12. Data and Algorithms in Transition

A Diachronic Affordance Analysis Perspective

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Abstract
The chapter investigates how ongoing feature changes in contemporary software reframe our understanding of data and algorithms, interprets these changes as shifting "rules of play," and introduces the notion of diachronic affordance analysis to conceptualize their rhetorical implications over time. First, it elaborates on the perceived "gameness" of software applications like online social networks, which often intensifies over time through continuous datafication via concepts like procedural rhetoric and the "implied player." Second, as most contemporary software is defined by constant "tweaking," it suggests considering the rhetorical implications of software change itself rather than focusing on the assemblage of features at any contingent moment. Finally, to demonstrate the approach, important developments between 2017 and 2020 in the mobile app *Samsung Health* serve as a case study.

Keywords: software affordances, diachronic affordance analysis, procedural rhetoric, implied player/user

As software applications evolve over time, they usually encourage users to turn more and more aspects of their professional and everyday lives into metrics and, often, to increase these metrics like high scores in a game. For example, author Nicholas Carr pointedly describes the experience of writing for the then-new *Kindle Unlimited* distribution program as a "zero-sum game that pits writer against writer."[1] Similarly, many non-commercial social media users intuitively experience and approach their online presence as

1 See http://www.roughtype.com/?p=6290.

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a quasi-game and develop routines to evaluate and optimize their "performance" accordingly. But how can we make this perceived "game-ness" more explicit to understand better the cultural logic of software development?

In this chapter, I investigate how constant feature changes in contemporary software, particularly mobile applications, continually reframe our understanding of data and algorithms through the lens of game studies.[2] The argument is subdivided in two phases. First, I propose to conceptualize the ongoing transformation of software applications in terms of "rules of play," drawing on Brock and Shepherd's use of procedural enthymemes—traditionally applied to study meaning making in games—to explain the work of algorithms (2016). Second, I explain how these rules are continuously changing, as well as how these changes, more than any individual configuration, can inform our understanding of software. To interpret the rhetorical implications of affordance adjustments over time, the notion of *diachronic affordance analysis* is introduced. That is, the chapter argues that we need to be mindful of how software evolves—e.g., by quantifying reading flow and paying authors per page like the *Kindle Unlimited* mentioned above—to understand how users such as Nicholas Carr, who gradually internalize the tool over time, make sense of it. Both the conceptual proposition and corresponding methodology will be exemplified using the mobile application *Samsung Health* as a case study to show how changes in the user interface and algorithmically determined functionality have contributed to reframing Samsung's stance towards the datafication of personal health over time.[3] With this approach, the chapter is intended to be relevant both as a methodological inspiration on how to analyze evolving software applications (e.g., within software studies or critical data studies) and as a guide for game scholars on how their methods and concepts apply to the broader datafication of contemporary digital societies.

Studying Software Affordances as Quasi-Textual Properties

For this argument, I propose studying algorithmically determined functionality—rather than specific types of algorithms like recommendation

2 Below, I refer to algorithmics primarily in terms of algorithmically defined software functionality (like determining how users can compare metrics or interact with others in apps like *Samsung Health*) rather than in terms of implementation on the level of code (like different approaches toward sorting or recommendation routines).

3 For the Android version of *Samsung Health* on the Google Play store, see https://play.google.com/store/apps/details?id=com.sec.android.app.shealth&hl=en&gl=US.

systems or layout algorithms for data visualization—in terms of software affordances (Curinga 2014). In media and culture studies, affordances have been defined as a "relational property" (Bucher and Helmond 2018, 235), i.e., as "socio-technical" (248) characteristics of software platforms understood as "environment[s]" (243). Matthew Curinga (2014) expands on that framing by intuitively describing "software as text" (n.p.) but without making explicit how to study the textual properties of software design. Yanni Alexander Loukissas (2019) uses similar terminology, arguing that "if data can be considered as texts […] interfaces are contexts: the settings in which data are meant to be fully understood" (125). This analogy suggests that the relationship between user and software/algorithm can be understood in similar terms as the co-creative relationship between reader and text. Just as a written text makes certain interpretations more or less plausible, the "interface as discourse" (Stanfill 2015) communicates "norms of use" by "mak[ing] certain uses easier or harder" (1061).

To further operationalize this perspective and formulate a heuristic specifically suitable for the diachronic perspective below, I suggest approaching (critical) affordance analysis as an equivalent of textual analysis, which implies conducting a "close reading" (Looy and Baetens 2003, 8) of the rhetorical implications of software functionality. The following six criteria may be useful to guide a "close reading" of software affordances:

First, characteristic omissions may communicate norms and values in the same way as adding features. For example, when Facebook introduced five predefined emotional responses for users to connote content posted on the platform in 2016, both tech journalists and (many) users were keenly aware that these did not include the much-discussed "dislike button" that many had expected, and which the company had been experimenting with.[4]

Second, since a close reading prioritizes uncommon phrasings rather than interpreting a text line by line, unusual design choices are a good place to start. According to Matthew Curinga, "often, the most powerful interpretations push the boundaries of [the] rules [of software design]" (n.p.).

Third, like exploring paradigmatic semantic relations in literary texts, i.e., comparing word choices against potential alternative phrasings, software design choices should be interpreted based on hypothetical alternatives. For example, Google's decision to keep and remodel its "I'm feeling lucky" button appears particularly meaningful given that the button has been

4 See https://www.businessinsider.com/why-facebook-didnt-make-dislike-button-2016-2.

part of the launch page since the early days and could have been removed long ago because it no longer served a clear function.[5]

Fourth, software design choices constitute an "'ideal user,' i.e., 'script[…]' a discursive material configuration of ideal use" (Docherty 2020, 1); following the analogy above, this process can be compared to how a text, according to Umberto Eco, constitutes a "model reader" (Pisanty 2015).

Fifth, much as a text that is not phrased carefully can elicit unintended interpretations, this also occurs as a consequence of software affordance design. As an example, consider apps like *Forest*, which aim to promote productivity by actively discouraging smartphone use as a distraction; because they simultaneously include social features like screenshot sharing to grow their user base, these design choices contradict the core functionality.

Sixth and finally, just like literature contributes to altering and/or expanding contemporary social imaginaries (e.g., Fluck 1983), software not only contributes to socio-cultural transformations but simultaneously shapes the users' algorithmic imaginary (Bucher 2017), i.e., assumptions about how algorithms "function" on both a technical and on a social level. Alexis Papazoglou (2019) provides a pertinent example by examining Facebook's then-new "Why am I seeing this post?" feature, arguing that it increases "algorithmic transparency" but also "could affect how we see ourselves," as it creates a feedback loop by mirroring our user activity through the lens of "Facebook's algorithm" (n.p.).

After outlining how to analyze the quasi-textual properties of software, the following section adds to this definition by emphasizing how many software applications, not just games or examples of overt gamification, can be understood as quasi-games that afford different "playing styles."

Re-Framing Software Affordances in Terms of Games

With his notion of "expressive processing," Noah Wardrip-Fruin (2009) posits that "data" and "process" (10) are always connected in software, particularly in digital games. He suggests that by observing processes like "AI techniques in the context of a relatively easy to evaluate area such as computer games […] we can use that understanding to judge proposals for using similar techniques in higher-stakes social contexts (e.g., areas such as surveillance)"

5 See https://www.thesearchengineguys.com/googles-im-feeling-lucky-button-has-received-a-remodeling.

(5). Similarly, authors like Alexander Galloway (2004) have drawn attention to how playing a digital game like *Civilization* involves "learning, internalizing and becoming intimate with a massive, multipartite global algorithm." Both authors do not use the notion of software affordances, but the connection they establish between games and other broadly defined types of software is very plausible. However, while both Wardrip-Fruin and Galloway suggest interpreting games as software, I instead propose to interpret algorithmic systems as games, specifically from the perspective of the users.

The ongoing popularity of gamification has led to an—often uncritical—incorporation of basic game mechanics like virtual currencies or leaderboards into a wide range of software applications.[6] However, non-game software also arguably encourages playful forms of use or even implicitly uses design metaphors from games. One such example is the snap-streaks feature that "challenges" Snapchat users to create unbroken chains of messages by responding within a narrow time frame, a feature that is clearly reminiscent of "combo" mechanics popular in digital games and can be just as "addictive" as reaching a high score in a game.[7] This "gameness" (Malaby 2007) of (specific types of) software becomes particularly evident from a long-term perspective; similar to how players of service games react to—also partly black-boxed—changes to the "meta" over time, social media creators adapt their strategies to changes in recommendation algorithms, using terminology reminiscent of games like "survive" and "outsmart" to describe the process.[8,9] Based on this premise, the aforementioned notion of the "ideal user" (Docherty 2020) appears comparable to the "implied player" (Aarseth 2014), a term Espen Aarseth uses to describe the strategies and tactics "suggested" by the rules and constraints of a game, i.e., forms of player behavior that prove successful and thus opportune. Docherty emphasizes how Facebook, both internally and externally, frames forms of use that are conducive to their goals as "healthy" (n.p.). Aarseth defines the implied player in similar, albeit fuzzier, terms as "a role made for the player by the game, a set of expectations that the player must fulfill for the game to 'exercise its effect,'" which have "a concrete, material existence" (both 132) enforced by the game's algorithmic composition.

6 See https://techcrunch.com/tag/gamification.

7 See https://www.businessinsider.com/teens-explain-snapchat-streaks-why-theyre-so-addictive-and-important-to-friendships-2017-4.

8 See https://www.pcgamesn.com/path-of-exile/expansion-expeditions-new-gems.

9 See https://sproutsocial.com/insights/instagram-algorithm.

This re-framing of algorithms "as games" can be helpful as a conceptual middle ground between the more traditional perspectives of technological determinism and the social construction of technology. Increasingly ostracized in many academic discourses, "technological determinism persists in the actions taken and justifications given by many actors" (Wyatt 2008, 167) beyond academia, and re-framing the user as a "player" who partially co-creates the game can offer a more "contemporary form" of "hybrid, or 'weak technical determinism'" (Curinga 2014, n.p.) suitable for the analysis of mobile applications and other consumer-facing software technologies characterized by constant updates and "tweaking" (Bogost 2016). Below, these changes will instead be interpreted as changing "rules of play," which lead to a spectrum of likely changes in "player behavior." As a case study, I use the mobile application *Samsung Health*.

The Rhetorical Dimension of Software Affordance Changes

Existing critical affordance analyses of software applications, ranging from blogging software (Hopkins 2013) and online social networks like Facebook (Curinga 2014) to civic tech organizations like mySociety (Baack 2018), usually focus disproportionately on the contingent moment of observation. Yet software is increasingly characterized by constant change. In her discourse analysis of the 1968 Garmisch conference, which is often considered the origin of software engineering, Federica Frabetti (2015) emphasizes "the pace of software growth" (73). This already encouraged developers in the 1960s to take disproportionate shortcuts and insisted that "society need[ed] to take responsibility for an incalculable risk" (75). These rapid changes have only become more prominent, to the point where constant change arguably constitutes an important aspect of the "social epistemologies," i.e., "the way in which we use and develop knowledges in everyday life" (Berry 2012, 381), of software itself. Companies like Salesforce (2007) initiated this shift and pioneered the platformization of software by selling subscriptions rather than physical products.[10] Ian Bogost (2016) has argued that the constant "tweaking" of an iconic algorithm like Facebook's Edgerank imbues it with quasi-religious connotations, i.e., "raises its station, fetishizes it, treats it as a totem" (n.p.). More recently, YouTube's controversial changes to its dislike functionality in November 2021 made it particularly evident that content

10 See for example https://techcrunch.com/2019/03/22/how-salesforce-paved-the-way-for-the-saas-platform-approach.

creators but also viewers are becoming increasingly aware of how companies communicate norms and values (e.g., suggesting to create an "inclusive and respectful environment") through affordance changes.[11] Marshall McLuhan (1994) famously argued that if "social rules change suddenly, then previously accepted social manners and rituals may suddenly assume the stark outlines and the arbitrary patterns of a game" (238–39), and many YouTube users indeed considered the seemingly arbitrary implementation an abrupt change of the "rules of play" on the platform.

Investigating patterns of change is also important to better understand and contextualize the data processed by a given software application because, as Loukissas (2019) reminds us, "data and algorithms are inextricably entangled" (103). In other words, they can only be meaningfully investigated in conjunction with each other. For example, by discussing how "algorithms can be racist and sexist," Rebecca Heilweil (2020) illustrates the difficulty in separating between algorithm and data, even though commonly used terms like "algorithmic bias" (n.p.) suggest that the root of the problem lies in the algorithm as "text." Yet many instances of algorithmic bias reported in recent years are primarily caused by insufficiently diverse training datasets used to improve machine learning applications. This entails that a change in training data or the availability of new training data also need to be taken into consideration along with affordance changes of algorithmic systems.

Reflecting on Twitter, Taina Bucher and Anne Helmond (2018) already address two important changes in its functionality: the "turn to hearts" and the corresponding icon change as well as "enabling a new timeline ordering" (244). However, the authors primarily focus on how the new status quo can be interpreted using several variations of the affordance concept rather than conceptualizing patterns of change themselves. To address this gap, diachronic affordance analysis focuses on tracing changes in the algorithmic behavior of software over time as procedural rhetorical operations in themselves, which create meaning by re-writing the implied "rules of play." As an analytical method, diachronic affordance analysis is driven by a research question and relevant concepts that help to identify and select the most relevant affordances for analysis. Here, the method will be exemplified by considering several important moments of change in the mobile application *Samsung Health*, the discursive context in which they take place, and how they reflect Samsung's stance on the datafication of personal health.

11 See https://blog.youtube/news-and-events/update-to-youtube.

Samsung Health, or: The Instrumentalization of Personal Health in Platform Politics

Launched in 2012 under the name *S Health*, the app primarily enabled users to monitor weight, blood pressure, and blood sugar levels by synchronizing with devices by Lifescan, Omron, and AandD via Bluetooth or USB. Much like its competitor *Apple Health*, *Samsung Health* (as it was rebranded in 2017) has become increasingly integrated into the functionality and algorithmic imaginary (Bucher 2017) of the smartphones it runs on (for example, it was launched simultaneously with and preinstalled on Galaxy S3 smartphones). As such, the evolution of the app and its "rules of play" reflect different phases in Samsung's platformization strategy, specifically in competition with Apple. The diachronic affordance analysis demonstrated in this short chapter primarily refers to articles from the Samsung Newsroom website and a few user reviews as material; these sources are indexed (see the section "Primary Sources"] and referenced by their indices below. When analyzing the rhetorical import of changes in the software affordances, changes pertaining to different types of data, including health-related data, user profile information, and relevant metadata (for example, incorporating *Samsung Health* into the Samsung Rewards program [S-17-3], i.e., effectively translating in-app activity into this external "virtual currency") will be particularly pertinent. Rather than documenting the addition, modification, and removal of features chronologically, the analysis below focuses on several rhetorically significant patterns of change and the corresponding cultural implications.

How Social Metadata Contribute to the "Gameness" of Samsung Health

It is important to point out that *Samsung Health*—like many "quantified self" applications—contains elements of gamification, but gamification is not part of its core functionality nor does it fit the definition of a digital game. This section focuses on how new metrics increase its gameness, but below I will elaborate on why it makes sense to consider *Samsung Health* "as a game," regardless of leaderboards and challenges.

In 2017, *Samsung Health* began systematically generating social metadata through its competitive "Together" feature, which incentivized users to compare fitness levels through a steps leaderboard and one-on-one challenges [S-17-3]. This step in the increasing datafication of *Samsung Health* makes it particularly plausible to re-frame the application "as a game" as suggested above, because it affords setting and especially measuring user-defined

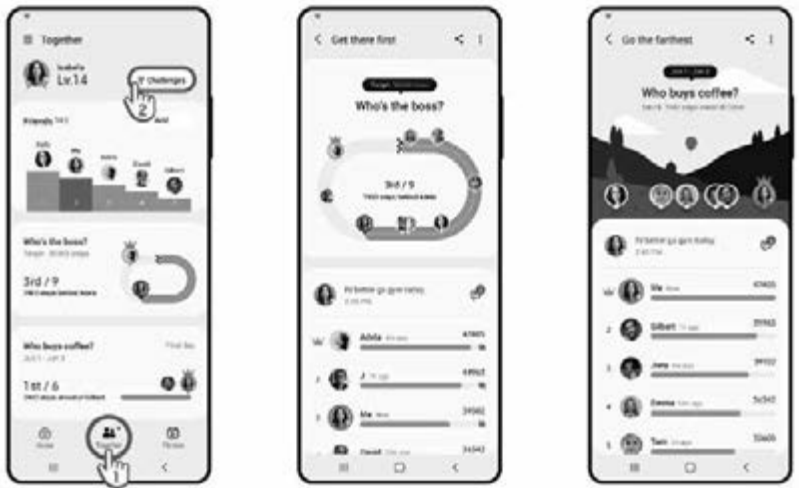

Fig. 12. Samsung Health "Together" feature (Samsung Newsroom).

"goals." Marshall McLuhan points out the inherent momentum of numbers, because, understood as "media," they exhibit a "dynamic drive toward growth and aggrandizement" (McLuhan 1994, 106); that is, numerically expressing any given phenomenon implies a tendency "toward unlimited growth."[12] Samsung's advertising of this feature change confirms McLuhan's proposition that "the joy in the multiplication of numbers" stems from "the pleasure of being among the masses" (both 107) by being immersed in a community, e.g., by listing the aggregate achievements of the *Samsung Health* user base, including walking a total distance of 59 billion km or collectively burning 3 billion kcal [S-21-1]. The ongoing refinement of social metadata in the app only explicates and intensifies this inherent "gameness" of software applications like *Samsung Health*. For instance, an early 2021 update introduced a "group challenge feature" that uses game-related iconography like a crown and a racetrack to incentivize the creation of new challenges, which in turn catalyze the creation of new metadata. These challenges are "hidden" behind titles like "who buys coffee?" that attribute social meaning to the numerical comparison. In this case, metadata like the time passed since a user's last in-app activity are designed to nudge users/players toward competitive behavior, albeit unnoticeably, since they appear in a small, light gray font in the user interface.

12 While this characteristic applies to many game genres like strategy or role-playing games, it is literally at the core of the more recent micro-genre of "incremental" or "idle games"; see for example https://pixl.nmsu.edu/files/2018/02/2018-chi-idle.pdf.

Other metadata created by the service include synthesizing aggregate "score[s]" for health-related phenomena, e.g., via the new sleep tracking features in September 2020 [S-20-9], which combine metrics like "breathing, vitals, and REM cycles" into a new data point via a proprietary algorithm. Devin Gaffney and Cornelius Puschmann (2012) point out that these aggregate "scores," popularized by the now discontinued "Klout score," appear game-like due to the lack of "algorithmic transparency" (2). That is, because the influence of individual metrics is partially but not completely transparent like in a digital game, these systems afford playful usage practices, such as tweaking individual parameters to infer their importance and gradually refining one's understanding (or, in game terminology, one's mastery) of the algorithmic model. Since 2018, the social metadata are also gradually being monetized, as the 6.0 update introduced a "discover" feature that uses the previously aggregated data on user "interests and fitness level" to display external content and "partner applications" and to allow partners to sell fitness accessories and clothing "within the platform" [S-18-10; translated from German by the author]. While this section focused on how new metrics increase gameness by suggesting new types of "scores" to compare, the focus below shifts toward the logic of incremental technological sophistication, which applies both to smartphones and video game hardware.

The Teleological Impulse of Software and Game Technologies

From a diachronic perspective, the *Samsung Health* app and its data-processing features follow the same logic of escalation as digital entertainment media, specifically gaming hardware. For instance, the on-demand electrocardiogram (ECG) added to Galaxy Watch devices in September 2020 was advertised as a "next-generation feature" [S-20-9], a framing reminiscent of the recently launched new game console generation. This incremental addition of new parameters to track, for example the concurrently implemented feature to "track oxygen saturation on Galaxy Watch3," maintains a constantly reinforced sense of "completeness" and an "encyclopedic impulse" (Clark 1992) as users are repeatedly reassured that the app will eventually offer a perfect datafication of their vital functions. Again, this paradigm becomes particularly plausible because it similarly applies to contemporary developments in gaming such as "games-as-a-service" (Dubois and Weststar 2021), which are continuously updated with new properties and mechanics to customize their virtual characters.

A corresponding development is the increasing focus on small-scale but real-time data evaluation, for example via the "new digital running

coach" that was introduced with the same September 2020 update and which arguably promotes a neoliberal "dashboard" (Batty 2015) approach to personal health. Batty shows how "the idea of monitoring human systems [via real-time dashboards] is intrinsic to modern medicine" and was later expanded to "monitoring human organizations" (29) like cities, inherently understanding them in similar terms as an "organism." The characteristic recombination of seemingly disjointed data points like "social class and density as well as pollution, twitter feeds etc." (31) in dashboards also applies to the constant addition of new real-time metrics in *Samsung Health*. After examining how both gamers and software users expect the ongoing inclusion and interconnection of new data points, the next section addresses specific types of "ideal users" as well as "implied players."

Defining "Ideal Users" Based on Combinations of Data Points

The "running coach" also demonstrates how, rather than limiting itself to generic "health" data, *Samsung Health* increasingly introduces and recombines metrics specific to "ideal types" of users with distinct interests like running, meditation, or injury prevention. These can be interpreted following Aarseth (2014) as implied players, who, similar "to [Hans-Georg] Gadamer's notion of the unfree player subject," constitute a "a boundary imposed on the player-subject by the game" (132) by tweaking the rules to encourage certain types of interaction (by adding further nuances) while discouraging others (by making them harder or more time-consuming to do). Constant feature change turns this mutual conditioning into an actual feedback loop; for example, the "launch screen [in the 6.0 update] was significantly simplified" in accordance with "the requirements and habits of the users" [S-18-10; translated from German by the author], i.e., often-used features and data points are positioned even more prominently and reinforce existing usage habits and "types." The notion of archetypal usage scenarios also affects the interrelatedness of data and algorithms, as new algorithmic features like "trip detection" can use available data (in this case the movement speed via GPS combined and/or the pedometer information) to infer standardized usage contexts, in this case e.g., to check only for tripping if the user is found to be "running" (rather than walking or meditating, for example). Thus, while users often do not reflect on how the software-as-game affords different ideal types of use, companies like Samsung gradually solidify existing "player types" as categories by adding new functionality that adds further nuance or gratification for users/players following these pre-existing paths. Until now, the analysis has focused

on how implications of affordance change for *Samsung Health* itself; the following sections widen the scope to discuss how recent changes position the application more broadly within pertinent societal discourses.

Intervening in Societal Debates via Affordance Changes

One of the most evident instances of rhetoric via affordance change was the "response" to the COVID-19 pandemic, notably by incorporating *Samsung Health* into Samsung Smart TVs in May 2020, two months after the first period of worldwide lockdowns. The television set has long been understood as the center of the "home." As David Morley (2004) notes, "the concept of home [has been] destabilized, both by new patterns of physical mobility and by new communication technologies" (303), and while some of these boundaries, specifically between work and leisure, have become even more permeable, the pandemic also clearly rearticulated the home as the locus of family life. The lockdowns reasserted TV's place in the home and the family, not least because it is usually connected to gaming consoles and runs Smart TV apps as well. Consequently, data-related changes in *Samsung Health* emphasize the family, for example via "individual accounts for yourself as well as your family members" to provide "personalized recommendations on workouts" [S-20-5] and more. The new affordance of being displayed, according to Samsung, "on the biggest screen in the household" (i.e., occupying a central space in the users' lives, especially under conditions of working from home and home schooling) also facilitated new ways of receiving metadata like "routines," i.e., reminders to perform workouts or relaxation exercises at specified times during the day.

Samsung itself did not explicitly address the pandemic, only stating that "given the current climate, we hope that the launch of *Samsung Health* makes it easier for our consumers to prioritize their physical and mental wellbeing on a daily basis."[13] Thus, the affordance changes can be understood as "filling in the gaps" in Samsung's official corporate communication via the media modality of user experience design. At the same time, extending the dashboard approach into the family, such as via health "goals" that can be expressed numerically (e.g., steps per day or number of meditation sessions per week) and shared between family members, expands the influence of "computing as a neoliberal governmental technology" (Chun 2011, 6) in the household. Apart from non-verbally "responding" to the unprecedented

13 See https://news.samsung.com/us/samsung-health-now-available-2020-samsung-smart-tvs-fitness-wellness-platform.

pandemic as it unfolded, *Samsung Health* recently used content updates even more granularly to intervene in societal debates tied to specific, distinct, or recurring events like the Christmas holidays. For example, the aforementioned group challenge feature was explicitly associated with the users' "New Year's Resolution" in the corresponding announcement [S-21-1], suggesting that the evolving data manipulation affordances built into the software can and should be interpreted as part of the users' everyday life and cultural environment.

This section addressed how software companies can respond to and intervene in societal debates through affordance changes, which are often more imperceptible than verbal or even visual corporate rhetoric and thus offer rhetorical opportunities because many users are not yet trained to "decode" them (e.g., in comparison with decades of advertising literacy education). The final section below tentatively incorporates user reviews, which can offer a glimpse into how users actually interpret specific affordance changes and develop procedural literacy in the process.

Considering User Reviews to Validate Hypotheses

Interpreting affordance analysis as a textual analysis of software implies that it can primarily identify likely interpretations on the basis of aesthetic choices; to assess the plausibility of these interpretations, analyzing discursive patterns in user reviews from the online app stores can be a suitable next step, even though these reviews can only offer anecdotal evidence. For example, user reviews can provide insights into how affordance changes shape the perceived algorithmic imaginary (Bucher 2017) of *Samsung Health*, with users explicitly addressing how adding or changing features affects their user behavior or "playing style." For example, user reviews often propose feature additions and changes to address usability concerns common in digital games. One highly evocative and controversial affordance change was the removal of the weight management, caffeine, and calorie tracking in July/August 2020. This feature removal was not explicitly communicated and justified by Samsung, which led to confusion and irritation within the user community. Responses indicate that users feel that their "investment" (both financial and emotional) in Samsung devices was devalued by this decision, arguing that it turns "existing Galaxy Smartwatches into an expensive step counter" and that the "cheaper Fitbit beats you [i.e., Samsung] now."[14] This suggests data are (justly) interpreted as assets in the ongoing platform competition, but, as users feel tied to platforms

14 See for example https://eu.community.samsung.com/t5/mobile-apps-services/samsung-health-app-weight-management-you-killed-it-care-to/td-p/1917065.

like *Samsung Health*, they expect them to "play that game" on their behalf as effectively as possible. For example, one user argues that this "unnecessary and inexcusable change has made the Samsung ecosystem useless to [them]"; another even explicitly mentions the game metaphor, defending Samsung's community managers by arguing that they are "just minions in this game." The five directions for diachronic affordance analysis outlined above do not claim to constitute a complete methodology, but they can be adapted to analyze how other types of non-game software change the implied "rules of play" and thereby continually readjust the procedural rhetoric of the respective application. The final section below offers some considerations for that purpose.

Outlook

As shown above, changes in software affordances readjust the framing of personal health (as well as related concepts) over time and give users new rules to play by. These involve framing health as an inherently social issue by adding social metadata but also by associating Samsung as a technology company with health insurances; the integration of Samsung Rewards operates similarly to incentive programs offered by insurances, i.e., providing benefits for using health-related in-app features, albeit within the Samsung ecosystem rather than society at large. As these changes occur gradually, they are often imperceptible to individual users, which can make them more influential. It should be noted in a few cases that interoperability qua data was seemingly counterintuitively limited, for instance by removing the integration with other apps through "connected services" [AA-18-8] in September 2018. These changes likely have pragmatic reasons, but they might nonetheless elicit "unintended interpretations" as suggested above, e.g., making the company appear "less open and more restrictive."[15]

Due to its scope, this chapter can primarily demonstrate the benefits of diachronic affordance analysis and of framing algorithmic systems as games using a limited case study; therefore, it appears useful to end on a few methodological suggestions. For example, the user-as-player analogy can be more systematically operationalized by elaborating on the user's explicit or implicit goals, routines, and strategies. Noah Wardrip-Fruin (2010) suggests using the "MDA framework" to conceptualize both games and other types of "operational logics" (17); this could help in differentiating between interfaces

15 See for example https://www.sammobile.com/2018/08/27/samsung-health-syncing-data-third-party-apps.

and "rules" (mechanics), emergent routines and feedback loops users adopt in response to these "material constraints" (dynamics), and more interpretive, self-reflexive observations based on long-term habitual use (aesthetics). For a larger-scale analysis, it would be useful to chronologically organize changes according to category (UI, social functionality, connection to devices like wearables or smart TVs, etc.) and include contemporary tech blog coverage, ideally multiple sources per update to identify potential interpretations of affordance changes from different angles.[16]

Furthermore, the method outlined above can be tweaked to accommodate other types of software. For example, I have demonstrated earlier how to use the timeline tool *Timeflow* to visually explore affordance changes, which is particularly useful for larger datasets and/or for specifically comparing affordance changes in different categories; these can be color-coded in *Timeflow* (Werning 2019). Using the online archive *Wayback Machine* offers additional opportunities for visual comparison, e.g., in adapting the method to study web applications (such as the *Coronadashboard* of the Dutch government), as it allows for contrasting different versions of the application's launch page over time. In this way, instances of priming (e.g., through the order and visual composition of data points on the page), the verbal and audiovisual framing of the implied user (Docherty 2020), and preferred "playing styles" can be compared systematically.[17]

References

Aarseth, Espen. 2014. "I Fought the Law: Transgressive Play and The Implied Player." In *From Literature to Cultural Literacy*, edited by Naomi Segal and Daniela Koleva, 180–88. London: Palgrave Macmillan. https://doi.org/10.1057/9781137429704_13.

Baack, Stefan. 2018. "Civic Tech at MySociety: How the Imagined Affordances of Data Shape Data Activism." *Krisis: Journal for Contemporary Philosophy*, no. 1. https://archive.krisis.eu/civic-tech-at-mysociety-how-the-imagined-affordances-of-data-shape-data-activism.

Batty, Michael. 2015. "A Perspective on City Dashboards." *Regional Studies, Regional Science* 2, no. 1: 29–32. https://doi.org/10.1080/21681376.2014.987540.

Berry, David M. 2012. "The Social Epistemologies of Software." *Social Epistemology* 26, no. 3–4: 379–98.

16 See the official coverage of the 6.0 update in late 2018 [S-18-10] and the corresponding feature preview by Android Authority [AA-18-8] as proof-of-concept below.

17 See https://web.archive.org/web/20200801000000*/https://coronadashboard.rijksoverheid.nl.

Bogost, Ian. 2016. "Go Tweak Yourself, Facebook." *The Atlantic*, April 28, 2016. http://www.theatlantic.com/technology/archive/2016/04/go-tweak-yourself-facebook/480258.

Brock, Kevin, and Dawn Shepherd. 2016. "Understanding How Algorithms Work Persuasively Through the Procedural Enthymeme." *Computers and Composition* 42 (December): 17–27. https://doi.org/10.1016/j.compcom.2016.08.007.

Bucher, Taina. 2017. "The Algorithmic Imaginary: Exploring the Ordinary Affects of Facebook Algorithms." *Information Communication and Society* 20, no. 1: 30–44. https://doi.org/10.1080/1369118X.2016.1154086.

Bucher, Taina, and Anne Helmond. 2018. "The Affordances of Social Media Platforms." In *The SAGE Handbook of Social Media*, edited by Jean Burgess, Thomas Poell, and Alice Marwick, 233–53. London and New York: SAGE Publications.

Chun, Wendy Hui Kyong. 2011. *Programmed Visions: Software and Memory*. Cambridge, MA: MIT Press.

Clark, Hilary A. 1992. "Encyclopedic Discourse." *SubStance* 21, no. 1: 95–110. https://doi.org/10.2307/3685349.

Curinga, Matthew X. 2014. "Critical Analysis of Interactive Media with Software Affordances." *First Monday* 19, no. 9. http://firstmonday.org/ojs/index.php/fm/article/view/4757/4116.

Docherty, Niall. 2020. "Facebook's Ideal User: Healthy Habits, Social Capital, and the Politics of Well-Being Online." *Social Media and Society* 6, no. 2. https://doi.org/10.1177/2056305120915606.

Dubois, Louis Etienne, and Johanna Weststar. 2021. "Games-as-a-Service: Conflicted Identities on the New Front-Line of Video Game Development." *New Media & Society* 24, no. 10: 2332–53. https://doi.org/10.1177/1461444821995815.

Fluck, Winfried. 1983. "Literature as Symbolic Action." *Amerikastudien* 28, no. 3: 361–71. http://www.jfki.fu-berlin.de/en/v/publications_fluck/1980/fluck_symbolic_action/Fluck_Symbolic_Action.pdf.

Frabetti, Federica. 2015. *Software Theory: A Cultural and Philosophical Study*. London: Rowman and Littlefield.

Gaffney, Devin, and Cornelius Puschmann. 2012. "Game or Measurement? Algorithmic Transparency and the Klout Score." In *#influence12: Symposium and Workshop on Measuring Influence on Social Media*. Halifax, Canada. http://devingaffney.com/files/influence12_submission_23.pdf.

Galloway, Alexander. 2004. "Playing the Code: Allegories of Control in Civilization." *Radical Philosophy* 128: 33–40. https://www.radicalphilosophy.com/wp-content/files_mf/rp128_article3_playingthecode_galloway.pdf.

Heilweil, Rebecca. 2020. "Why Algorithms Can Be Racist and Sexist." *Recode*, February 18, 2020. vox.com/recode/2020/2/18/21121286/algorithms-bias-discrimination-facial-recognition-transparency.

Hopkins, Julian. 2013. "Assembling Affordances: Towards a Theory of Relational Affordances." In *AoIR Selected Papers of Internet Research*. Vol. 3. Association of Internet Researchers. https://spir.aoir.org/index.php/spir/article/view/783.

Leonardi, Paul M. 2010. "Digital Materiality? How Artifacts without Matter, Matter." *First Monday* 15, no. 6. http://firstmonday.org/ojs/index.php/fm/article/view/3036.

Loukissas, Yanni Alexander. 2019. *All Data Are Local. Thinking Critically in a Data-Driven Society*. Cambridge, MA: MIT Press.

Malaby, Thomas M. 2007. "Contriving Constraints (The Gameness of *Second Life* and the Persistence of Scarcity)." *Innovations: Technology, Governance, Globalization* 2, no. 3: 62–67. https://doi.org/10.1162/itgg.2007.2.3.62.

McLuhan, Marshall. 1994. *Understanding Media: The Extensions of Man* (*MIT Press Edition*). Cambridge, MA: MIT Press.

Morley, David. 2004. "At Home with Television." In *Television after TV: Essays on a Medium in Transition*, edited by Lynn Spigel and Jan Olsson, 303–23. Durham, NC: Duke University Press.

Papazoglou, Alexis. 2019. "Understanding Facebook's Algorithm Could Change How You See Yourself." In *Social Media and the Self. An Open Reader*, edited by Jefferson Pooley. Allentown, PA: mediastudies.press. https://doi.org/10.32376/3f8575cb.6e843c25.

Pisanty, Valentina. 2015. "From the Model Reader to the Limits of Interpretation." *Semiotica* 206: 37–61.

Stanfill, Mel. 2015. "The Interface as Discourse: The Production of Norms through Web Design." *New Media & Society* 17, no. 7: 1059–74. https://doi.org/10.1177/1461444814520873.

van Looy, Jan, and Jan Baetens, eds. 2003. *Close Reading New Media: Analyzing Electronic Literature*. Leuven: Leuven University Press.

Wardrip-Fruin, Noah. 2009. *Expressive Processing: Digital Fictions, Computer Games, and Software Studies.* Cambridge, MA: MIT Press.

Werning, Stefan. 2019. "Disrupting Video Game Distribution: A Diachronic Affordance Analysis of Steam's Platformization Strategy." *Nordic Journal of Media Studies* 1, no. 1: 103–24.

Wu, Teresa, Maurine Kwende, and Nada Dabbagh. 2020. "Affordance Analysis of WordPress." In *Innovate Learning Summit 2020*, edited by Theo J. Bastiaens and Gary H. Marks, 43–57. Waynesville, NC: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/218780.

Wyatt, Sally. 2008. "Technological Determinism Is Dead: Long Live Technological Determinism." In *The Handbook of Science and Technology Studies*, edited by Edward J. Hackett, Olga Amsterdamska, Michael E. Lynch, and Judy Wajcman, 3rd ed., 165–80. Cambridge, MA: MIT Press. https://www.dhi.ac.uk/san/waysofbeing/data/data-crone-wyatt-2007b.pdf#page=181.

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