Algorithmic Colonization of Love: The Ethical Challenges of Dating App Algorithms in the Age of AI

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Abstract: Love is often seen as the most intimate aspect of our lives, but it is increasingly engineered by a few programmers with Artificial Intelligence (AI). Nowadays, numerous dating platforms are deploying so-called smart algorithms to identify a greater number of potential matches for a user. These AI-enabled matchmaking systems, driven by a rich trove of data, can not only predict what a user might prefer but also deeply shape how people choose their partners. This paper draws on Jürgen Habermas's "colonization of the lifeworld" thesis to critically explore the insidious influence of delegating romantic decision-making to an algorithm. The love lifeworld is colonized inasmuch as online dating algorithms encroach into our romantic relations to the extent that communicative action within romance is replaced by the technocratic rules of an algorithm.

Key words: dating apps, algorithm, AI, Habermas, colonization

1. Introduction: Love is an Algorithm?

During the COVID-19 pandemic, dating sites exploded in popularity. In March 2020, Tinder posted a new daily record: 3 billion swipes. From March to May 2020, the usage of OkCupid spiked by 700%, while Bumble's video calls alone surged by 70% (Chin and Robison 2020). However, searching for love online was already popular before March 2020, and the pandemic only accelerated the trend. According to a 2019 Stanford study, online dating has displaced "the intermediary roles of friends and family" as the number one way that American couples meet romantic partners (Rosenfeld, Thomas, and Hausen 2019, 17753). For such a popular service, the specific inner workings of online dating platforms are still

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rather obscure to most users. But the general idea is simple: to transform romantic love—humanity's most intimate relations—into a mathematical algorithm.[1]

As early as 1965, researchers used punch cards to record questionnaires about who an "ideal date" might be (Bridle 2014). The information was then fed into a five-ton IBM computer to suggest potential matches. People called this big matchmaking machine "The Great God Computer": it would "know something that [people] don't know" (Bridle 2014).[2] With the rise of the Internet in the 1990s, computer matchmaking turned into online dating. Many companies established online platforms for internet users to post self-advertisement as well as to browse others' profiles (Finkel et al. 2012). The matching process of these dating websites was more-or-less random since the profiles presented to users were a more-or-less random group of people.

In the last two decades, dating algorithms have been updated to be more predicative. Online dating companies launched matchmaking algorithms to filter partners based on their profiles. After users answered questionnaires, algorithms would analyze and predict suitable dates and then match them automatically. These algorithms were often claimed to be a more scientific and reliable way to find soulmates compared to human judgements (Rudder 2014). In the 2010s, with the popularity of smartphones, dating apps dominated the online dating industry. Their profiling algorithms have been largely simplified: with a few clicks, users can be matched by merely swiping through headshots (Schwartz and Velotta 2018).

Nowadays, online dating algorithms tend to be increasingly "intelligent" because they incorporate more machine learning. Many dating apps are deploying artificial intelligence (AI) to create different sorts of smart matchmaking, where users need no longer swipe on the screen. For instance, online dating leader Match.com has developed an AI dating chatbot "Lara" to serve as users' personal love coach. Applying natural language learning to interact with users, Lara not only recommends potential matches, but also guides users on how to manage love relations (Li 2019). eHarmony has also created an advanced AI which can analyze every detail of users' chat history and provide them with personalized advice about how to make the next move (Tuffley 2021). Similarly, Happn trains its AI to learn users' ideal dates and "rank profiles that might be more interesting" to them (Ghosh 2017).[3] Loveflutter's AI system can even coach its users about when to start physical dating and which restaurants, bars, or clubs to go to (Silva 2018). These AI-driven dating algorithms do not specify what makes a good match. They simply match people according to correlation inferred from the large trove of data

gleaned from users' engagement with the app.[4] As more data is generated online, it seems likely that dating algorithms might become even smarter in the near future.[5]

As for love, it is often seen as the most intimate aspect of our lives, involving "a mutual revelation of private concerns and sharing of cherished emotions" (Anderson 1990, 185). Dating algorithms may capture some aspects of romance, but it seems that they may never grasp the full complexity of romantic experience.[6] Nevertheless, algorithm-driven matchmaking systems keep predicting and shaping our dating life. Tinder users can surely decide to swipe right or left to choose whom to date, but it is Tinder's algorithm that determines which profiles are visible in the first place.

Admittedly, there is a difference between being offered various possible partners and actually choosing one or falling in love. So, it might be argued that what is changed is only the way we "meet" people (on the basis of contingency, in bars, at parties etc. vs on the basis of AI) and not directly a change in the emotion of love. But I will show that the amorous emotion *is* affected by the way we choose partners, because dating app algorithms (e.g., Tinder's swipe algorithm) construct a new experience of love, which forces us to change the perspective on ourselves and our emotions of love. Moreover, some AI-enabled matchmakers (e.g., Lara and LoveFlutter) directly "coach" users on how to date properly and successfully by surveilling users' engagement with the app, which not only shapes whom to date but normalize users' *perception of love* according to commercial and technical logic. We need to ask whether we should delegate our romantic decision-making process to an algorithm. What is the risk of letting AI determine our love life?

This paper draws from Habermas's "colonization of the lifeworld" thesis to critically explore some fundamental consequences of AI-driven matchmakers. The article is divided into four parts. It starts with an introduction of Habermas's colonization thesis, identifying how his argument can be used to analyze what I call the "algorithmic colonization of love." Parts two, three, and four specify three pathological effects on the symbolic reproduction of the lifeworld due to the algorithmic colonization of love. Part two discusses the loss of meaning, describing how love is reduced not only to a commodity but to a set of codes and math. Part three concerns the legitimation crisis caused by the asymmetrical power structure between dating apps and users that results from surveillance capitalism. Part four will show that dating algorithms not only amplify the existing self-commodification process, but also create a new self-representation—an algorithmically colonized identity. The paper suggests that people should be allowed to develop their love relations

through open-minded interactions with others rather than just following some technical norms prescribed and manipulated by AI-powered dating systems.

2. Algorithmic Colonization of Love

In *The Theory of Communicative Action (II)*, Habermas introduces the colonization thesis to critically assess the pathological effects of modern society. His concept of colonization is not the literal meaning of "colonial masters coming into a tribal society," but rather it describes the process of the system relentlessly encroaching on the lifeworld.[7] Habermas conceives of society "simultaneously as a system and as a lifeworld" (Habermas 1987, 118).

The core function of the lifeworld is to assure the symbolic reproduction of society. The lifeworld provides sources as well as background for "communicative action," a term which does not simply mean the actions that need linguistic interactions, but that these interactions should be based on mutual understanding among all participants. Each member's beliefs are developed on their own rather than coerced through deception or manipulation. For Habermas, the lifeworld is crucial for nurturing people's communicative rationality, and at the same time, by the medium of communicative action, the lifeworld reproduces itself through three parallel processes: 1) cultural reproduction or the transmission of meaning; 2) social integration or the "legitimately ordered interpersonal relations;" and 3) socialization or the development of individuals with a strong sense of self (personal identity) (Habermas 1987, 141–44).

By contrast, the system's function is to assure society's material reproduction. The system consists of all those strategic actions—the interactions that are success-oriented—where outside forces are used to achieve goals. Unlike communicative actions, which are motivated by the goal of reaching consensus, strategic actions are often driven by the motivation of reaping benefits. To be sure, this distinction is not to show that communicative actions demand disinterested actors. Basically, everyone acts in order to pursue some objectives (Strecker 2009). Nevertheless, for communicative actions, people achieve their goals not by manipulation but only based on "an understanding of their situation, which is shared with regard to the truth of the relevant facts, the normative rightness of social relations that come into play, and the truthfulness of those involved" (Strecker 2009, 366).

With the rationalization of the lifeworld, systemic coordination also grows rapidly in society. When the capitalist mode of production emerges, the system begins to be able to legitimate itself through the media of money and power without the need for communicative actions. In this sense, the system attains a sort of

"autonomy," as it only follows its inherent logics of systemic integration, without being "evaluated and questioned through lifeworld" (Heyman and Pierson 2015, 3). In Habermas's eyes, such a nearly "autonomous" system itself is not that problematic, if it is only restricted to the realm of material reproduction. What he really worries about is when the systemic imperatives expand beyond their intended boundary to intrude on the lifeworld in an uncontrolled manner, which results in what he calls the "colonization of the lifeworld" (Habermas 1987, 355).

For Habermas, people should be allowed to develop their own personalities and construct shared cultural meanings through broad-minded interactions with others. When the lifeworld is colonized, the communicative discourse will be distorted and even replaced by instrumental rules, which may lead to three pathological effects on the symbolic reproduction of the lifeworld: a loss of meaning in cultural reproduction, a crisis of legitimation in social integration, and a loss of individual identity in socialization.

In this article, I adopt Habermas's colonization thesis to reflect on algorithm-driven love relations. Notably, it seems that Habermas himself never directly analyzed the issue of romantic love, but we can still use his colonization thesis as a normative model to critically understand the AI-enabled love and its pathological effects on modern society.[8] Habermas's colonization thesis is proposed to criticize the technicization of social interactions, in which communicative interactions are crowded out or reduced to a technical exchange. That means the mechanical process oriented to efficiency, convenience, and standardization will take the place of qualitative experience and meaningful interactions (Feenberg 1996).

In Habermasian terms, love and romantic relationships are crucial parts of our lifeworld, while dating apps act as systems that encroach into and thereby transform our lifeworld, structuring our romantic relations by their own priorities (of commodification and profiteering) by providing their own sources and a background of (circumscribed) action. Such encroachment may lead to what I call the "algorithmic colonization of love," where users tend to develop love relations with others not via open-minded interactions but only through some non-negotiable norms prescribed and manipulated by dating algorithms.

I understand that the ideas underlying Habermas's modernization theory—that all societies follow a trajectory from "primitive" to "modern" and that the lifeworld is assumed to be not influenced by power—are rather contested (Fraser 1985; McCarthy 1991; Cohen 1995). So, I do not need Habermas's historical and romanticizing assumptions of the lifeworld but simply follow a normative understanding of the lifeworld to critically analyze the tension between love relations and

dating algorithms. My argument emphasizes that the lifeworld reproduces itself only through communicative actions and this process of participatory interactions should not be distorted or crowded out by commercial or technical imperatives.

In this paper, I do not plan to establish an overall theoretical framework about the algorithmic colonization of love. Instead, I focus only on describing three main types of social pathologies (caused by the algorithmic colonization of love) in the domain of culture, society and person: 1) the loss of meaning; 2) the legitimation crisis; and 3) the identity crisis.[9]

3. Loss of Meaning

This section will argue that steered by dating algorithms, love relations can be reduced not only to a commodity but further to a set of codes and math—an algorithm. When the intimate emotions of human beings are commodified and algorithmically colonized, they lose some of their meaningfulness in that dating mates might regard each other only as "things" rather than humans they can meaningfully interact with.

Commodification is not a new issue. Many scholars have diagnosed the tension between amorous relations and utilitarian-economic logic. In *Eros and Civilization*, Herbert Marcuse argues that humans' romantic fantasies have been commercialized with the growth in mass consumption of romantic experience. As a result, the commercialization of love would produce "pseudo-needs" and eliminate the possibilities for human emancipation (Marcuse 1974). Zygmunt Bauman makes a particular critique on the commodified form of love. As he puts it in *Liquid Love*, "just as on the commodity markets, partners are entitled to treat each other as they treat the objects of consumption. . . partners are cast in the status of consumer objects" (Bauman 2007, 21). He states that:

> Getting sex is now 'like ordering a pizza . . . now you can just go online and order genitalia.' Flirting or making passes are no longer needed, there is no need to work hard for a partner's approval, no need to lean over backwards in order to deserve and earn a partner's consent, to ingratiate oneself in her or his eyes, or to wait a long time, perhaps infinitely, for all those efforts to bring fruit. (Bauman 2010, 22)

So, the commodification of love is problematic because it can result in an alienation of love relations. When pleasures and sexual desires are all mediated through the purchase and use of a commodity, people treat potential partners only as commercial products rather than as someone with whom they need to communicate.

Such commodification results in a "impairment of interhuman bonds" and especially "the pulverization of love relationships" (Bauman and Mazzeo 2012, 117).

Besides commodification, I will show that online dating algorithms also lead to a new type of loss of meaning: algorithmically colonized dating culture. In this culture, users' romantic experience is algorithmically transformed into one that is less interactive, cheaper, and shallower. As Tinder's founders claimed, their app was intentionally designed to offer a fluid experience: it is like playing a "game" which not only "take[s] the stress out of dating," but drives people not to invest much time and emotion in dating. (Stampler 2014)[10] That is why Tinder's users' profiles are designed to be "similar to a deck of playing cards, and love, sex and intimacy are the stakes of the game" (Hobbs, Owen, and Gerber 2017, 272).

Let's take a closer look at Tinder's swipe algorithm. It is designed such that users can only swipe either left or right to date or not. Swiping right means a possibility for the date; swiping left completely rejects the algorithmic match. As Gaby David and Carolina Camber argue, such binary logic in Tinder's swipe logic restrains the meaningful expression of intentions between potential daters (David and Camber 2016). This quick swipe over profiles may make users forget about the real human beings behind photographs. As Chris Haywood argues, swiping users tend to treat each other as objects rather than as people with whom one needs to interact: "The process of swiping through multiple profiles can be seen as similar to browsing a shopping catalogue, where the process of choosing is an affective experience [. . .] Women become treated as a product, considered comparatively against other women" (Haywood 2018, 145–46).

Besides being less interactive, the swiping algorithm may strengthen the impression that there are endless options from which to choose. Due to the perceived surplus of options, love becomes cheap and de-valued, and any single date becomes less important. As one woman complained: "I had sex with a guy and he ignored me as I got dressed and I saw he was back on Tinder [. . .]" (Sales 2015).[11] This cheap love constructed by dating apps may explain "the dawn of the dating apocalypse." (Sales 2015) As Nancy J. Sales describes it, the new, algorithmic way of dating could lead to profound societal changes: "When there is a surplus of women, or a perceived surplus of women, the whole mating system tends to shift towards short-term dating. Marriages become unstable. Divorces increase. Men don't have to commit, so they pursue a short-term mating strategy" (Sales 2015).[12]

Lastly, the swipe algorithm also contributes to an appearance-centered dating culture. By design, a user's decision to "like" or "dislike" is made solely on the basis of a profile picture. App users are thereby nudged to pick potential partners

only according to others' physical looks. Some may argue that the swipe algorithm merely reflects a long existing culture in in-person dating (Kao 2016). It is true that physical appearance is rather important in offline dating. But as Eva Illouz shows, the "first impression" in real life is of a dynamic experience of the "whole personality" which includes movement, sound, quirks, smells, etc. (Illouz 2007). By contrast, when people swipe photos, their experience is often static: "[they only] experience their body for how it looks rather than how it feels" (Breslow et al. 2020, 26). So, the swipe algorithm tends to produce a shallow culture that only spotlights users' fixed profile photos rather than their flowing experience of emotions. In this sense, the procedure of being presented with choices has direct influence on the emotion of love itself.

4. Legitimation Crisis

This section will show that within surveillance capitalism, online dating platforms are always in the position of power where they can easily exploit and manipulate their users. Not only is the asymmetrical power very hard to be challenged by democratic scrutinization, but it may also erode the democracy itself by modifying users' behavior and undermining their critical thinking capacity for democratic participation.

Early in 2021, there was a lawsuit filed against the investors of Clarifai, the investment group behind OkCupid. In the lawsuit, it was claimed that Clarifai got access to OkCupid's database "to train its algorithms used for analyzing images and videos, including for purposes of facial recognition" (Wu 2021).[13] The problem is that OkCupid's users were not notified about the access, let alone asked for their consent. Another privacy scandal involved Grindr, a LGBTQ+ dating app, from which a large number of users' sensitive data, including their HIV status and most recent testing date, was shared with advertisers (Singer 2018).

At first glance, these two cases are typical concerns about privacy violation. Online dating algorithms are highly dependent on a large amount of data, especially some sensitive personal facts, such as sexual orientation, religion, HIV status, and swipe history etc. This heavy reliance on private data is worrisome when some data may be obtained by other companies illegally.[14] However, the privacy concern is just the tip of the iceberg. The bigger issue is a new capitalist logic that Shoshana Zuboff describes as "surveillance capitalism" which "unilaterally claims human experience as free raw material for translation into behavioral data" (Zuboff 2019, 8). Some of this data is used to improve products and services, while the rest is seen as "behavioral surplus" that is sold on a new marketplace. This data can be

rather useful to corporations and governments who want to understand and shape the behavior of individuals.

Within surveillance capitalism, it is not surprising that OkCupid and Grindr exploited users' personal data to build and exchange their predicative products with their business customers (e.g., advertisers). That is just the business model of the online dating industry. Dating apps keep track of every detail of users' romantic life on their platforms. With the help of algorithms, these experiences are analyzed and translated into behavioral data for the exploitation of the "surplus": Some of these data feed apps' own algorithmic profiling and recommendations to improve their services, but other data are used to make predication products (e.g., personalized advertising) which are then sold to advertisers. This underlying process of exploitation in surveillance capitalism reveals an asymmetrical power structure between users and surveillance capitalists. As Zuboff states:

> [Surveillance capitalism] represents an unprecedented concentration of knowledge and the power that accrues to such knowledge. They know everything about us, but we know little about them. They predict our futures, but for the sake of others' gain. . . These knowledge asymmetries introduce wholly new axes of social inequality and injustice. (Zuboff and Laidler 2019)[15]

As for the online dating industry, such an asymmetrical power structure can also be found between users and dating platforms. At first sight, online dating companies are not conceived to exploit users: users sacrifice privacy to find their match online, and platforms profit from providing their efficient recommendations (Lanzing 2019). However, with a closer look, dating sites reap structurally more benefits than users. First, dating algorithms often covertly translate the romantic experiences of users into behavioral data without their consent. Dating apps often claim their services to be purely socializing, downplaying their business features. Consequently, most users "do not know they are part of a commercial transaction" (Lanzing 2019, 143). In Zuboff's terms, humans' life experiences are thus "unilaterally" acquired by private companies (Zuboff 2019).

Besides, dating apps often *arbitrarily* analyze users' romantic life and translate them into behavioral data. For dating apps, users leave tracks about their romantic aims or ideal modes of partners, which is part of their romantic relations. By default, dating algorithms treat these data the same as economic products. For Zuboff, however, personal data is not a commodity that can be traded arbitrarily, since the data is a constitutive part of human experience. Beate Roessler explains

this point more explicitly. According to her, these data "that were supposed to belong to and stay in the sphere of social relations" should not be commercialized, since they are necessary for users to develop personhood and social relations with others (Roessler 2015, 149). If these data are arbitrarily extracted, she worries that people and their social relations with others can be "manipulated into a certain commercialized" manner:

> I am being forced to adopt a view on myself and on my social relation that is motivated not by friendship but by the market, and therefore, not self-determined, or determined through the norms of the social context (Roessler 2015, 149)

A third point is that dating algorithms often exploit users' "behavioral surplus". I have mentioned how OkCupid and Grindr exploited users' data for advertising. It has also been found that an online dating algorithm can track and manipulate users' behaviors to buy its premium services:

> [T]he key is to keep users sufficiently satisfied so they do not abandon the service too quickly, but not too satisfied so they would be inclined to convert to paying services. This means that the algorithm needs to dynamically alternate between encouraging users and restricting them (Courtois and Timmermans 2018, 7)

Users use Tinder to aim for their perfect match, but its algorithm covertly drives users only toward the platform's revenue (Sax 2021).[11] This case reveals the evil of manipulation: Tinder's algorithm exploits the users' vulnerabilities so as to "steer his or her decision-making process towards the manipulator's ends" (Susser, Roessler, and Nissenbaum 2019, 3).

Importantly, dating app algorithms are not isolated and restricted in the realm of love, but closely integrated and bound in a wider society that is driven by various algorithms. Within such an algorithmic society, algorithms have been broadly used to determine our lives, while it is very hard for democratic scrutinization to challenge that exploitive and manipulative power structure (Calo and Citron 2021; Danaher 2016). Habermas reminds us that a legitimation crisis can take place if a rigid power asymmetry cannot be effectively challenged by democratic participation, where people would not accept the legitimacy of the existing political structures (Iser 2017; Heyman and Pierson 2015). For dating algorithms and the wider algorithmic society, there are mainly two obstacles that hinder people's participation, which can erode democracy and may lead to a legitimation crisis.

On the one hand, dating app algorithms work like what Frank Pasquale calls a "black box," where the inner workings of algorithms are often hidden and obscure for the public (Pasquale 2015). On the other hand, to reap the greatest benefit, surveillance capitalists are not only monitoring people's behavior but trying to modify and manipulate people's behavior "with subtle and subliminal cues, rewards, and punishments that shunt us toward their most profitable outcomes" (Zuboff and Laidler 2019).[16] This means of behavioral modification undermines individuals' "capacity for the moral judgement and critical thinking necessary for a democratic society" (Zuboff and Laidler 2019).[17] As a result, there may be little room for people to resist—or they even do not know they should, as the willingness to resist may have been replaced in the first place (Susskind 2018; Frischmann and Selinger 2018).

5. Identity Crisis

In this section, I will argue that online dating platforms not only amplify the existing self-commodification process, but also create a new self-representation—*an algorithmically colonized identity*. This new identity may not be derived from one's own self-determination. Instead, it is the dating algorithms that drive users to more actively participate in a prescribed normalization process.

The issue of self-commodification has been widely discussed in critical theories. Erich Fromm argues that the logic of consumption will make people regard themselves as consumers and products, which will lead to a kind of self-reification: "A person is not concerned with his life and happiness, but with becoming saleable" (Fromm 1948, 70). People are thus alienated from their own feelings by experiencing themselves only as commodities. Bauman is also concerned about the issue of self and identity threatened by the commercialization. For Bauman, the logic of consumerism will lead to a bypassing of moral agency. In the contexts of face-to-face interaction, individuals have an innate moral impulse to not only understand and empathize with others but also to take responsibility for others (Bauman 2003). But in the context of consumerism, people would not be able to exercise their moral agency, since their decision-making is influenced by the logic of commodification and their innate ethical impulse is prevented from being freely exercised.

The problem with which both Fromm and Bauman are concerned is not only that love relations become superficial, but that people are being alienated from themselves. People are self-commodified, and they do not experience true pleasure derived on their own but a pleasure prescribed and steered by consumerism.

They suggest that humans' freedom for self-determination has been undermined in the commercialization of love. Just as Fromm shows: "People are motivated by mass suggestion, their aim is producing more and consuming more, as purposes in themselves. All activities are subordinated to economic goals, means have become ends; man is an automaton—well fed, well clad" (Fromm 1995, 243).

The phenomenon of self-commodification can be easily found in online dating apps. For instance, as cited in a research interview, Tim was an experienced Tinder user and he bragged about how he helped a friend "sell" himself (Hobbs, Owen, and Gerber 2017, 280). In Tim's eyes, his profile is a product, so he needs sales techniques to let other Tinder users "buy" it. Like Tim, Alice is a Tinder user who shared her experience about how to present herself successfully on Tinder: "you try and pick the best photos of you [. . .] we've all got this idea of ourselves and it is *marketing*" (Hobbs, Owen, and Gerber 2017, 281, emphasis added). Both Tim and Alice apply the business logic of "buying" and "marketing" to commodify their own profiles, which represents a type of self-commodification.

Besides promoting self-commodification, dating apps actively shape users' identity through technical norms prescribed by dating algorithms. In the previous section, I discussed why swipe algorithms are intentionally designed in a game-like way: "Swipe left, swipe right, 'It's a Match!' After matching the app prompts users to choose between sending the match a message, or 'keep playing.' Like a game" (Seidel 2015).[18][19] By gamification, the dating experience is reduced to a must-win game that is competitive, playful, and addictive. To win the dating game in finding a suitable match, users have to adapt themselves to a system of norms that is prescribed by dating algorithms. In an algorithmically constructed dating game, it is the algorithms that decide which profiles are more visible to other daters. So, in order to stand out, users have to know how to make the most use of the algorithms. They have to learn how an algorithm works and how to let the algorithm help them play the dating game efficiently. Knowledge about the algorithm is vital. But algorithms are often hidden and invisible, and by incorporating more machine learning, these algorithms become rather obscure even for their own designers (Pasquale 2015; Wang 2022, 2023). So, the algorithmic imaginary is crucial here.

The term "algorithmic imaginary" is coined by Taina Bucher, on the basis of her studies of Facebook users' interaction with algorithms. Algorithmic imaginary refers to "ways of thinking about what algorithms are, what they should be, how they function and what these imaginations in turn make possible" (Bucher 2017, 39–40). Bucher argues that such imaginary will change users' behavior in treating

and utilizing algorithms. In the case of Facebook, for instance, users may adjust their data-sharing behavior to make the full use of perceived algorithmic functions.

For online dating apps, users can also exercise such algorithmic imaginary to win their dating games in order to, for instance, get the most responses. The imaginary can be acquired from one's own experience with an algorithm, or the sharing strategies of people who have got many matches online, and so on. By algorithmic imaginary, users know when to start swiping, how to select the best photos, and even what types of pets they should pose with. In a nutshell, algorithmic imaginary provides users the de facto norms to follow, informing them how to make the full use of algorithms to win their dating games. This imaginary makes the normalization process on dating apps more active and participatory (Wang 2022).

Nevertheless, these norms may not be derived from users' true identity, but may be prescribed only by the dating algorithms. By design and functions, algorithms often classify users into different categories. A category can make users more easily able to identify themselves, so that they can express themselves more efficiently. But categories, which have already assumed an existing set of judgements, can constrain people's thinking and encourage them more easily to accept prescribed classification set up by designers (Crawford 2021).

At first sight, such a prescribed normalization process is common for general dating culture, where discursive norms like the dominant criteria of beauty constrain users' abilities to define, present, and encounter others. But dating apps do this form of normalization in a particular way. Dating app algorithms learn personal preferences and silently recommend possible partners only based on similar characteristics without users' knowing it. They thus create what Lorenza Parisi and Francesca Comunello call a "relational filter bubble" where users only date someone who is "similar" to them (Parisi and Comunello 2020). In this way, dating algorithms construct a new but compartmentalized environment where people only see through their own personalized world of knowledge and experience intimate interaction only with those who share similar traits. Unconsciously, users are gradually trapped in a conditioned space where they passively follow their pre-existing preferences and are prevented from actively and fully expressing their identities.

Moreover, dating app algorithms follow an imperative of systemic logic which can sometimes outweigh individuals' self-identification. Algorithms can sort users into certain categories that are only for dating apps to analyze data and match people more efficiently, rather than to let users freely express their identities. For instance, many studies have criticized the binary gender category designed in

Tinder, Bumble, and other dating apps (MacLeod and McArthur 2019). This binary classification is partly due to the efficiency and usefulness that online dating apps focus on: "gender within the apps is not about identity as such but rather is a way of sorting users into groups that make matches more likely" (MacLeod and McArthur 2019, 831). As a result, classified only as male or female, users from gender minorities cannot freely identify themselves and often feel distressed when presenting themselves on dating platforms.

6. Conclusion: Beyond Non-negotiable Love

By drawing on Habermas's colonization thesis, this paper mainly argues that under an asymmetrical power structure, dating apps via gamification can problematically encourage users to define themselves and rank others according to the apps' norms, categories and metrics, thereby disallowing meaningful self-expression and intimate interactions. However, some may hold that dating culture in general can be also seen as a "game," where people try their best to increase the chances of success on dates, and they are also encouraged to learn and follow some social norms on what to wear, how to flirt and how to apply makeup, etc. So, how do dating apps shape users' relationships and self-definition in a particularly different way from dating more generally?

I would argue that dating apps follow a very different logic. The dating app algorithms prescribe those norms that are not naturally formed through everyday interactions but predefined by app designers in a de-contextualized and unnegotiable manner. In real life dating, for example, physical appearance is not a fixed and static thing but involved in a flowing experience contextualized in a dynamic process of dating, in which the relevance of one's beauty is always changing with intimate interaction moving on. Meeting someone at a bar, for instance, people can be attracted by someone's external looks, but via face-to-face interactions they can also explore and gradually recognize some other more internal qualities of being humorous or responsible, etc.

Nevertheless, on dating apps, the dynamic and contextual process of dating is broken down into separate components that are "manageable and manipulable" only to computerized algorithms (van Dijck 2013, 12). Particularly, the feature of external appearance is designed in a way that is not only isolated from the flowing process of dating but also built as a fixed criterion in matching dating mates. The fluid and interactive experience of appearance itself is thus reduced to a static standard or in Gilles Deleuze's metaphor, a "mesh" that allows someone to pass through while refusing others (Deleuze 1992).

Notedly, such a deciding standard is non-negotiable, or in Zuboff's words, it is a kind of "uncontract" based on a "unilateral execution": There is no need for the social process of promises, dialogue, or shared meaning, except for the automated enforcement (Zuboff 2019, 211). In Tinder's swipe algorithm, for instance, physical attractiveness becomes the only factor for users to swipe right or left. There is no negotiation or dialogue involved, and there is no chance for some plain-looking users to fully express themselves. In this sense, algorithms de-contextualize and "uncontract" the interaction process of dating, restraining individuals' thinking and exploring other more internal characteristics of possible partners.

Hence, for AI matchmakers, we admit that their predictive algorithms can be beneficial to many of us, making our dating experience more interesting and more efficient, but we should also be very careful about how their algorithms can make our interactive experience of love become a non-negotiable automated process. Habermas is right to remind us that we should not give up our communication actions too easily in the lifeworld. Even in an algorithmic society, people should be allowed to find what they really love through open-minded interaction with others, instead of being prescribed and manipulated by dating app algorithms.

Acknowledgments

Notes

1. As OkCupid's data guru Christian Rudder suggests: "[T]ake something mysterious—human attraction—and break it down into components that a computer can work with" (retrieved from Rudder's YouTube lecture "Inside OkCupid: The math of online dating": https://www.youtube.com/watch?v=m9PiPlRuy6E). This is generally how dating algorithms are designed.

2. Retrieved from https://www.theguardian.com/lifeandstyle/2014/feb/09/match-eharmony-algorithm-internet-dating.

3. Retrieved from https://www.businessinsider.com.au/happn-is-getting-paid-subscriptions-and-will-use-ai-to-recommend-matches-2017-4?r=US&IR=T.

4. As Happn's CEO Didier Rappaport shows, "We do not believe that if you like the same movie, you will fall in love. (Our algorithm is) more based on data we have" (Ghosh 2017). Retrieved from https://www.businessinsider.com.au/happn-is-getting-paid-subscriptions-and-will-use-ai-to-recommend-matches-2017-4?r=US&IR=T.

5. Eventually, as David Tuffley imagines, future AI could create a wholly virtual partner who behaves just like a real person over the next decades (Tuffley 2021).

6. As Jim Kozubek argues, "Online-dating platforms can tell us a lot about potential partners, but people are not made of steady data points, and love is not just about matching interests" (Kozubek 2014). Retrieved from https://www.theatlantic.com/technology/archive/2014/09/love-is-not-algorithmic/380688/. A user is not merely a flat profile; instead, she can have several different profiles and identities on social media and her self-presentation can be contradictory and inconsistent (Kozubek 2014).

7. Habermas also uses a metaphor to describe the colonization thesis: "[. . .] the imperatives of autonomous subsystems make their way into the lifeworld from the outside—like colonial masters coming into a tribal society—and force a process of assimilation upon it" (Habermas 1987, 355).

8. Sérgio Costa notes that "Habermas rarely refers to the issue (of love)" (Costa 2005, 4). Merold Westphal also asks: "How important is it that it never occurs to Habermas to speak of love?" (Westphal 1998, 14).

9. For Habermas, social pathologies caused by the colonization of the lifeworld are more complicated. In the domain of culture, there are 'loss of meaning,' 'unsettling of collective identity,' and 'rupture of tradition.' In society, there are 'withdrawal of legitimation,' 'anomie,' and 'withdrawal of motivation.' In the domain of person, there are 'crisis in orientation and education,' 'alienation,' and 'psychopathologies' (Habermas 1987, 143). In this article, for a matter of convenience, I would generalize these social pathologies into three main types.

10. Retrieved from http://time.com/4837/tinder-meet-the-guys-who-turned-dating-into-an-addiction/.

11. Retrieved from https://www.vanityfair.com/culture/2015/08/tinder-hook-up -culture-end-of-dating.

12. *Ibid.*

13. Retrieved from https://www.airoboticslaw.com/blog/machine-learning-data -do-you-really-have-rights-to-use-it.

14. Under the EU's GDPR (General Data Protection Regulation), data subjects should be informed and consent if their personal information are collected by companies. Although GDPR does not apply in the US, the basic concern of privacy is similar.

15. Retrieved from https://news.harvard.edu/gazette/story/2019/03/harvard -professor-says-surveillance-capitalism-is-undermining-democracy/.

16. *Ibid.*

17. *Ibid.*

18. Tinder has also launched a real game called Swipe Night, turning dating experience largely into an adventure game. Tinder's app offered the free game to users who answered some moral dilemmas about how they would prepare for the end of the world. After that, users would receive "a list of singles who made similar choices": "Daters who swipe right on each other will be able to match and have a conversation. A left swipe means that person will have to find someone else to survive the apocalypse with" (Newcomb 2019). Retrieved from https://fortune.com/2019/09/20/ tinder-swipe-night-dating-game/.

19. Retrieved from https://medium.com/@jane_seidel/the-game-of-tinder-3c3ad 575623f.

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