of 24 hours?). (FOREST RANKING>GLOBAL)	The app lists all app users and their total minutes of "planting"/smartphone abstinence, from highest to lowest, together with the total number of living and dead tree credits. On the very top the app shows how much time there is left in the round (e.g. 0 day 8 hours 5 min). (FOREST RANKING>GLOBAL)	Similar to the above, the time of smartphone abstinence is presented in minutes, which results in what seem to be very high scores (e.g. 8129 minutes) and makes the abstinence/achievement seem bigger than it is. This function implies that the developers see competition and comparison with other users as a good method to solve and better understand the user's smartphone use. However, although it might motivate some users, it is still a very mechanistic approach to smartphone overuse that does not foster a profound understanding of smartphone use and addiction. For instance, if the user stands at the top of the leaderboard but the users directly underneath him/her have a very low score, the user might think he is doing well, although relatively the score might not be that good. Moreover, this function can cause the user to focus on being better than other people, instead of focusing on a personal goal that is more specifically direct towards the user's problems and needs. Also, the fact that the app focuses on comparison (similar to OffTime) points towards the assumption that smartphone addiction as an integral quantity which can be compared. Hence, the developers do not take into consideration that smartphone addiction has also to do with personal factors.

The user can add friends, of which the user can view their scores. (FOREST RANKING>FRIENDS)	The app lists all the friends of the user and their total minutes of smartphone abstinence from highest to lowest, together with the total number of living and dead tree credits. On the very top it shows how much time there is left in the round. (FOREST RANKING>FRIENDS)	Similar to the above. The option to add friends also seems contradictory in regard to the goal of the app, because it makes the app itself more interesting and can stimulate the user use the app more. Moreover, the app again focuses on competition and comparison (similar to OffTime), which frames smartphone use and addiction as an integral quantity. This creates a limited understanding of addiction, because smartphone addiction is caused by several factors, including personal factors and thus cannot be easily compared.
At the first launch of the app, the app shows a six-step explanation of how the app works which the user can view and/or skip.	Each step shows a relatively large picture with a short text underneath that explains the app. E.g. "Develop a "no smartphone" pattern to speed up your productivity."	-
The user can get achievements by: following 15/30 friends, share Forest content at least 10 times, unlocking 6 tree species, reaching the top 100/50/10 in global ranking, reaching a total focused time of 4 hours/3-7-15-30 days, and by planting healthy trees for 3/7 days in a row. (ACHIEVEMENTS)	Each achievement has its own image that corresponds to the title of the achievement and is in greyscale when not yet achieved. Underneath the title of each achievement the user can see his/her progress (e.g. "Unlock at least 6 tree species (0/6)"). (ACHIEVEMENTS)	The rules for these achievements shows that smartphone abstinence and especially competition are regarded as the suitable/important treatments for smartphone addiction. This points towards a limited understanding of treating smartphone addiction, as smartphone addiction can have different causes and symptoms, and addiction is symptom dependent (Sinnot-Armstrong and Pickard 2013). Again, smartphone addiction is framed as something static instead of dynamic.
The user can exclude certain apps which will not kill the user's tree when using the app. (APP WHITELIST)	-	This affordance can create a false sense of safety and can therefore create more risk for the user.
The app sends a push-notification when the user's tree has died because of smartphone use. (PUSH NOTIFICATION)	The app shows a push notification that says: "Your tree has withered". (PUSH NOTIFICATION)	-
At the first launch of the app, the user gets a pop-up with information about the reward calculation during each "planting session". The user gets 1 credit for each session, 1 extra credit per 5 minutes and 5 extra credits per extra 30 minutes. (HOME)	-	This calculation system shows that it takes a lot of smartphone abstinence in order to unlock new trees/bushes/sounds and especially a real tree. Together with the fact that the user gets 5 extra credits per 30 minutes, this implies that longer sessions of smartphone abstinence is favoured and therefore understood as a good solution for smartphone addiction.
The user can set the duration of the planting session from a minimum of 10 minutes to 120 minutes. The user can then click "plant". (HOME)	-	The fact that starting a "smartphone abstinence session" of less than 10 minutes is not possible, points towards the assumption that smartphone abstinence of less than 10 minutes is not valuable and cannot be rewarded. The fact that the user can also not set a session of more than 2 hours would indicate that it is recommended to use your smartphone again after a break of 2 hours. This seems contradictory towards the goal of the app, as the user is restricted to a smartphone abstinence of 2 hours. Especially

		since the price to unlock items is very high. So the user would need to come back after every two hours.
-	When the user has planted a tree, the home screen says: "You have *stayed focused* for … minutes today." If the user has not planted anything yet, it says "Start planting!" (HOME)	"You have stayed focused" points towards the assumption that when you are not using your smartphone, you are always focused. However, a session of smartphone abstinence is not necessarily better than a session during which you use your smartphone. It depends on what you are doing while not using your phone, and what you are doing when you use your phone. For instance, you can be very productive using certain apps for your work, and you can be very unproductive when not using your smartphone; you could watch a TV-series instead. Hence, there is a lack of context and with that a lack of understanding the addiction. It is also important for the user to understand what he/she should be doing when not using his/her phone in order to overcome the smartphone overuse.
The app offers for each tag a summary of: total planting time, total living and dead tree credits, ratio of living trees, average planting time, total planting time, total smartphone time, and focused time distribution. The user can view this per tag and per day/week/month/year. (TAGS)	The title of the tag (e.g. "school work" is presented on the top of the screen. The average time is presented in minutes. The planting time/smartphone abstinence is represented as a green bar, and smartphone use time is represented as a brown bar. The focused time distribution is presented as a green graph. (TAGS)	The app differentiates between smartphone use and smartphone abstinence by presenting the amount of living trees/smartphone abstinence and the amount of dead trees/smartphone use. But unlike BreakFree and OffTime, the apps does not further make judgements about this. There are no other categories/levels/zones that represent good or bad behaviour. The fact that the user can review summaries within each tag (unlike OffTime), makes it easier for the user to interpret the data. The fact that the summary is also attached to the tags and notes, helps the user to place his/her behaviour even more in context. However, the fact that the user can choose to view a summary for a whole year, homogenizes the data and offers the user just a few generalized numbers.
The user can click on the info icons for more information about each category. (TAGS)	"Average time - The average time of your planting (Total, successful and failed, respectively)." "Summary - Number of healthy trees, number of dead trees, success rate and total planting time." "Focused time distribution – The focused time distribution over the hours." (TAGS)	-
The dead and/or living trees that the user has planted are presented in a visual forest. This forest represents one day, and thus refreshes every day. The user can still review all previous forests by clicking the arrows. (FOREST)	The app shows a green platform made up of squares on which the user can plant the trees to create a lush forest. (FOREST).	The fact that each day begins with an empty forest might stimulate the user to keep earning credits to plant trees by limiting his/her smartphone use. However, it also becomes more of a chore and stimulates the user to keep engaging with the app while he/she is not even addiction to his/her phone anymore.
The user can click on each planted dead/living tree to see	The app lists each tree, along with minutes of smartphone	This function affords the user to keep some sort of diary/inventory that puts the data (planting sessions) in

a summary of all planted trees (planting sessions). (HOME>TODAY)	abstinence, the time/date of the session, the corresponding dead/living tree credits, the tag name and the attached note. (HOME> TODAY)	context thanks to the time/date, tag and note that the user assigned to the planting session(s). This offers the user to reflect on the sessions and with that to better understand his/her smartphone usage.
The user can spend his/her credits on different ambient sounds that play when using the app. There are 6 in total. The price for each sound cost a minimum of 500 credits. (AMBIENT SOUND)	The user can click a play button to hear a demo of each sound. Each sound has its own title (e.g. "Night Forest", "Sandy Beach"). The first sound ("Rain Forest") is already unlocked. The price of each sound is shown next to each sound title. (AMBIENT SOUND)	This seems contradictory towards the goal of the app, because in order to listen to the ambient sound the user has to spend time within the app.

7.2.5 OffTime: Textual discourse analysis

WEBSITE = http://offtime.co/ (home page)

WEBSITE2 = http://offtime.co/bigpicture/

OFFTIME – TEXTUAL DISCOURSE ANALYSIS		
"Rhetorical device"	Description	(Quick) interpretation
Vocabulary (metaphors, connotations)	ALL: "…helps you to (…) *unplug*…", "…find digital balance in a *hyperconnected world*.", "OffTime lets you control your *connectivity*…, "*Unplug* and focus on your work.", "In an increasingly *connected world*…", "*Reconnect*", "*Take time off from constant connectivity*."	The metaphors "unplug" and "(hyper)connectivity" in this context carry negative connotations and create a feeling of intimacy we have with our smartphones, which is framed as problematic. Therefore, the developers imply that the main problem is that we spend too much time on our phone which distracts us from our offline life. Smartphones are framed as being too intrusive. "Reconnect" and "unplug" also signify that with our phones, we are not engaging with our life anymore, and thus we need to get back to life/reconnect through the use of the app. Smartphone addiction is framed as a problem caused by hyperconnectivity, and which thus can be solved by limiting connectivity.
	WEBSITE: "Invite your partner for a *shared evening together*, kids and family for dinner time…"	This sentence includes words that carry romantic and social connotations, which creates an opposition between using and not using your phone. Smartphone use is framed negatively as something unsocial.
	WEBSITE2: "We spend more time interacting with *screens* than *real people*."	Smartphones are presented in a negative way by describing them as just "screens", which carries negative connotations and emphasizes the "non-humanness" and "mindlessness" of smartphones. On the other hand, the pleonasm of "real people" emphasizes the "humanness" of people. Again, this creates a strong opposition between technology and humans.
	WEBSITE2: "It's a *gift* to yourself and the people you care about. It might just be the most valuable *gift* there is: your time and attention."	The metaphor "gift" carries positive connotations and the notion of importance. Thus, the developers assume that the app (as the gift) is important to solve the addiction as it gives you time back as well as your attention. Smartphone use is framed as a problem that causes loss of time and attention, which is solved by the use of the app.
	WEBSITE2: "Mobile technology (…) *infiltrate* our homes, and *graft itself* onto our very bodies."	The metaphors "infiltrate" and "graft" carry very aggressive and negative connotations, consequently framing mobile technologies as such. This also points towards the assumption that there exists a problem: mobile technologies are too interwoven with our lives.
	WEBSITE2: "information *junk food*"	"Junk food" frames the information we get from smartphones as negative/not good for you. However, as the affordances of the app itself show, the app does not differentiate between different types of apps and content in specific.
	WEBSITE2: "But it's not simply about *balancing* work and free time, it's also about *balancing* on- and offline."	The developers highlight the importance of balance, which implies that they believe that totally limiting smartphone use is not the solution to smartphone addiction.
Mood/modality	WEBSITE: "*Tame the chaos*."	This imperative, although it should not be taken too literally, creates the idea that there is a problem (hyperconnectivity) which we need to control (by the use of app). Again paradoxically, smartphones are presented as being intrusive and causing smartphone addiction. Still, they recommend to solve this with the use of an app on your smartphone.

	WEBSITE: *"We have changed."*	Using this imperative points towards the assumption that we have changed (in the age of hyperconnectivity), presupposing a problem which creates a reason for us to use the OffTime app.
	WEBSITE: *"With the mobile revolutions things dramatically changed."*	This declarative sentence claims that mobile technologies changed many things, which points towards the assumption that there is a problem (smartphone addiction), caused by technology instead of (solely) humans.
	WEBSITE2: *"... at what cost?", "Do we really want our smartphones to gatecrash the best moments of our lives?"*	This interrogative sentence functions as making clear that there is a problem with us and our smartphones, which we need to solve right now.
	WEBSITE2: *"...mental disengagement from work during free time is essential."*	This declarative sentence again highlights the problem of hyperconnectivity brought about by smartphones, which emphasizes the need for limiting smartphone usage.
Presuppositions/ assumptions *(strongly overlaps with other rhetorical devices)*	WEBSITE: *"...helps you to focus and to unplug to be creative..."*	The developers assume that smartphone addiction entails not being focused nor creative. They also assume that this can be solved through the app.
	WEBSITE: *"With OffTime you're fully with the people you care about...", "Be with the people you care about."*	Presupposes that you're not fully with people you care about when using your smartphone (without the OffTime app). Smartphone use is framed as "unsocial".
	WEBSITE: *"...thanks to smart app blocking, communication filters, and insights into your smartphone usage." "... thanks to auto-replies and your personal event protocol..."*	It is assumed that the blocking of apps, filtering of communications, the option for auto-replies and insight of smartphone usage helps to limit smartphone use.
	WEBSITE: *"In total already more than 500 years of undistracted time created."*	The developers presuppose that when you use your phone (without the OffTime app), you are distracted. It also implies that the app helps you to focus. This creates a very simplistic/overgeneralized understanding of smartphone addiction and smartphone use in general, since smartphones are not always distractive but can also be productive.
	WEBSITE: *"... so you can do the things that matter."*	The developers assume that when you do not have the app installed, you do things that do not matter. This entails the assumption that you need the app in order to be productive. Similar to the above, this creates a simplified understanding of smartphone use.
	WEBSITE: *"Or simply enjoy some peace of mind.", "Relax at home."*	Assumes that smartphone use cannot be peaceful and mindful, again creating the distinction between hyperconnectivity/disturbance cause by smartphones and the peace/mindfulness of smartphone abstinence.
	WEBSITE: *"Get to know yourself.", "We provide you with intuitive analytics of your phone usage, enabling you to identify your habits. Learn what you're doing, when you're doing it, and how long for."*	The developers assume that user data provides (accurate) knowledge which can help you limit your smartphone use. This shows that the developers praise quantification as a form of knowledge, and which is better than human knowledge.
	WEBSITE: *"Set hurdles, reminders or restrict access to any apps that you find distracting.", "For a chosen period, block calls...", "...that might disturb you.", "Select the people who can still get through."*	This presupposition shows that the developers regard total smartphone abstinence not as the right solution for smartphone addiction, because contacts are still important. These sentences also point towards the assumption that it depends on each person what type of restriction helps, framing smartphone addiction as something dynamic. However, they do not mention other aspects that are connected to smartphone addiction, such as personal factors. Hence, smartphone addiction/use is still framed in a limited way.

	WEBSITE: "…without the fear of missing out…", "…and *we'll make sure you do not miss a thing*.", "… (without FOMO)."	This highlights the fact that the developers understand that FOMO (fear of missing out) is an important factor of smartphone addiction and needs to be solved in order to solve the addiction. However, some people in popular media (The Guardian) say that just getting rid of all temptations instead of resisting it all the time is a better solution for smartphone addiction.
	WEBSITE2: "…*brings people closer to the things that really matter to them*…" APP: "Enjoy your *quality time.*"	Presupposes that when you use your phone, you are not engaging with things that matter to you. Again, emphasizing the meaningless and bad information/communication that is provided by smartphones. This points towards a problem of smartphone addiction, although there might not be a problem at all, because the connectivity of smartphones can also bring people closer together. Again, the developers make an easy two-way distinction between online and offline.
	WEBSITE: "*It's time we get back into control.*"	Assumes that we were in control before (the age of smartphones), creating a negative notion of smartphones as technologies that have control over us. Thus, they imply that there is a problem which is caused by smartphones.
	WEBSITE: "*Relax at home.*"	The developers assume that with a smartphone you cannot relax, again creating a negative representation of smartphones as a disturbance, and therefore creating the idea of a problem.
	WEBSITE2: "We spend more time interacting *with screens than real people.*"	This presupposes that when we interact with our smartphones we are not interacting with real people. Again, this creates the idea that there is a problem; we are not socializing enough because of smartphones. However, people also spend time with real people online, and this can go hand in hand with interacting with people offline. Hence, the developers create a juxtaposition between on- and offline, creating the idea that we have a problem with our phones.
	APP: "*Find out what apps are keeping you from peace and productivity*."	This points towards the assumption that not all smartphone apps are negatively influencing productivity and cause smartphone addiction.
Agency	WEBSITE: "OffTime *helps* you to focus…"	The app is framed as active (Agent), while the user is framed as passive; someone who cannot focus and needs help from the app.
	WEBSITE: "… and *your personal event protoco*l.", "*OffTime lets you control* your connectivity…", "*Improve self-control.*", "*You decide what's important!*"'	However, here the app is mostly framed as an instrument (passive) and the user as having control over it (active). Thus, although they also state the functions of the app (what it can do), the developers also highlight the control and choices the user has.
	WEBSITE2: "*We should begin thinking* about…", "*We also need to consider*…", "*We need to become aware* of when we want to engage with technology and social media, and *identify* the times that we don't."	Again, the user is represented as having control over the situation, which implies that solving the addiction (also) has to do with the user him/herself.
	WEBSITE2: "Our solutions *enable* people to customize their connectivity…"	Still, "enable" frames the app as active/Agent, assuming that the users cannot customize their connectivity without the app. Although the app provides several options for control (such as scheduling), the user is still framed as being dependent on the app.
Absences	BOTH: No explicit mention of smartphone addiction.	Rather than talking about smartphone addiction, the issue that the developers talk about is hyperconnectivity. However, this contradicts the sharing affordances of the app itself as

		the app implements social sharing buttons. Moreover, hyperconnectivity is not the only problem in regard to smartphones. There are more specific problems, such as impulse control problems (gambling, online shopping), that are maybe not that easily solved by limiting smartphone usage.
	BOTH: No mention of other treatments/methods besides quantification.	This highlights the developers' limited understanding of smartphone addiction as something that can and should be quantified. Other (more reflective) treatments are neglected.
	BOTH: No mention of other causes for the addiction, apart from the smartphones themselves.	Not only smartphones themselves can cause smartphone addiction, but also other aspects such as personal problems or society. The problem of smartphone addiction is framed in a limited way as something that is caused by technologies that cause hyperconnectivity.
Other	WEBSITE2: "We spend more time interacting with *screens* than *real people*."	Similar to BreakFree, there is a paradox how the developers frames technology. On the one hand, technology is framed negatively; as just "screens" and devices that cause hyperconnectivity. On the other hand, the "intuitive analytics" that the app provides are praised, and the app is presented as the solution to the problem. This points towards the developer's limited understanding of smartphone addiction.
	WEBSITE2: "We also need to consider how *technology might improve our well-being without taking anything away*."	The contradictory qualities of technologies/smartphones is highlighted; not only the negative aspects, but also the positive aspects are emphasized. However, this contradicts the affordances of the app itself, since the app does afford the user to take functions of the smartphone away, such as blocking app notifications.
	WEBSITE2: "*Unplugging is not isolation, it's an opportunity to reconnect.*" "*OffTime is not just downtime.*"	Unlike their other statements, here the developers do not make an easy two-way distinction of a good/offline and a bad/online life; they admit that there are bad but also good sides to connectivity.
	APP: "The OffTime Score gives you *an idea* of how balanced your smartphone usage is and *it shows you the effects* of focused work and off times without distraction. It's *calculated by duration and intensity of usage* over a whole day. The higher the value, the more focused and reduced is your usage. The maximal value is 100 points and would mean that you are not using your smartphone at all. A value between *60 and 80 points* is good and means you have a *balanced* usage. If your score is lower than 60 it would pay off to reduce your device usage or to use it differently. One hour without your smartphone or long sessions of focused readings or talking on your phone has positive effects on your score. *Unlocking your smartphone* ten times an hour and talking it in your hand every few minutes will result in negative effects on your score.	Unlike BreakFree, these developers do provide some extra information about how the score is calculated. They also recognize the score only gives you *an idea* of your behaviour. However, the Offtime Score only relates to smartphone overuse, instead of other (personal) aspects that cannot be measured by the app. Hence, aspects such as withdrawal are not taken into account. Moreover, similar to BreakFree, the score is based on duration and amount (of app accesses, calls, etc.), which again frames smartphone overuse as something that can be quantified, instead of presenting smartphone overuse as being constituted by several interlocking factors. However, they do recognize that personal factors stand in relation to smartphone addiction and highlight that this is a feature that their app lacks. Hence, they show a more elaborate understanding of smartphone addiction than the developers of BreakFree and Forest. Still, similar to BreakFree, it is not clear what the thresholds mean exactly, because "balanced" is a very vague term. Again, this creates an easy two-way distinction between smartphone abstinence and smartphone addiction.
	WEBSITE2: "We're currently *collaborating with Humboldt University's department of Psychology in research concerning mobile technology use*. *This gives us an informed scientific foundation* for our own work (...)."	Although their app lacks a profound understanding of smartphone addiction, the developers claim that they do have grounded scientific knowledge of the subject.

7.2.6 OffTime: Affordance analysis

OFFTIME - AFFORDANCE ANALYSIS		
Form/function	**Interface**	**(Quick) interpretation**
After each completed "OffTime", the user gets a notification which presents the duration of the OffTime, and can choose to share this via other apps (e.g. WhatsApp, Facebook, Gmail) by clicking on the sharing button. (ACTIVITY LOG)	The apps shows the message:"Good Job! ... minutes and ... second OFFTIME. .. hours and .. minutes total." The user is also presented with the "OffTime sessions" the user completed on the day and the day before, as well as on what specific time and date these were completed. (ACTIVITY LOG)	The option to share the "OffTime" seems contradictory to the aim of the app, since the connectivity with other apps- especially social networking sites- is often a cause for smartphone use and addiction. Although this option is probably implemented to motivate the user, it can also be problematic in regard to controlling smartphone use.
The app counts the user's number of OffTime sessions, device usage and total "OffTime" and compares this to all other users of the app. The user can share this via other apps by clicking on the sharing button. (COMPARISON)	The app presents each of these three numbers (in hours and minutes) above a scale that changes from light green to orange to red. The scale shows a horizontal line to indicate how this data of the user relates to the average of all other users. Underneath the scale this is further explained: E.g. "You have more number of sessions than 50% of all users." (COMPARISON)	This comparison affords the user to put their behavioural data more in context. However, because the app does not clarify what "all users" means, this function is not very valuable for reflection. For instance, you do not know how many other users there are, which has a big influence on how your score is presented. It is also not clear what type of users these are; maybe they are all very addicted which would make the user's score look more positive than it might actually be. Smartphone addiction is framed as something that can be assessed by looking at only three types of data and by comparing it to other people, while there are many other factors that (together) cause smartphone addiction. Moreover, users should and cannot be compared because personal factors are also related to smartphone addiction. Also, the colour coding is very vague (similar to BreakFree) and is not further clarified. For instance, on what are the colour thresholds based? If you have more device usage/ sessions than 70 per cent of the users you are already in the orange part of the scale, but does that necessarily mean you are using your smartphone too much? Again, the data is not really put in context which limits reflection and does not really give much insight to the user.
The notifications that are blocked during each "OffTime" can still be read afterwards. (ACTIVITY LOG)	-	This shows a better understanding of solving smartphone addiction than BreakFree, because the developers recognize that connectivity is an important and inevitable part of our modern everyday lives (Young 1999 p.10). This function affords the user to still be up-to-date while not having used his/her smartphone.
The user can set and name a goal (e.g. "Work time" or "family time") for which the user can set a limit of daily device usage, session reminders, and turn on goal notifications. The user is then able to track this progress (e.g. 23 minutes out of the maximum of 180 used). (GOALS)	The user can track the progress of the daily goal. The bottom of the screen shows the average daily minutes of the user's smartphone usage next to the average daily usage of "the world". The minutes used within the chosen goal is presented as a green bar. For example, if the user used his/her device for 180 minutes which was the set	The interface presents the user's average and the average of "the world" so the user can compare his/her behaviour. But what "the world" exactly entails is not clarified. Where does that average come from? Is it the average of all other users? This number has a lot of influence on the interpretation on the user's own average. Hence, it is important to clarify this, so that the user can better interpret the data and therefore also better understand his/her smartphone behaviour.

	maximum, the bar is completely green. (GOALS)	Moreover, the comparison again shows that the developers think that smartphone addiction is comparable and therefore has nothing to do with personal factors.
The user can create a profile for a specific purpose (e.g. "sleep", "work", "family time") for which the user can choose specific settings: Hide app notifications, block calls/SMS from specific people, restrict access to certain apps, "soft-blocking", send auto-replies, change ringtone for important contact, change the way you can stop the OffTime session. (MY DAY > ADD NEW PROFILE)	-	These affordance point towards the fact that the developers understand that smartphone use differs per context. Still, the affordances are only directed towards limiting general functions and not directed towards more specific limitations, such as specific applications, or limitations related to the specific type of user. Moreover, these are aimed at stimulating self-control by limiting certain functions (external stoppers (Young 1999)). This again shows that the developers understand smartphone addiction in terms of overuse, which is only one aspect of smartphone addiction (Kwon et al. 2013).
The user can schedule "OffTime sessions" using the created profiles. E.g. From Monday to Friday 9-5 is scheduled for "work". (SCHEDULE)	-	This option gives the user some freedom in choosing how and when he/she would like to limit smartphone use. However, the app in general is still very static as it provides each user with the same options. Moreover, scheduling is a good method to limit smartphone use (Young 1999) but should be used in conjunction with more reflective methods.
The app counts the number of smartphone sessions, device time, and the number (and type) of apps accessed, which the user can view. (MY DAY)	The app shows the number of phone sessions on top of the screen in the biggest font. Underneath this, the app shows the device time, the progress of the daily goal in a green font, the most used app/top contact, the OffTime score, and a blue button that says "Take OffTime". (MY DAY)	The interface would imply that the number of phone sessions has the biggest influence your score/smartphone use and therefore is the most important. The interface also implies that the other elements that are presented are also important factors in relation to smartphone use. Moreover, this again shows the focus on the aspect of overuse. Also, this data is not put in context (other than the date of that day), which on the one hand helps the user to make his/her own interpretations, but on the other hand limits a profound understanding of the data and with that limits the user's understanding of smartphone usage.
The app calculates an "OffTime score" which is based on the duration and intensity of usage of one day. 100 means you are not using your phone at all. 60-80 means your usage is "balanced" and below 60 is bad. The user can click the info icon to read more about this score. The user can see the addiction score per day, week or month. (INSIGHTS>SCORE)	The OffTime score is placed in the centre of the screen, using the largest font. The score is framed by a blue circle that corresponds to the score (if the score is a maximum of 100 the circle is completely blue). Beneath the circle it says: "Try to check your smartphone less and take more OffTime to improve your score". (INSIGHTS>SCORE)	Similar to the addiction score in BreakFree, the score implies that smartphone addiction is calculable. Moreover, it is not made clear on what the thresholds are based and what the developers mean by "balanced". This creates a very static and vague understanding of smartphone addiction. The info the user gets by clicking the info icon (see discourse analysis) does provide with a bit more information about how the score is calculated but still not mention on what the thresholds are based and what "balanced use" entails.
The app calculates the difference in score between the present and previous day, as well as the average score of the week. (INSIGHTS>SCORE)	-	OffTime makes less of a distinction between good/bad score than BreakFree, as it does not use colour coding and instead just provides a number. However, it is not clear what the score entails. Hence, data is not put in context which frames smartphone addiction in a simplistic way and as an integral quantity.

The user can choose to view his/her addiction score per week or month. (INSIGHTS > SCORE > SCORE TREND)	The app presents a blue data visualization (graph) of the OffTime scores of each week and month. The graph shows a horizontal line that represents the user's average of that week/month. (INSIGHTS > SCORE > SCORE TREND)	The user's behaviour is measured against user's average behaviour, which makes it more difficult to tell if the user is doing good or not. For instance, if the average is very low (e.g. 20) but the graph goes up beyond that average, it looks like the user is doing good while his/her score might still be bad (below 60). Moreover, although the user can use specific profiles for specific contexts and goals such as sleep and work, these profiles are not shown in the graphs. So, the behaviour lacks data and therefore offers the user only a limited understanding of his/her behaviour.
The user can choose to view the number of device sessions or device time per day, week or month. (INSIGHTS > TOTAL USAGE)	The app presents a purple data visualization (graph) of the number of device sessions or device time in hours and minutes per day/week/month. The graph shows a horizontal line that represents the average of that day/week/month. (INSIGHTS > TOTAL USAGE)	Similar to the above.
The app calculates the number of app accesses and the duration of each use, and the total time of app use. The user can choose to view this per day, week, or month. (INSIGHTS >APPS)	The app lists the used apps from most-used to least-used. The amount of time spent in each app, or the number of app accesses, is represented as an orange bar along with a number (e.g. x50 or 1 hour and 2 minutes). (INSIGHTS > APPS)	Similar to the above. A thousand times checking an app per month may seem more than it actually is and may lead to think that the user has an addiction/problem which might not be the case at all. Again, the app does not provide enough context to give meaning to the data. Moreover, the user cannot view what he/she did within each app. This is important, especially with apps like Chrome/Safari, since smartphone addiction can be caused by a specific element of an app which can be present in other apps as well (Young 1999).
The app calculates the number of calls/texts, duration of each call, and for how long each contact contacted you. The user can choose to view this data per day, week, or month. (INSIGHTS> CONTACTS)	Similar to the app section, the app lists the number of calls/texts and the duration of each persons' call from highest to lowest. The amount is presented as a red bar that relates to the total amount of that day/week/month alongside a number. (INSIGHTS > CONTACTS)	-
The app creates a summary of the user's smartphone use of each day/week/month, which the user can choose to view. (INSIGHTS > HIGHLIGHTS)	The app presents a summary of smartphone usage of each day/week/month and displays: the number of written texts, the number of calls, the smartphone time, the most used apps plus the duration and number of accesses, the maximum time of smartphone abstinence, and the total "OffTime". (INSIGHTS > HIGHLIGHTS)	The summary offers (maybe even stimulates) the user to make correlations between different data. However, the user can make wrong correlations because again, these data are not put in context. So, the summary still does not provide a profound understanding of the user's smartphone use.

The user can invite other people to join the "OffTime" via e-mail, code, or other smartphone applications. (HOME)	The app shows the message: "Time together is well spent" (HOME)	This entails the assumption that time together online is not well spent. Similar to the rhetoric on their website, the developers create the assumption that "offline life" is better than "online life", because being online is less social or even unsocial.
-	"You have used your device over … minutes." (PUSH NOTIFICATION)	Unlike BreakFree, the app does not tell the user if this is good or bad, but just sends a reminder. The app does not make a judgement but stimulates the user to make his/her own interpretation.

7.3 List of images

All images (screenshots) are produced by me.

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