'Pataphysical Software: (Ridiculous) Technological Solutions for Imaginary Problems

Miguel Sicart
Center for Computer Games Research
IT University of Copenhagen
miguel@itu.dk

Irina Shklovski
Department of Computer Science
Department of Communication
University of Copenhagen
ias@di.ku.dk

ABSTRACT

These days, whether the problem is climate change or boredom, there is an app for that. The rhetoric of problem and solution, accelerated by commercial needs and salvific tech gurus, implies that software can save the world. This paper wants to start a movement/rebellion against the ubiquitous equation of P(problem) + S(software) = S(solution) as a rational approach to the ailments of this world. We question the technological effort to "playfully" afford order and control to humans through the provision of computational rules. Instead, we propose an alternative approach: designing 'pataphysical software to address familiar but ultimately imaginary problems. Defined by poet Alfred Jarry, 'pataphysics is the science of imaginary problems. Adopting the methods of 'pataphysics, we have developed mobile applications that explore invented problems and provide no solutions for them. We demonstrate how such an approach allows us to ask design questions through an aesthetic 'pataphysical practice of software development.

Author Keywords

'Pataphysics, software, data, design, mobile apps, art.

CCS Concepts

• **Human-centered computing~Interaction design~Interaction design process and methods**

INTRODUCTION

In the words of VC Marc Andreesen, "software is eating the world" [4]. Technological solutions move the world forward, solving old problems while often creating new ones. The inexorable advance of software solutions for every conceivable function is evidence of the triumphs of reason and rationality. As every design or software development student knows, the first question they must answer is "what is the problem that you are trying to solve?" [67]. For

solutions to be created and software to be designed, problems must be identified, framed as solvable, disassembled into smallest constituent parts and operationalized for computation [3][58][45]. The reality of any solution renders even the most imaginary problems ultimately real, taken seriously in the unvarnished effort to save or at least improve the world. These days, whether the problem is climate change or boredom, there is an app for that.

In 2019, at TechFestival in Copenhagen thousands of people came together in workshops and summits to grapple with various societal challenges. One such effort tackled the problem of climate change. The exercise resulted in proposals for several different mobile phone apps. This rhetoric of problem and solution, accelerated by commercial needs and reduced to absurdity, implies that software can save the world [62][73]. The rational, "scientific" approach of design [87][23][22] and HCI [32] [94][68] has led to the idea that most human experience can be addressed as a problem "solved" by software.

This paper is a result of a refusal and a rebellion against the ubiquitous equation of P(problem) + S(software) = S(solution) as a rational approach to the ailments of this world. We question the technological effort to "playfully" provide order and control to human behavior through the provision of computational rules [24]. Such software limits our understanding of the world where we are rewarded for following clearly specified rules of behavior – achieving 10,000 steps or progressively lowering the number of calories consumed, engaging in timed fasting or meditation, getting things done on schedule and so on. In such a world we become well-managed hamsters inside computational wheels. Pushed to its logical conclusion, such a world can look ridiculous. Yet the results of software eating the world, however ridiculous, are also very real, resulting in surveillance capitalism [95] and digital resignation [29].

If software needs to exist, and please notice that maybe software *should not exist*, there are many approaches to its creation. In this paper we present the idea of 'pataphysical software as a critical [2] way to analyze and develop ridiculous software for imaginary problems. Our main argument is that HCI would benefit when shifting at least occasionally from a classical scientific approach to a 'pataphysical one. In a world increasingly inhabited by technologically spawned monsters and monoliths of power,

a focus on ridiculous solutions for imaginary problems may be one way forward. If the fate of the world is taken less seriously then perhaps we can move beyond technological realism of current platforms and structures and finally begin to consider options for what "it could be otherwise" might look like.

'Paraphysics is not a way of designing, it is a way of thinking about software, in alignment with Agre's notion of critical technical practice. To stay coherent with the logics and aesthetics of 'pataphysics, we insist on making sweeping claims, lacking nuance, and denying the methods of scientific inquiry, aligning us with the intellectual tradition of Alfred Jarry.

In what follows we will review related literature on the topics of solutionism and the value of the absurd and consider related work that engages with humour, satire and parody as tools for thinking critically about technology and its possibilities. We then describe two applications that we have built and present results of testing our software in the world. We consider the structural obstacles (or lack thereof) to broad deployments of 'pataphysical software embedded in existing systems of gatekeeping and control of content for mobile devices. We finish with implications for design and a call to action for the CHI community. Since this paper makes no clear and measurable contributions to critically oriented design conversations in the academic dialectic of contribution as measurable and quantifiable, we consider already this work to be a 'pataphysical success, and urge readers who agree, to stop reading and just cite the paper.

BACKGROUND

The sentiment that technology can save the world is not new of course. Turner [92] traces the idea that behavior of machines and people can be represented mathematically and thus addressed computationally to the work of Norbert Wiener during WWII [93]. That vision, Turner claims, lead to a broadly held notion that a better, more egalitarian society is achievable through computation.

This notion that technology can be used to address practically any problem has been critiqued in HCI and beyond [88][80][17][89]. In response, there have been many methodological and creative developments in HCI from speculative design [30] and design fiction [13] to adversarial design [26], undesign [72] or artistic interventions [37][49][33]. Scholars have argued whether implications for design were even relevant [28] and sought to locate the limits of technology design through considerations of appropriateness and inappropriateness [69]. These efforts seek to locate different lenses through which to engage the possibilities and problems of technological innovation and the increasing uncertainties about the kinds of futures we are creating [53]. Critiquing the tendency of design to focus on the problem-solution binary, Bell [11] proposed that designers instead shift to a different process that engages in diagnosing potential and offering possibilities, rather than looking for trivial answers to problems. Yet learning to "unsee" the world and the world as merely a lot of problems to be solved remains a challenge.

Researchers have grappled with solutionism [62] in different ways – through artistic expressions, interventions and even "seriously silly design fiction" [14][15][16]. The limits of technology as a solution to personal or world's problems have also been probed by artists like James Bridle [18] and critical designers/artists like !Mediengruppe Bitnik [12]. One of the examples of 'pataphysical design we are presenting here addresses the quantified self, inspired by the critiques proposed by Whitson [74], Sharon [83], Moore and Robinson [61], and Linehan et al [56]. What some might consider problems in need of a technological solution have been a cause of general merriment with humorous news articles proliferating annually around the time of the International Consumer Electronics Show (CES) or in time for Black Friday.

Critical design [47] is a close relative to 'pataphysical design, as we will argue in this paper. The work of Bardzell and Bardzell [5][40] for example, was an inspiration (see also Malpass [59]). Ratto's critical making [76] is also aligned with our project. Sengers' et al reflective design [82], Dourish's understanding of critical technical practice [27], and Flanagan's critical play approach [36] are also echoed in our 'pataphysical approach. Our work should also be placed in relation with the results of the Stupid Shit No One Needs & Terrible Ideas series of Hackathons (http://www.stupidhackathon.com). Of course, citing all this previous work is our attempt at addressing the scholarly requirements of the field of design [60][31], as described by Marshall et al. However, proper 'pataphysics should only refer to proper 'pataphysics, and all the previous work cited so far does not really qualify as 'pataphysical science.

Do not despair, though! 'Pataphysics has previously made its appearance in scholarly discourse as well. Rosenbak [77] used the lens of 'pataphysics to consider smart city design by utilizing lies about cities as a way to imagine urban futures, while also applying 'pataphysics to design processes [78][79]. Raczinsky and colleagues [75] designed a 'pataphysical search engine as a way to engage with questions of creativity in something as mundane as online search. Further afield Schinkus [81] proposed a visual epistemology based on 'pataphysics to study finance as imagination, while Landis [51] critiqued the scientific orientation of molecular gastronomy through the parody of culinary 'pataphysics.

We also consider the work of Buttrick, Linehan, O'Hara, Casey, and Rowland [19][20][48][55] to be honorary 'pataphysical work. In fact, we argue that some of the critical, aesthetic, punk work in HCI was inadvertently 'pataphysical. Our contribution to the long overdue 'pataphysical turn in HCI is to extend the work of these pioneers and systematize it under an explicitly 'pataphysical approach to design.

A BRIEF INTRODUCTION TO 'PATAPHYSICS

'Pataphysics is an aesthetic scientific theory borne out of the modernist avant-gardes [42]. The poet and playwright Alfred Jarry proposed 'pataphysics as an alternative to the rational discourse of the Enlightenment, suggesting that what the world needed was a "science of imaginary solutions" [46, p. 4]. In *Exploits and Opinions of Dr. Faustroll, Pataphysician* [46], Jarry laid the groundwork for an artistic approach to science that would propose an aesthetic alternative to scientific thinking.

Instead of working towards generalized solutions, 'pataphysics becomes a science of the particular: "[…] 'pataphysics is *subjective*, privileging the particular above the general, the imaginary above the real, the exceptional above the ordinary, the contradictory above the axiomatic" [46, p. 2].

Even though 'pataphysics developed into different schools, as well as secret and not-so-secret organizations focused on exploring this artistic science, there is no history of 'pataphysics. There is no method of 'pataphysics. There is no theory of 'pataphysics: "To understand 'pataphysics is to fail to understand 'pataphysics" [46, p. 1]. And yet, 'pataphysics is present in the arts and the sciences, when they dare to change perspective and embrace their own relative meaninglessness.

In this project we have embraced 'pataphysics as our scientific and aesthetic method. We understand 'pataphysics as a particular approach to the incomprehensible nature of the universe. In the words of Jarry: "Pataphysics will be, above all, the science of the particular, despite the common opinion that the only science is that of the general. Pataphysics will examine the laws governing exceptions, and will explain the universe supplementary to this one; or, less ambitiously, will describe a universe which can be - and perhaps should be - envisaged in the place of the traditional one." [46, pp. 21-22].

There are parallels between the construction of 'pataphysical software and Baudrillard's [10] reflections on gadgets. Baudrillard observed that "something that serves no purpose whatsoever may […] still serve us" (p. 123). While as 'pataphysicians we deplore the notion of "servitude", Baudrillard might be a good introductory point for those interested, but not invested in 'pataphysics as yet.

We propose that 'pataphysical software is that software, which identifies an imaginary problem, frames it as solvable through software design and development, and proposes a technical exploration to that problem that should exist available for all the world to engage with. 'Pataphysical software is the result of an aesthetic, scientific, and design approach, which we will attempt to explain throughout this paper.

But we are more ambitious: our work will serve as illustrations of how software "solutions" in the form of apps are also 'pataphysical software. By developing 'pataphysical software we will demonstrate ('pataphysically, of course) how all software is 'pataphysical. Following Jarry, we decry the belief that software represents generalized solutions to problems. Instead, we argue that software merely creates idiosyncratic solutions to particular problems.

'Pataphysical design is not critical design

Some readers might be tempted to see a 'pataphysical software project as *yet another* instantiation of critical design. We are providing after all *yet another* critique of software and technology in society. But critical we are not.

Critical design [5][7][8][9] has been an important inspiration for this project. 'Pataphysical software critiques both technology design and the rhetoric of solutions around them. Like critical design, 'pataphysical software performs that critique from an aesthetic approach to technology design. Much like critical design, 'pataphysical design proposes a method for creating interactive technologies that draws from aesthetics and critical theory.

However, there is one significant difference. Critical design lives in labs, research centers, and art galleries because these designs "embody extreme values that for some have no place in this world. They seem to belong in a parallel world where extreme aspects of our own world have somehow metamorphosed into whole environments" [30, p. 138]. While it may have some impact in how some technology is developed, critical design is a practice mostly limited to the academic and artistic world, with some notable exceptions that we have already mentioned as being honorifically 'pataphysical [19][20][48][55]. In all fairness, Pierce and others [71] propose an understanding of critical design that would be sympathetic with our 'pataphysical goals. To a certain extent, our 'pataphysical efforts live in artistic and academic environments too. Critical design and 'pataphysical software use the cultural and social umbrellas of academia and the arts, perpetually underfunded but also more free than commercial endeavors, for being critical.

The main difference would then be how 'pataphysical design can only be understood if it faces the sociotechnical infrastructures of software distribution. 'Pataphysical design requires an engagement with users at scale, by engaging with the gatekeeping of corporate actors. Interacting directly with the review, evaluation, and distribution economies of the real world would also be a form of critical engagement through software. Therefore, 'pataphysical software is developed using commercial tools, with the intention of being distributed to the masses through app stores.

PUTTING THE 'PATAPHYSICAL IN SOFTWARE

The first step in the 'pataphysical method of software design is to do desk research [63] in order to identify the kinds of imaginary problems that 'pataphysics can address. This process has to be non-scientific, guided by taste and intuition in a kind of intellectual *derive*, as no scientific methods can be applied during the development of 'pataphysical software, or the results will not be 'pataphysically appropriate.

A 'pataphysical overview of the most popular software on Apple's App Store between 2018 and 2019 inspired us to develop 'pataphysical software for two imaginary problems: content consumption and self-tracking. The overview by definition needs to be non-scientific, as no scientific methods can be applied during the development of 'pataphysical software, or the results will not be 'pataphysically appropriate.

Let's define these problems 'pataphysically: scientific research on mobile phone use has highlighted how they have become more than communication technologies [43]. Mobile phones are used for a multitude of purposes. Perhaps the most important of these is the consumption of content, whether that be news, social feeds, or media. People look at their phones constantly in search for content, with design patterns like infinite scrolling and pull to refresh promoting this particular mode of usage.

Content consumption has been classically framed as a scientifically addressable problem: users want to consume content in ways that fit their schedules, and that keeps them engaged, which serves commercial goals. Patterns of engagement and dark patterns [52][25] emerge as ways of providing content for users to consume on their phones in ways that can be quantified, evaluated, and optimized. An imaginary problem became solved by scientific approaches to software, unleashing the infinite scrolls of Facebook or the reward schemes of Twitter and Instagram. As critiques show, the scientific approach to content consumption failed (or succeeded, depending on your point of view) [21].

A similar, though perhaps less spectacular failure can be witnessed in self-tracking technologies [57][44][64][65] [38]. Since mobile phones are portable computers equipped with a variety of sensors that allow for the processing of contextual usage data, a software industry emerged around the use of these data to track and potentially improve human lives. From step trackers to period trackers, health and well-being become numbers that can be followed and acted upon [39][41][91].

Classic software development considers lifetracking through computational data as a problem that requires a scientific-based solution. The data from sensors is trained on data that reflects a reality of averages, as Apple's Core Motion object CMPedometer illustrates[1]. Users are encouraged to live by the results of that data filtered through those averages, regardless of their actual experiences [38]. Again, this is treating a particular problem through a scientific lens, creating all kinds of social, cultural, and technological problems in turn.

Both content consumption and self-tracking assume that the computational processing or mediation of data will have a positive effect in our lives, making us more aware of the world around us and our own embodied being. Content consumption is wrapped by content producers through the conceptual equation of accessing to information equaling freedom, without questioning the social, technological or economical tradeoffs that facilitate media consumption. Self-tracking is also imbued with the idea that data tracked and processed through computational media is inherently objective [90]. We consider these assumptions to be imaginary, and therefore better suited to be addressed from a 'pataphysical perspective.

We have therefore developed two 'pataphysical engagements with these imaginary problems.

ATTN – Attention manager

Our first application addresses the problem of content consumption. The proper 'pataphysical approach to software as a medium for engaging with content has nothing to do with distributing content, and everything to do with the management of attention. That is the particular solution to the imaginary problem of content consumption. We have therefore designed, developed, and distributed an attention manager.

ATTN is a mobile app that displays a blank screen that dims over time. Users can tap or swipe to increase brightness again. ATTN is designed to keep the user's attention engaged in the phone, without providing them with any content. It is content consumption without content, the most 'pataphysical of all content consumptions.

ATTN shifts the design problem from creating content to managing attention. Instead of consuming content for pleasure and solace, users can just look at the screen, as it slowly dims away. Many design patterns have been developed to ensure that users can engage with more and more content through their mobile devices. Those design patterns fuel an economy of data harvesting for advertisement, and have resulted in the commercialization of human relations, as well as the trivialization of news. All of these solutions are scientific solutions, validated by user experience tests. And yet, the problem of content and attention only grows.

ATTN is designed as a minimalistic experience: it has only three screens the user can interact with. Once the application loads, an introduction screen with the title and a start button greet the user. There is also an "About" button that allows users to read a more detailed description of the purpose of the app. The final screen of the application is the center of the experience.

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[1]https://developer.apple.com/documentation/coremotion/cm
pedometer
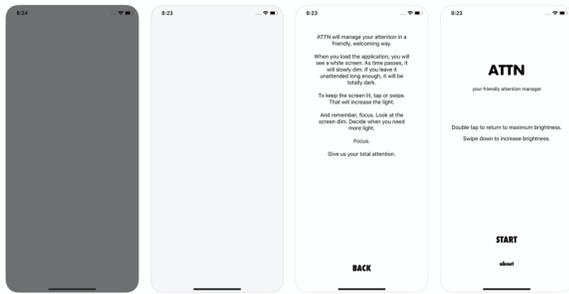
Figure 1: ATTN in the App Store

ATTN is a 'pataphysical alternative to content consuming applications. With no actual content to be consumed and only attention to be used, ATTN provides a particular solution (the empty, dimming screen) to an imaginary problem (the need to consume content on a phone).

Number of You – Self-tracking software

Our second application addresses the issue of self-tracking and quantification of life in search of self-optimisation. From a 'pataphysical point of view, self-tracking should 'pataphysically abandon its dreams of an objective understanding of human bodies and their lived experienced through trackable data. Therefore, we propose a 'pataphysical solution that embraces a version of numerology as a source for self-understanding. Our 'pataphysical app Number of You is the result.

Number of You will give users a number that reflects them. We do not specify what it reflects – it is up to users to identify what the number says about them. It is not about the tracking, about the sensors, or about the data: it is about the value of that number in the users' life. The number is generated using Swift's built-in (pseudo)random number generation functions within a range of 0 to 255.

Self-tracking and the quantified self are based on the idea that access and visualization to trackable data from users might lead to correcting habits and better lives. Data tracked by computers is allegedly an "objective" and "accurate" (please notice the "scientific" rhetoric) representation of the sources of data. Any errors or mistakes in data processing can be overcome by better access and processing of more data captured by more accurate sensors. At the heart of this type of software lies the scientific assumption that human behavior can be formalized, and that these formalisms, translated into information that any user can interpret, will lead to a better life.

Of course, data tracking can lead to all these improvements, but it requires specialized knowledge. Without that knowledge, self-tracking becomes close to numerology: users read a number on screen, and gauge whether it fits their reality (or even bend their reality to fit that number). Number of You is built on this assumption: instead of actually tracking data and translating it to users, it provides a number that users can interpret as they want. Instead of making self-tracking a general problem that can be addressed

scientifically, it makes self-tracking a particular problem that can be addressed 'pataphysically. Users are given a number, they can interpret whichever way they want. Again, a particular solution to the imaginary problem of translating sensor data into quantifiable, meaningful images of lived experiences.

Number of You is a minimalistic app. It has one introductory screen with text explaining its contents, and once loaded it alternates between two views. The first is the Number of You. The second view shows a graph of the numbers mapped on a timeline. The background color of the application changes depending on the value of the Number of You.
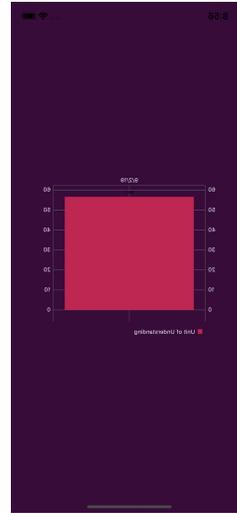
Figure 2: Number of You, the Quantified Interface

To make the app more 'pataphysically credible, Number of You was designed to request access to all privacy sensitive sensors and applications on the iOS platform. Number of You requests access to Contacts, Motion, Geolocation, Camera, Calendars, Microphone, Motion, Photo, Reminders, and Speech Recognition. The software does not do anything with these requests, as that would be too scientific.

The logic of 'pataphysical design

Both ATTN and Number of You follow the same design procedure: first we identify particular trends in software applied as a solution to a perceived problem. Then we deconstruct the nature of the problem to illustrate that it is only a "problem" within a narrow understanding of the intersection of software, human practices, and economic practices. We then look for the particular in each of these problems: we isolate the more specific, most reduced form of solution lurking in these problems, and we design software around it. We strip content consumption of content, and we strip self-tracking of data capture and processing. We then submit these 'pataphysical solutions to the App Store, so they can be integrated in the wider ecology of software solutions.

'Pataphysical software relies on a systematic incredulous approach to what software can do with data representations.

It takes as a premise that all representations that are computable are limited and restricted, both by technical and by human factors. Instead of seeing this as a problem that needs to be addressed by improving data processing, usability, and sensor capabilities, 'pataphysical software embraces these impossibilities as design inspirations, and proposes usable software that does nothing, and that by doing nothing effectively addresses problems understood as being imaginary. In other words, 'pataphysical software is designed around the idea of imaginary problems that can only be solved with particular, idiosyncratic solutions.

PUTTING 'PATAPHYSICAL SOFTWARE IN THE WORLD

As with any exploratory endeavor, designing 'pataphysical software is only a first step. A fundamental aspect of the 'pataphysical approach is engaging with the messiness and infuriating idiosyncrasies of the world. Since our goal is to demonstrate that in the end, most software is just a kind of ridiculous solution to one or several imaginary problems, then our 'pataphysical software ought to join the same pantheon of software inventions and propositions.

'Pataphysical software needed a different approach to validation instead of the classic user tests and evaluation processes. Since our intention is to engage with the issues (or better, the very impossibility) of software as problem-solving technologies, user testing will never lead us to meaningful results (Encinas et al, Ferri et al., Blythe et al.). After all, the software we have designed only addresses imaginary problems. Thus we decided to put 'pataphysical software out in the world, seeking validation from within the real world systems of software distribution and consumption.

Our project evaluation method was then outsourced to the Apple App Store. Instead of evaluating whether users found 'pataphysical software an appropriate solution to imaginary problems, we went through the process of submitting the software to a curated online store in which many of the sources of inspiration for these projects are available. In other words, the App Store submission process itself would be validating our approach to 'pataphysical software

App Store Submission as Empirical Validation

The process of submitting to the App Store implies usability testing, since the apps need to respond to Apple's guidelines for user interaction, as well as software efficiency testing. More importantly - if the apps are accepted by the App Store, our argument that most software is inadvertently 'pataphysical would be validated. If the curators of the App Store find our work to be acceptable, it means that our 'pataphysical solutions are on par with all the other software solutions in the store. Our software shows from the inside the meaninglessness of many contemporary software applications.

Evaluation and testing are ways of validating the results of a design process. Since our argument is that a 'pataphysical approach is a valid method for creating software that addresses (imaginary) problems, submitting the apps to the App Store for review and potential publication would be a validation of our designs. If the apps were to be approved, we would be right in assuming the validity of 'pataphysical design: our apps would live in the same software ecosystem as all the other apps. If they were not, the reviews from the App Store would provide us with insights to the limits of our 'pataphysical approach, which we could use to improve the software in future iterations.

Given that Apple's Human Interface Guidelines are tightly integrated in Apple's toolchain, we consider it irrelevant to discuss the usability and design decision regarding interfaces and general software navigation. We submitted to the rules and suggestions of the Interface Builder until XCode gave no error messages or warnings. We also used standard tools to provide the App Store with all the visual requirements, from screenshots to the applications' icons. Since we opted for a fairly minimalistic aesthetic, there is not much to comment on that regard.

We conducted the submission of both applications through the standard App Store systems, submitting a build through XCode while providing all other information through the App Connect online service. For both submitted applications we wrote standard copy text. This text, which is displayed on the App Store, was written as an earnest explanation of the 'pataphysical goals of the applications. However, we also added as a note to the App Store reviewers a comment on how these apps are part of an academic research project.

Submission of ATTN

The submission process of ATTN was straightforward. Once the app was submitted, it took less than 48 hours for it to be accepted and, as we had intended, immediately released on the App Store.

The submission success of ATTN is an example of how the App Store welcomes 'pataphysical software. Even though the app really doesn't do anything at all except dim the screen over time unless users interact with it, it did not break any of the App Store technical or content policies. It was allowed and published as an entertainment application. We consider this a success in our method: not only are there no problems with regards to publishing an app that does not really do anything, it also makes evident that it is on the same level as all the other apps in the store. Usefulness, or even entertainment, is not a requirement for software to be distributed and consumed.
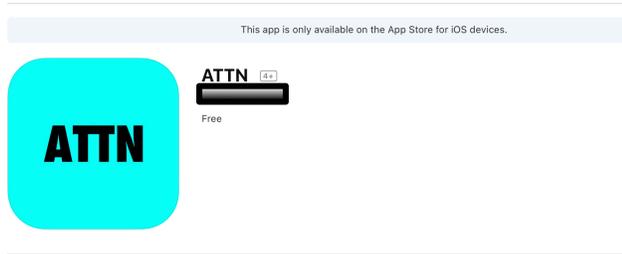
Figure 3 - ATTN in the iOS Store (anonymized for review)

Submission of Number of You

Number of You was a more complicated affair. Almost immediately after submission, we received an automatic notification that warned us of two missing privacy settings in the app's info.plist file. Correcting them required uploading a new build, and so Number of You was submitted for review as version 1.01.

The review process was also longer, first of all because Number of You is a moderately more complex application. Even though memory usage in apps on iOS is sandboxed, the review process includes checking for the efficiency in the use of memory, which we use to store the different numbers given to users. Number of You also uses an external library for plotting charts, which can slow down the process of review given the external dependencies. Number of You is also an app that changes overtime, and that only delays the review process more.

Finally, and more critically, Number of You was designed to request access to all privacy-sensitive "protected resources"[2]. If the user does not comply with any, there will be a reminder on screen so they can give permission at any time. The app does nothing with this access - it does not read any data, store it, or parse it. It only requests for permissions, with the idea that users might have more faith in the number and the quality of the values if they have previously yielded privacy permissions. It is a 'pataphysical design decision to explore the numerological aspect behind self-tracking. After all numerology pretends to be scientific and based on data.

These permission requests were grounds for the second rejection from the App Store. Version 1.01 was rejected because it was importing the HealthKit and HomeKit frameworks so that it could do the privacy requests. However, as the App Store review noted, due to performance issues and the fact that the app was technically not doing anything regarding health data or home automation, the app did not live up to Apple's performance standards and needed to be rejected. Version 1.02, which we uploaded some hours after this first rejection, removed the imports to these two

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frameworks as well as the functions that made use of them. The app returned to review at that stage.

Figure 4 - Number of You's Rejection Story (anonymized for review)

After a few hours, the App Store contacted us requesting more information about the usage of the protected resources in Number of You. We didn't need to submit a new binary; it was enough to write a 4000 characters max. explanation about the intended use of the application. We did so, explaining the role of Number of You in exploring artistically concepts behind self-tracking.

Figure 5 - Rejection reply (anonymized for review)

Soon after our submission, we received notice from the app store that Number of You is rejected from distribution, for three reasons: first, it did not comply with the guideline 2.5.1 regarding Performance, as we asked the user to consent to use protected resources without doing anything with that data. Second, the app does not fulfill the requirements of guideline 4.2 regarding Design, which is focused on Minimum Functionality. According to the final verdict, Number of You does not "enable people to do something they couldn't do before or in a way they couldn't do it before" (verbatim from App Store Review). Third, the app does not fulfill the requirements of guideline 5.1.1 (Legal – Privacy – Data Collection and Storage), because it does not

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[2]https://developer.apple.com/documentation/uikit/protecting _the_user_s_privacy/accessing_protected_resources

clearly specify why it needs access to all these protected resources [85].

Number of You is at the moment rejected from the App Store, and while we are considering how to 'pataphysically address the questions raised by the reviews, we think that we have gained valuable insights regarding the 'pataphysical nature of software in the world.

What happens with 'Pataphysical Software in the world
Our intention with this methodology was not to be "successful". We have not tracked the number of downloads of each app, and we have done little to no effort publicizing them. Our empirical validation of the apps was limited to the submission and acceptance processes by the App Store. This is because, if the apps can be accepted, then arguably there is a fundamentally 'pataphysical element in most applications distributed by the App Store. Since ATTN was accepted without problems, we claim that software tends to be 'pataphysical. Number of You's rejection illustrates how 'pataphysical software needs to be aware of the sociotechnical discourses around technology use and their attendant infrastructures.

Apple presents itself as a privacy-first company, and Number of You's calls for user consent in accessing protected resources triggered a manual review of the application that ultimately led it to be rejected. Apple is deeply invested in value signaling regarding privacy. That is why an app that asks for permission to potentially use protected resources, but does not do anything with them, is treated as an inadequate app. In Apple's ideology, all data gathered through the use of protected resources need to be computed to give some value to users. This is a common idea of the kind of data-value exchange that underlies much of the contemporary data economy [1]. If the data is accessed but not computed, if it is supposed to only act as an inspiration for a user's self-understanding, like in Number of You, then the app should be disqualified. At the heart of Apple's understanding of privacy sensitive data is the notion that data needs to be useful in a computational way [84]. Human interpretation of data, imagination and the whimsical on the other hand, are all negligible.

This process of continuous rejections of Number of You taught us a valuable 'pataphysical lesson. We tried to get the app approved by Apple invoking vague artistic statements and contextualizing Number of You as part of a research project. We are ashamed to admit that in this we acted as un-'pataphysically as one could act. Number of You was rejected not because it was 'pataphysical, but because *it was not 'pataphysical enough*. Unlike ATTN, Number of You is not interactive, and deputizes interpretation to the user. Yet 'pataphysical software needs to be interactive in order to make the point of the ridiculousness of software. At the moment of writing these lines, we are working on an interactive version of Number of You that can be accepted as a proper 'pataphysical contribution in the App Store.

'PATAPHYSICAL HCI – IMPLICATIONS FOR DESIGN
The initial name for this project was "ridiculous software", and while this paper has presented our work as an engagement with software design, development, and distribution as 'pataphysical, our ultimate goal is to illustrate the ridiculousness of software.

Of course, we do not mean that all software is ridiculous. Paraphrasing George Box's famous quote about statistical models, all software is ridiculous, but some of it is useful. Systems running power plants, or pacemakers, are mostly not ridiculous (they may become so when inserted into monetization strategies, but that is another story). The usefulness of software should not blind us to its attendant ridiculousness. A lot of the software that is not infrastructural, is ridiculous. Take a look at any app store, from Apple's to Microsoft's: what is all that software doing, if not taking problems that are not problems and making them comply to measurable standards of efficacy and aesthetic pleasantness? And yet what is the point with all that software, if not to turn users at best into data wells that can be monetized?

Where do we go from this starting point where all software is ridiculous? You can stop reading now and move on to the next section – the manifesto.

If you have kept on reading, maybe it is because you are a maker of critical software. The implication of 'pataphysical software for critical design and critical software is that it will only work as an argument if you put it out in the world. 'Pataphysical software needed to collide with the infrastructures of commercial distribution, so it could become actually "problematic". Instead of seeing software as an answer to a problem, software needs to be designed as the problem, it should be thought of as a way of asking questions to explore problems. If software is seen as a solution it is simply an inadequate answer to an incompletely formulated problem. With a 'pataphysical lens, we seek to resituate software from an instrument to solve design problems to an instrument for asking better and more interesting questions.

A MANIFESTO FOR 'PATAPHYSICAL SOFTWARE
The western world is full of existential worries about the role of technologies in the kind of futures being built. Decades ago, with the Internet still a fledgling network, technological optimism saw few bounds. We were going to create a better world through technology after all. The unvarnished idealism has soured as we find ourselves facing the problems of surveillance capitalism [94] as our economic structures and digital resignation [29] as a common response to the enormity of the problems we face from the people tangled up in them [53]. We need a different way of thinking about the technologies we create and their possibilities. Design is not going to save the world and neither is software. We need a different way to conceptualize what are the actual problems that we are trying to solve and perhaps we need to imagine

different kinds of ridiculous solutions [70]. We need to make space for play [86][66], deliberately and consistently because we must have environments that let us imagine emancipatory rather than confining data worlds.

We see ridiculousness as a necessary form of play - a way to locate existing boundaries to possibilities and a way to push at them, to challenge them [21]. Ridiculous software makes obvious the absurdity of our technologies when pushed to their logical extremes. We call for a 'pataphysical software' movement to search for emancipatory data worlds.

Perhaps the science of the apocalyptic future ought to be 'pataphysics. What better way to respond to the increasingly negative and apocalyptic forecasts than with laughter and satire, with lightness rather than the weighty seriousness of scientific effort.

Or, in more clear words inspired by Jarry, we call here for the creation of 'pataphysical software that computes the antinomy of technology-world pataphors congregated in the clinamen of human-technology experience, so it can become the absolute syzygy of a unique imaginary solution.

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REFERENCES

[1] Alessandro Acquisti, Curtis Taylor, and Liad Wagman. 2016. The Economics of Privacy. *Journal of Economic Literature* 54, 2 (June 2016), 442–492. DOI:https://doi.org/10.1257/jel.54.2.442

[2] Philip Agre. 1997. *Computation and Human Experience*. Cambridge University Press

[3] Alfred V. Aho. 2012. Computation and Computational Thinking. *Comput. J.* 55, 7 (July 2012), 832–835. DOI:https://doi.org/10.1093/comjnl/bxs074

[4] Marc Andreessen. 2011. Why Software Is Eating The World. *Wall Street Journal*. Retrieved September 18, 2019 from https://www.wsj.com/articles/SB10001424053111903480904576512250915629460

[5] Jeffrey Bardzell and Shaowen Bardzell. 2013. What is "Critical" about Critical Design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '13)*, 3297–3306. DOI:https://doi.org/10.1145/2470654.2466451

[6] Jeffrey Bardzell and Shaowen Bardzell. 2013. What is "Critical" about Critical Design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13), 3297–3306. https://doi.org/10.1145/2470654.2466451

[7] Jeffrey Bardzell, Shaowen Bardzell, and Erik Stolterman. 2014. Reading Critical Designs: Supporting Reasoned Interpretations of Critical Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14), 1951–1960. https://doi.org/10.1145/2556288.2557137

[8] Shaowen Bardzell, Jeffrey Bardzell, Jodi Forlizzi, John Zimmerman, and John Antanitis. 2012. Critical Design and Critical Theory: The Challenge of Designing for Provocation. In *Proceedings of the Designing Interactive Systems Conference* (DIS '12), 288–297. DOI:https://doi.org/10.1145/2317956.2318001

[9] Shaowen Bardzell, Jeffrey Bardzell, Jodi Forlizzi, John Zimmerman, and John Antanitis. 2012. Critical Design and Critical Theory: The Challenge of Designing for Provocation. In *Proceedings of the Designing Interactive Systems Conference* (DIS '12), 288–297. https://doi.org/10.1145/2317956.2318001

[10] J. Baudrillard and J. Benedict. 2005. *Le Système Des Objets*. Verso. Retrieved from https://books.google.dk/books?id=0T3-3Ce5VocC

[11] Chauncey Bell. 2008. My Problem with Design. *Ubiquity* 9, 34 (September 2008), 1–7. DOI:https://doi.org/10.1145/1459233.1459232

[12] !Mediengruppe Bitnik and Felicity Lunn. 2018. *alert("!Mediengruppe Bitnik");* VfmK Verlag für moderne Kunst, Vienna.

[13] Julian Bleecker. 2009. *Design Fiction: A Short Essay on Design, Science, Fact and Fiction*. Near Future Laboratory, Los Angeles. Retrieved from http://drbfw5wfjlxon.cloudfront.net/writing/DesignFiction_WebEdition.pdf

[14] Mark Blythe, Enrique Encinas, Jofish Kaye, Miriam Lueck Avery, Rob McCabe, and Kristina Andersen. 2018. Imaginary Design Workbooks: Constructive Criticism and Practical Provocation. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (CHI '18). https://doi.org/10.1145/3173574.3173807

[15] Mark Blythe, Jamie Steane, Jenny Roe, and Caroline Oliver. 2015. Solutionism, the Game: Design Fictions for Positive Aging. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (CHI '15), 3849–3858. DOI:https://doi.org/10.1145/2702123.2702491

[16] Mark Blythe, Kristina Andersen, Rachel Clarke, and Peter Wright. 2016. Anti-Solutionist Strategies: Seriously Silly Design Fiction. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI '16), 4968–4978. DOI:https://doi.org/10.1145/2858036.2858482

[17] Susanne Bødker. 2006. When Second Wave HCI Meets Third Wave Challenges. In *Proceedings of the 4th Nordic Conference on Human-computer Interaction: Changing Roles* (NordiCHI '06), 1–8. DOI:https://doi.org/10.1145/1182475.1182476

[18] J. Bridle. 2018. *New Dark Age: Technology and the End of the Future*. Verso Books. Retrieved from https://books.google.dk/books?id=O_s6DwAAQBAJ

[19] Laura Buttrick, Conor Linehan, Ben Kirman, and Dan O'Hara. 2014. Fifty Shades of CHI: The Perverse and Humiliating Human-Computer Relationship. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '14), 825–834. https://doi.org/10.1145/2559206.2578874

[20] Sean Casey, Ben Kirman, and Duncan Rowland. 2007. The Gopher Game: A Social, Mobile, Locative Game with User Generated Content and Peer Review. In *Proceedings of the International Conference on Advances in Computer Entertainment Technology* (ACE '07), 9–16. https://doi.org/10.1145/1255047.1255050

[21] Justin Cheng, Moira Burke, and Elena Goetz Davis. 2019. Understanding Perceptions of Problematic Facebook Use: When People Experience Negative Life Impact and a Lack of Control. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI '19), 199:1–199:13. DOI:https://doi.org/10.1145/3290605.3300429

[22] Nigel Cross. 2006. *Designerly Ways of Knowing.* Springer-Verlag, London. Retrieved September 18, 2019 from https://www.springer.com/gp/book/9781846283000

[23] Jane Darke. 1979. The primary generator and the design process. *Design Studies* 1, 1 (July 1979), 36–44. DOI:https://doi.org/10.1016/0142-694X(79)90027-9

[24] Sebastian Deterding, Staffan L Bj o rk, Lennart E Nacke, Dan Dixon, and Elizabeth Lawley. 2013. Designing Gamification: Creating Gameful and Playful Experiences. 3263–3266. DOI:https://doi.org/10.1145/2468356.2479662

[25] Michael Dieter. 2015. Dark Patterns: Interface Design, Augmentation and Crisis. In *Postdigital Aesthetics: Art, Computation and Design*, David M. Berry and Michael Dieter (eds.). Palgrave Macmillan UK, London, 163–178. DOI:https://doi.org/10.1057/9781137437204_13

[26] Carl DiSalvo. 2012. *Adversarial Design*. The MIT Press, Cambridge, MA.

[27] Paul Dourish, Janet Finlay, Phoebe Sengers, and Peter Wright. 2004. Reflective HCI: Towards a critical technical practice. In *CHI'04 extended abstracts on Human factors in computing systems*, 1727–1728.

[28] Paul Dourish. 2006. Implications for Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '06), 541–550. DOI:https://doi.org/10.1145/1124772.1124855

[29] Nora A. Draper and Joseph Turow. 2019. The corporate cultivation of digital resignation. *New Media & Society* 21, 8 (2019), 1824–1839. DOI:https://doi.org/10.1177/1461444819833331

[30] Anthony Dunne and Fiona Raby. 2013. *Speculative Everything: Design, Fiction, and Social Dreaming*. The MIT Press.

[31] Enrique Encinas, Mark Blythe, Shaun Lawson, John Vines, Jayne Wallace, and Pam Briggs. 2018. Making Problems in Design Research: The Case of Teen Shoplifters on Tumblr. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (CHI '18). https://doi.org/10.1145/3173574.3173646

[32] Daniel Fallman. 2003. Design-oriented Human-computer Interaction. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '03), 225–232. DOI:https://doi.org/10.1145/642611.642652

[33] Sarah Fdili Alaoui. 2019. Making an Interactive Dance Piece: Tensions in Integrating Technology in Art. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (DIS '19), 1195–1208. DOI:https://doi.org/10.1145/3322276.3322289

[34] Gabriele Ferri, Jeffrey Bardzell, Shaowen Bardzell, and Stephanie Louraine. 2014. Analyzing Critical Designs: Categories, Distinctions, and Canons of Exemplars. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (DIS '14), 355–364. DOI:https://doi.org/10.1145/2598510.2598588

[35] Gabriele Ferri, Jeffrey Bardzell, Shaowen Bardzell, and Stephanie Louraine. 2014. Analyzing critical designs: categories, distinctions, and canons of exemplars. In *Proceedings of the 2014 conference on Designing interactive systems*, 355–364.

[36] Mary Flanagan. 2009. *Critical play: Radical game design*. MIT press.

[37] Bill Gaver and Heather Martin. 2000. Alternatives: Exploring Information Appliances Through Conceptual Design Proposals. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '00), 209–216. DOI:https://doi.org/10.1145/332040.332433

[38] Nanna Gorm and Irina Shklovski. 2016. Steps, Choices and Moral Accounting: Observations from a Step-Counting Campaign in the Workplace. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing* (CSCW '16), 148–159. DOI:https://doi.org/10.1145/2818048.2819944

[39] Nanna Gorm and Irina Shklovski. 2019. Episodic use: Practices of care in self-tracking: *New Media & Society* (May 2019). DOI:https://doi.org/10.1177/1461444819851239

[40] Shannon Grimme, Jeffrey Bardzell, and Shaowen Bardzell. 2014. " We've conquered dark" shedding light on empowerment in critical making. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational*, 431–440.

[41] Sarah Homewood, Harvey Bewley, and Laurens Boer. 2019. Ovum: Designing for Fertility Tracking As a Shared and Domestic Experience. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (DIS '19), 553–565. DOI:https://doi.org/10.1145/3322276.3323692

[42] Andrew Hugill. 2012. *'Pataphysics. A useless guide*. The MIT Press, Cambridge, MA. Retrieved September 18, 2019 from https://mitpress.mit.edu/books/pataphysics

[43] Lee Humphreys. 2005. Cellphones in public: social interactions in a wireless era. *New Media & Society* 7, 6, 810–833. DOI:https://doi.org/10.1177/1461444805058164

[44] Lee Humphreys. 2018. *The qualified self: Social media and the accounting of everyday life*. MIT Press.

[45] Peter J. Denning. 2009. The Profession of IT: Beyond Computational Thinking. *Commun. ACM* 52, 6 (June 2009), 28–30. DOI:https://doi.org/10.1145/1516046.1516054

[46] Alfred Jarry and Simon Watson. Taylor. 1996. *Exploits & opinions of Doctor Faustroll, pataphysician : a neo-scientific novel*. Exact Change, Boston, MA.

[47] Vera Khovanskaya, Eric P.S. Baumer, Dan Cosley, Stephen Voida, and Geri Gay. 2013. "Everybody Knows What You're Doing": A Critical Design Approach to Personal Informatics. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13), 3403–3412. https://doi.org/10.1145/2470654.2466467

[48] Ben Kirman, Conor Lineham, and Shaun Lawson. 2012. Exploring Mischief and Mayhem in Social Computing or: How We Learned to Stop Worrying and Love the Trolls. In *CHI '12 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '12), 121–130. https://doi.org/10.1145/2212776.2212790

[49] Ben Kirman, Conor Linehan, Shaun Lawson, and Dan O'Hara. 2013. CHI and the Future Robot Enslavement of Humankind: A Retrospective. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '13), 2199–2208. DOI:https://doi.org/10.1145/2468356.2468740

[50] Ben Kirman, Conor Linehan, Shaun Lawson, and Dan O'Hara. 2013. CHI and the Future Robot Enslavement of Humankind: A Retrospective. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems*, 2199–2208. https://doi.org/10.1145/2468356.2468740

[51] Kevin Landis. 2014. Culinary Pataphysics: Dining, Theatre, and the Historical Avant-Garde. *Gastronomica* 14, 2, 46–55. DOI:https://doi.org/10.1525/gfc.2014.14.2.46

[52] Chris Lewis. 2014. *Irresistible Apps: Motivational Design Patterns for Apps, Games, and Web-based Communities* (1st ed.). Apress, Berkely, CA, USA.

[53] Ann Light, Alison Powell, and Irina Shklovski. 2017. Design for Existential Crisis in the Anthropocene Age. In *Proceedings of the 8th International Conference on Communities and Technologies* (C&T '17), 270–279. DOI:https://doi.org/10.1145/3083671.3083688

[54] Conor Linehan and Ben Kirman. 2014. Never Mind the Bollocks, i Wanna Be AnarCHI: A Manifesto for Punk HCI. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '14), 741–748. https://doi.org/10.1145/2559206.2578880

[55] Conor Linehan, Ben Kirman, Shaun Lawson, and Mark Doughty. 2010. Blowtooth: Pervasive Gaming in Unique and Challenging Environments. In *CHI '10 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '10), 2695–2704. https://doi.org/10.1145/1753846.1753853

[56] Conor Linehan, Sabine Harrer, Ben Kirman, Shaun Lawson, and Marcus Carter. 2015. Games Against Health: A Player-Centered Design Philosophy. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems* (CHI EA '15), 589–600. https://doi.org/10.1145/2702613.2732514

[57] Deborah Lupton. 2016. *The Quantified Self* (1st ed.). Polity Press.

[58] Jeannette M. Wing. 2006. Computational thinking. *Communications of the ACM* 49, 3 (2006), 33–35.

[59] Matt Malpass. 2013. Between Wit and Reason: Defining Associative, Speculative, and Critical Design in Practice. *Design and Culture* 5, 3: 333–356. https://doi.org/10.2752/175470813X13705953612200

[60] Joe Marshall, Conor Linehan, Jocelyn Spence, and Stefan Rennick Egglestone. 2017. Throwaway Citation of Prior Work Creates Risk of Bad HCI Research. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*, 827–836. https://doi.org/10.1145/3027063.3052751

[61] Phoebe Moore and Andrew Robinson. 2015. The quantified self: What counts in the neoliberal workplace. *New Media & Society* 18, 11: 2774–2792. https://doi.org/10.1177/1461444815604328

[62] Evgeny. Morozov. 2013. *To save everything, click here : the folly of technological solutionism*.

[63] Gjoko Muratovski. 2016. *Research for Designers: A Guide to Methods and Practice*. SAGE, London.

[64] Dawn Nafus. 2016. *Quantified: Biosensing Technologies in Everyday Life*. MIT Press.

[65] Gina Neff and Dawn Nafus. 2016. *Self-Tracking* (1st ed.). The MIT Press.

[66] Christena Nippert-Eng. 2005. Boundary Play. *Space and Culture* 8, 3, 302–324. DOI: https://doi.org/10.1177/1206331205277351

[67] Antti Oulasvirta and Kasper Hornb\a ek. 2016. HCI Research As Problem-Solving. In *Proceedings of the 2016*

CHI Conference on Human Factors in Computing Systems (CHI '16), 4956–4967. DOI:https://doi.org/10.1145/2858036.2858283

[68] Sharon Oviatt. 2017. Theoretical foundations of multimodal interfaces and systems. In *The Handbook of Multimodal-Multisensor Interfaces*, Sharon Oviatt, Björn Schuller, Philip R. Cohen, Daniel Sonntag, Gerasimos Potamianos and Antonio Krüger (eds.). Association for Computing Machinery and Morgan & Claypool, New York, NY, USA, 19–50. DOI:https://doi.org/10.1145/3015783.3015786

[69] Corinthias P. M. Sianipar, Gatot Yudoko, Kiyoshi Dowaki, and Akbar Adhiutama. 2013. Design Methodology for Appropriate Technology: Engineering as if People Mattered. *Sustainability* 5, (August 2013), 3382–3425. DOI:https://doi.org/10.3390/su5083382

[70] Eric P.S. Baumer and M. Six Silberman. 2011. When the Implication is Not to Design (Technology). In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11), 2271–2274. DOI:https://doi.org/10.1145/1978942.1979275

[71] James Pierce, Phoebe Sengers, Tad Hirsch, Tom Jenkins, William Gaver, and Carl DiSalvo. 2015. Expanding and refining design and criticality in HCI. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 2083–2092.

[72] James Pierce. 2012. Undesigning Technology: Considering the Negation of Design by Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '12), 957–966. DOI:https://doi.org/10.1145/2207676.2208540

[73] Alison Powell. 2013. Book Review: To Save Everything Click Here: The Folly of Technological Solutionism by Evgeny Morozov. *LSE Review of Books*. Retrieved September 17, 2019 from https://blogs.lse.ac.uk/lsereviewofbooks/2013/05/01/book-review-to-save-everything-click-here-the-folly-of-technological-solutionism/

[74] Jennifer R. Whitson. 2013. Gaming the Quantified Self. *Surveillance & Society* 11, 1/2: 163–176. https://doi.org/10.24908/ss.v11i1/2.4454

[75] Fania Raczinski, Hongji Yang, and Andrew Hugill. 2013. Creative Search Using Pataphysics. In *Proceedings of the 9th ACM Conference on Creativity & Cognition* (C&C '13), 274–280. DOI:https://doi.org/10.1145/2466627.2466648

[76] Matt Ratto. 2011. Critical Making: Conceptual and Material Studies in Technology and Social Life. *The Information Society* 27, 4: 252–260. https://doi.org/10.1080/01972243.2011.583819

[77] Søren Rosenbak. 2018. Designing for a City of Lies: How to Rethink Belgiums Smartest City Through Engaging

the Imaginaries of Its Local Citizens. In *Proceedings of the 15th Participatory Design Conference: Short Papers, Situated Actions, Workshops and Tutorial - Volume 2* (PDC '18), 38:1–38:3. DOI:https://doi.org/10.1145/3210604.3214363

[78] Søren Rosenbak. 2018. Designing for a City of Lies: How to Rethink Belgiums Smartest City through Engaging the Imaginaries of Its Local Citizens. In *Proceedings of the 15th Participatory Design Conference: Short Papers, Situated Actions, Workshops and Tutorial - Volume 2* (PDC '18). https://doi.org/10.1145/3210604.3214363

[79] Søren Rosenbak. 2018. The science of imagining solutions : design becoming conscious of itself through design. Umeå University, Umeå Institute of Design.

[80] Christine Satchell and Paul Dourish. 2009. Beyond the User: Use and Non-use in HCI. In *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group: Design: Open 24/7* (OZCHI '09), 9–16. DOI:https://doi.org/10.1145/1738826.1738829

[81] Christophe Schinckus. 2018. Pataphysics of finance: An essay of visual epistemology. *Critical Perspectives on Accounting* 52, (May 2018), 57–68. DOI:https://doi.org/10.1016/j.cpa.2016.08.003

[82] Phoebe Sengers, Kirsten Boehner, Shay David, and Joseph "Jofish" Kaye. 2005. Reflective Design. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility* (CC '05), 49–58. https://doi.org/10.1145/1094562.1094569

[83] Tamar Sharon. 2017. Self-tracking for health and the quantified self: Re-articulating autonomy, solidarity, and authenticity in an age of personalized healthcare. *Philosophy & Technology* 30, 1: 93–121.

[84] Irina Shklovski, Emily Troshynski, and Paul Dourish. 2015. Mobile technologies and the spatiotemporal configurations of institutional practice. *J Assn Inf Sci Tec* 66, 10 (October 2015), 2098–2115. DOI:https://doi.org/10.1002/asi.23321

[85] Irina Shklovski, Scott D. Mainwaring, Halla Hrund Skúladóttir, and Höskuldur Borgthorsson. 2014. Leakiness and Creepiness in App Space: Perceptions of Privacy and Mobile App Use. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '14), 2347–2356. DOI:https://doi.org/10.1145/2556288.2557421

[86] Miguel Sicart. 2014. *Play Matters*. The MIT Press, Cambridge, MA.

[87] Herbert A. Simon. 1996. *The Sciences of the Artificial (3rd Ed.)*. MIT Press, Cambridge, MA, USA.

[88] Eric Stolterman and Anna Croon Fors. 2008. Human Computer Interaction (HCI): Towards a Critical Research

Position. *Design Philosophy Papers* 6, 1 (2008), 17–40. DOI:https://doi.org/10.2752/144871308X13968666267112

[89] Lucy Suchman. 2007. *Human-machine reconfigurations: Plans and situated actions*. Cambridge University Press.

[90] Melanie Swan. 2012. Health 2050: The Realization of Personalized Medicine through Crowdsourcing, the Quantified Self, and the Participatory Biocitizen. *Journal of Personalized Medicine* 2, 3 (September 2012), 93–118. DOI:https://doi.org/10.3390/jpm2030093

[91] Chris Till. 2014. Exercise as Labour: Quantified Self and the Transformation of Exercise into Labour. *Societies* 4, 3: 1–17.

[92] Fred Turner. 2008. *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*. University of Chicago Press, Chicago, IL, USA.

[93] Norbert Wiener. 1989. *The Human Use of Human Beings*. Free Association Books, London.

[94] John Zimmerman, Jodi Forlizzi, and Shelley Evenson. 2007. Research Through Design As a Method for Interaction Design Research in HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 493–502. DOI:https://doi.org/10.1145/1240624.1240704

[95] Shoshana Zuboff. 2019. *The age of surveillance capitalism : the fight for a human future at the new frontier of power*.