Engaging with

EVERY AI

How to move AI from imperfect algorithms to perfect user interactions

Kirsi Hantula
Oskar Korkman
Karri-Pekka Laakso

Reaktor

ALICE LABS

PROLOGUE

Re-humanizing artificial intelligence

Digital technologies have become an indispensable part of daily lives. We communicate by way of social media and follow the step count to signal whether we have walked enough. We find movies, addresses, and partners with the aid of digital services. As our lives become intimately intertwined with digital infrastructure, they are influenced and shaped by the decisions made by global digital companies. These data empires, as they are also called, have unprecedented economic and political power in steering the digital world. Yet, despite intensifying critique of data companies, people continue to use their services. Even if they mistrust the companies, most people find the consequences of opting out unthinkable. This kind of dissonance calls for a better understanding of the role that digital technologies have in the everyday—a task that has defined our ongoing ethnographic research project.

Everyday AI is a collaboration between Alice Labs and the Centre for Consumer Society Research, University of Helsinki, in partnership with Reaktor. In this report, Alice Labs presents the first compelling findings of the project, documenting everyday experiences with two algorithmically-empowered services: recommender systems and digital assistants. The two services were chosen because of the intimate and everyday nature of their purpose, that of assisting users in daily needs and offering them guidance in making choices.

The meticulous, first-hand observations demonstrate that recommender systems and digital assistants repeatedly fail in their promise of providing pleasurable encounters, rather delivering irritating engagements with crude and clumsy machines. The mismatches raise the question of whether personalization, as one of the main driving forces of the industry, is an unproductive aspiration to begin with. Personalization is not exactly personalization. Mechanic classifications are not dealing with ‘you’, but with people like you. The bigger issue, however, appears to be that algorithmic systems, whether recommender systems or digital assistants, are not as clever as people would like them to be.

The algorithmic encounters described in this report appear to suggest that the more closely we live with machines, the more we would like them to be like our human companions. Based on what it should do, the perfect algorithm demonstrates context-awareness and intuitively responds to diverse aims and changes in people’s lives. The human-like, instinctive algorithm, however, remains a dream that is difficult, if not impossible, to fulfill. Therefore, we ask in our project, why try to make machines human-like, as humans already do a much better job on that front?

We promote design recommendations that call for establishing the human as a critical and creative agent in human-machine relations. With a better understanding of the everyday experience, we can assess the current critique of data empires, but also find new and improved ways to tackle the situation. Digital technologies are often developed to a ‘one

size fits all' model. Yet, as the experiences with recommender systems and digital assistants suggest, in different contexts, people take up very different stances in relation to technologies. They might want to be passive, or prefer to be actively involved. The design guidance that we offer suggests that we need to build digital services with a keen eye to how people interact and communicate with them, taking into account whether they want to remain inactive in relation to digital services, or take a more dynamic role and closely collaborate with the machine.

At first glance, the experiences described in the report can appear as minor first-world problems. Not finding an appropriate movie for the family, or the quickest route to the favorite café, is a trivial everyday nuisance. The small incidents, however, tell of the larger issues at stake in terms of algorithmic biases and sorting powers. The report does not discuss the societal implications of the findings, but they are suggestive in this regard. The call to re-humanize design suggests that we need to engage with the bottom-up imaginaries of artificial intelligence. We need to listen carefully to what social workers, journalists, content moderations, and nurses have to say about algorithmic competences that are supposed to ease their workload. We need to remain careful that we do not strengthen machine logic at the expense of human logic.

Only by carefully combining human strengths and machine strengths can we start really seeing the smartness of machines. Here, Finnish companies can carve out spaces that are not occupied by today's data empires. Technology futures can be built in ways that purposely aim to increase trust in digital companies, rather than weaken it. Ambitious design goals underline the importance of multi-stakeholder projects. We need more interaction between academia and the industry while, within companies, professionals from different fields—from design and data science to marketing—need to interact more closely.

Finally, this report promotes dialogue with the current debate on the ethics of artificial intelligence, suggesting that we need to move forward from an abstract focus on the ethical principles of AI. Who would not want artificial intelligence that is unbiased, legible, and respects human rights? Ultimately, however, the organizational environment and the everyday uses of algorithmic systems determine whether the system is just and ethically robust. Similar technologies can be used in ethical and unethical ways. For a more grounded approach, we need concrete examples, rather than sweeping generalizations. We need to talk about what technologies do in the everyday, and to whom, and based on what values. This report is an early step in this direction. We hope to convince our readers that it pays off to understand the everyday of artificial intelligence.

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Minna Ruckenstein
Academic lead of the Everyday AI –project
Centre for Consumer Society Research
University of Helsinki

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CHAPTER 1

When what you see is no longer what you get

Public narratives about AI still focus on the macro view - is AI going to take our jobs? Will killer robots turn on us? But when we turn our attention to how AI interacts with us in our day-to-day lives, the narrative isn't so clear-cut. AI-powered products like music or video streaming services can't fully comprehend the vagaries of people's decision-making and behave on the premise that users will always want to be passive to them. What we found is that this often isn't the case.

CHAPTER 1

Rapid advancements in artificial intelligence have received a lot of attention in recent years, boosting speculations of how AI will transform our lives. In the current public imagination, visions about robotics and automated systems bringing efficiencies to companies and society exist next to predictions about robots stealing our jobs.

These new hopes and fears seem to have at least one thing in common. They are based on the understanding that the relationship between people and their tools is somehow changing. Prior to AI-powered systems, there was no question that a tool was a tool. A user of a hammer, or a desktop computer, had some control of where, when, and how she used them. She knew that the computer would not do anything on its own, without a specific command, communicated with the computer's interactional tools: the mouse, icons, menus or the pointer[1].

At that point, what you saw was what you got. Not anymore. Today, advanced AI-powered systems are often designed to accomplish their tasks unassisted, without any direct commands by users. Users no longer need to dictate how these systems do their job (and nor could they, even if they wanted to), as the constantly learning and adapting systems automate activities and increase speed and efficiency.

The limits of being passive

In many ways, this change has, of course, been a blessing. AI-powered systems – or algorithmic systems, as we will also call them in this report – can help organizations to optimize and automate their processes or allow scientists and practitioners in different fields to detect patterns previously indiscernible to humans. Or they can take care of dangerous or repetitive tasks, which humans had hitherto done.

It is often best to let AI-powered systems do their job without direct user interference in these activities. Humans are prone to make mistakes, and in specialized subdomains, unnatural to humans, they cannot match the computational capabilities of advanced machine learning systems.

In this report, however, we want to draw the attention elsewhere: to the role of ***algorithmic systems*** in people's everyday lives. We suggest that the ideal of an entirely independently working AI should be challenged and broadened in this context.

Last year, Alice Labs, a Helsinki-based consultancy with a history of carrying out non-profit research, and the Centre for Consumer Society Research (CSRC) at the University of Helsinki conducted a year-long

In this report, we use the term **'algorithmic system'** *to draw attention to the human role in AI-powered systems. Our interviews revealed that people often perceive AI-powered systems from the perspective of interaction. They try to make sense of such systems actively and even facilitate them by changing their behaviour.*

1 *Harper & Garragha,* ***"The User is Dead! The implications of AI for HCI."***

study on the use of music and video streaming services and digital assistants in the home and leisure settings in partnership with Reaktor. In this report, selective findings from interviews, particularly those with design implications, are presented.

During the study, we noticed that users of these AI-powered systems repeatedly found themselves in situations where a passive position towards the algorithmic system brought no benefit to them – and in fact, it was often directly opposite to what they wanted. In such situations, people often wished that they could have poked the system in the right direction. Or, they would have liked to be able to communicate to the system that it had made an error, sometimes even collaborate with it actively.

We think that these observations raise two important questions:

> ***Do people in their everyday lives always expect to be passively served by algorithmic systems?***
>
> ***Can algorithmic systems accommodate people's daily needs and aspirations without any human assistance?***

Based on our study, the answer to both of these questions is a 'no'.

People are inconsistent

Let's make one thing clear, though. By saying that people do not always want to remain passive towards algorithmic systems, we do not mean that they never do. Of course, people do, also in many everyday situations.

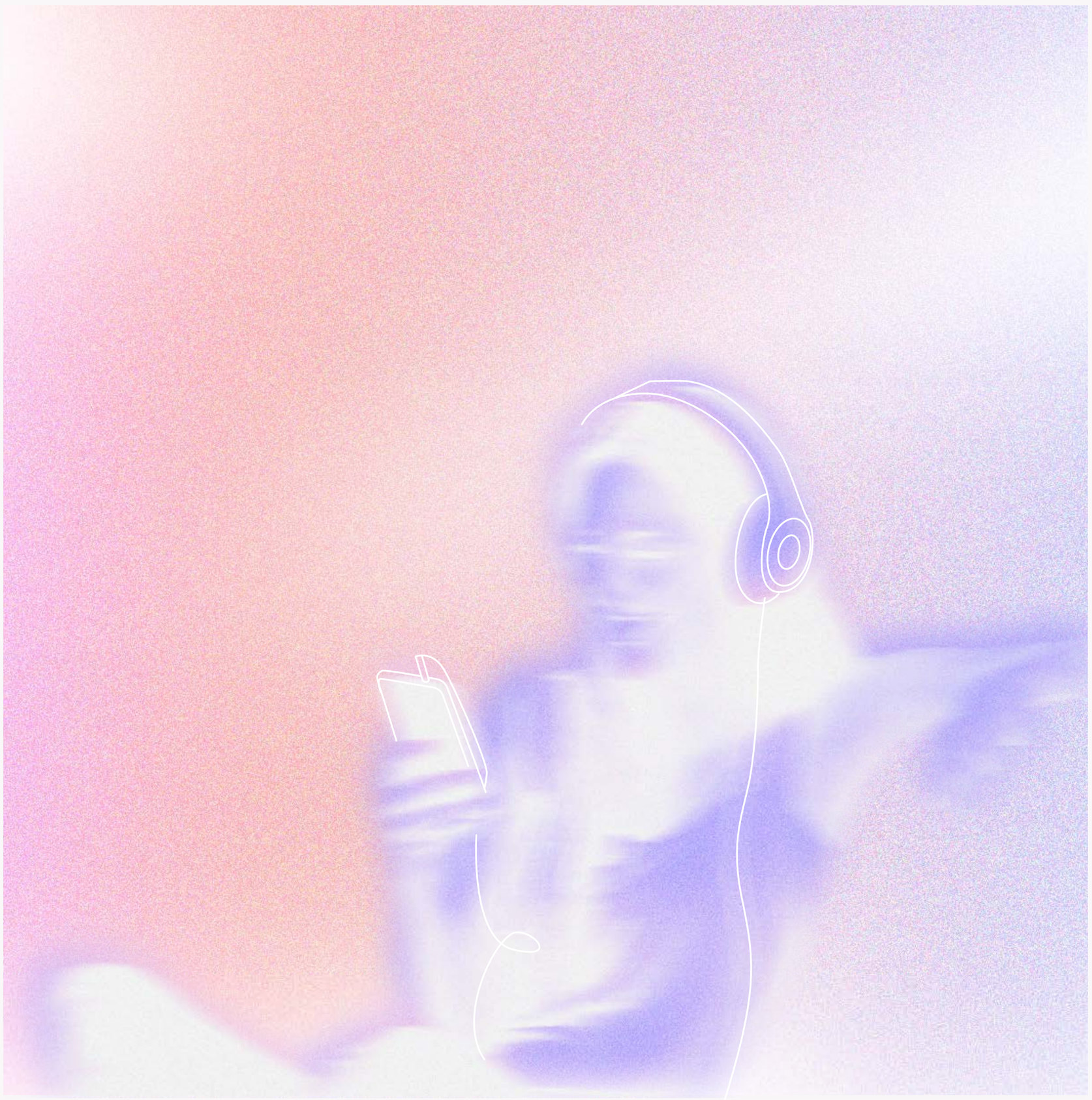
We are merely proposing that caging people in a role of permanent passivity may not be the right way to solve some of the tensions that now exist between people and AI-powered systems in the context of everyday life. This is because people are inconsistent, and their lives are disorderly. Their situations, circumstances and aspirations change. They get tired and hungry, glad or sad. Sometimes they feel adventurous but other times completely the opposite. And sometimes people have no clue what they really want.

Amid these changes and constant fluctuation, how could an algorithmic system possibly always know what to offer, no matter how superior it is?

We suggest that the best way to accommodate this – very human – fickleness is to partly let go of the ideal of an independent all-powerful artificial intelligence. And instead, replace it with a vision of a more versatile AI that sometimes works unassisted and other times cooperates to a varying degree with users.

We also argue that building more versatile algorithmic systems will only succeed if system providers develop their expertise on people's everyday needs and aspirations by closely inspecting how users interact with specific AI-powered services. They need to pay minute attention to the often-small hiccups or tensions created between the user and the system in different situations in daily life.

Armed with this understanding, system providers will be capable of better assessing how independent or interactive an algorithmic system ought to be in a given use situation.
To make these points clearer, we will briefly explain how we approached the interview data we collected and the insights we gained.



CHAPTER 2

What we learnt

Identifying repeated, daily occurrences where the AI doesn’t correctly satisfy the user’s desires highlights the nuances about human behaviour that algorithms are currently misunderstanding. Three clear user roles emerge in these varied situations: Passive, Guiding, and Collaborative, with differing expectations for the algorithmic system’s clarity, actionability, and consistency.

CHAPTER 2

When we analyzed the data we gathered, our main ambition was to find patterns – recurring everyday situations where users repeatedly encounter problems whilst using digital assistants or streaming services. We believe that these recurrent, often seemingly mundane and fleeting frustrations reveal a deeper gulf between algorithmic decision-making and users' broader life aspirations in the situations where these systems are in use.

Regularly, these moments also lead users to question the logic of the algorithmic system and wonder if there was a way to make the system work better. This diminishes user satisfaction.

FOCUS OF THE STUDY	STUDIED SYSTEMS	FIRST-HAND DATA
The use of algorithmic systems at home and in leisure settings	AI-powered streaming services and digital assistants (smart speakers and voice assistants)	24 in-depth interviews with Finnish, American and Chinese respondents

All the interviews were conducted in 2020, mostly by video due to the global COVID-19 pandemic.

Our analysis produced three key insights:

1. Users want to adopt a different role in algorithmic decision-making in different situations. There are situations where they wish to remain ***passive*** towards the algorithmic system, situations where they want to ***guide*** the system and situations where they want to ***collaborate***.

2. No user wants to adopt a passive role in algorithmic decision-making in all situations, and neither are there users who always want to collaborate. The role that people want to adopt depends on the nature of their situation and their earlier experiences of using smart technology in a similar situation.[2]

3. Currently, users often cannot adopt the kind of role they would want in their interaction with AI-powered systems. Algorithmic systems "force" them to guide the system when users want to be passive or make users passive when they would want to collaborate.

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2 *For similar observations about the role of expectation-confirmation see also Bhattacherjee, "Understanding information systems continuance: An expectation-confirmation model"; Venkatesh et al., "Extending the two-stage information systems continuance model: incorporating UTAUT predictors and the role of context"; Brill, Munoz, and Miller, "Siri, Alexa, and other digital assistants: a study of customer satisfaction with artificial intelligence applications".*

In the pages that follow, we present the three user roles – Passive, Guiding and Collaborative – and reflect the implications of our findings for designing more versatile and actionable algorithmic systems. We will look at the three user roles through the lens of the three concepts presented below.

> ***Clarity*** *– What does the user want to know about the working of the algorithmic system in this situation?*
>
> ***Actionability*** *– How does the user want to change the working of the algorithmic system in this situation?*
>
> ***Integrity*** *– How does the service provider best acknowledge the user's key pain points in this situation?*

To get started, we will give short descriptions of each of the user roles that will be discussed in the remaining report.

Passive

A passive role means that users want to focus their attention on some activity, such as working or doing house errands, not interacting with an algorithmic system.

In such situations, people expect that the AI-powered system is capable of providing a frictionless user experience. They hope to carry on with cooking while their voice assistant provides the correct weight conversions, for example.

Presently, people in these situations often find that they have to participate in algorithmic decision-making against their wishes. This usually happens when the system makes an error and delivers results that do not match their expectations, leaving them with no choice but to intervene.

Guiding

When people want to guide the algorithmic system, they perceive it as a means for fulfilling a present intention, such as spending a relaxing moment.

Imagine, for example, that a person has had a tough day at work. They turn to their video streaming service to relax by watching a film. In this situation, the user does not wish to get too much involved in algorithmic decision-making, but they want to make sure that

the system can recommend films to help her relax. That is why the user is willing to “push” the recommendation system of the streaming service in the right direction. They know it is impossible for the system to flawlessly predict their current state of mind, energy level and a host of other factors that may impact the choice of film.

Nowadays, this kind of interaction with recommendation systems is difficult. In our study, users in these situations often felt frustrated about their own inability to guide the system to do a better job.

Collaborative

When people’s key ambition is to engage in personal development and exploration, they wish to take an active, collaborative role in algorithmic decision-making. This typically happens when people want to learn more about a subject that they have become interested in or broaden their taste by finding stimulating new music or literature, for example.

Engaging oneself in personal development always requires active involvement by the person himself because exploration and learning are subjective and individual processes. This rules out an algorithmic system making all decisions on the user’s behalf. Presently, however, users are incapable of assuming an active role in algorithmic decision-making, since seamless, real-time co-operation with an algorithmic system is not possible. Therefore, algorithmic systems can only offer limited support for users in these situations.

	PASSIVE	GUIDING	COLLABORATIVE
Preferred role for AI	Background automation	Smart assistant	Co-intelligence
User expectations	Consistency Convenience	Accuracy Fit with daily variation	Resource for personal exploration and learning
Main tension	Inability to correct AI’s mistakes	Inability to proactively nudge AI in the right direction	Inability to work together with AI in real time

The three different roles users are willing to adopt depending on the situation.

CHAPTER 3

Passive use is needed in active sitatuations

When people are engaged in other activities while using AI in the background, they want to adopt a passive relationship towards the AI-powered system. They expect the service to run smoothly with no need for their involvement. So when the AI doesn’t get the songs in the playlist right or fails to give a satisfactory answer to a question, the user needs to transition from a passive to an active role, disrupting their activity. When this happens, people start to wonder about the algorithm’s logic and desire the agency to instantly correct the problem when it occurs, hoping that the algorithm will adjust to prevent this error from happening again in the future.

Situations where people would want to be passive in algorithmic decision-making usually have one thing in common. They are moments when people engage themselves in an activity, and an AI-powered system has a secondary, supporting role. For example, a person is studying and checks the spelling of a word from a smart speaker while writing in a foreign language.

In these situations, people may be quite actively involved in their primary activity but prefer to remain passive towards the algorithmic system. They expect that the system will manage the assigned task smoothly and rapidly, which allows them to save time and effort and focus their attention on the principal activity.

Mistakes cause disruptions

As long as the algorithmic system can deliver the results that people expect, everything proceeds smoothly. As a user scenario, such situations come closest to the assisting and empowering role that technology, in general, is often portrayed to have in people's lives.

> *A couple who has dinner guests can focus on the discussion with their friends without pausing to change the background music, as their music streaming service takes care of playing pleasant music to accompany the evening.*

> *A father who is trying to go outside with his little daughter does not have to cease to dress up the child to check the weather from the Internet but can ask the digital assistant on his phone to tell the weather forecast for him instead.*

Currently, however, algorithmic systems too often fail users' expectations in passive use situations. In our interviews, all respondents talked about incidents when an algorithmic system forced them to pause their activity and turn their attention to the AI-powered system.

This usually happens when an algorithmic system makes a mistake that users feel necessary to correct: the delivered results are so obviously wrong from their point of view that they cannot be allowed to pass. Alternatively, the system gravely misjudges the user's needs in the situation, thereby disrupting the user's activity.

> *If I ask it [a smart speaker] to convert Fahrenheit degrees to Celsius degrees, it will continue by telling me that to convert Fahrenheit to Celsius degrees you need to multiply by this and subtract this from that. And I am like, I do not need this information. It goes on for too long.*
>
> ***Female, 32 (Helsinki, Finland)***

The point at which an algorithmic system interrupts the situation varies, depending on the nature of the occasion. A user who is listening to an AI-generated workout playlist while working out in a gym might not bother to pause his training to change the music, even if there was an occasional song in the playlist that is too slow-tempo for a workout playlist.

But if a user turns on the family's smart speaker to get some pleasant background music for an evening spent at home, he might be much quicker to react to a wrong musical choice.

> *…When I would say 'play pop music' to the smart speaker, it would start playing a song from the music streaming service with the name 'Pop Music'. C'mon, I'm sure it is a nice song and a good artist, but that is not what I meant.*
>
> ***Male, 40 (Helsinki, Finland)***

Expectations: Consistent and friction-free

From the users' point of view, such disruptions always have more or less the same effect on the situation. They distract people from what they were doing, forcing them to focus their attention on the system. They steal time and sometimes break the rhythm or the flow of the main activity.

All this, of course, is precisely the opposite of people's aspirations of a convenient and friction-free user experience. But even more annoying is their powerlessness to fix the problems that they encounter.

Let's not forget that most people today have used different kinds of AI-powered services and devices for years now. So, in a situation where an algorithmic system makes a mistake, they know that the system should receive some input to produce more accurate results. The problem is that providing actionable information to the system in these situations often feels laborsome and ineffective.

> *Maybe I should give the system much more the do-not-recommend data for it to learn. But I have not bothered to click hundreds of times no, no, no.*
>
> ***Male, 35 (Helsinki, Finland)***

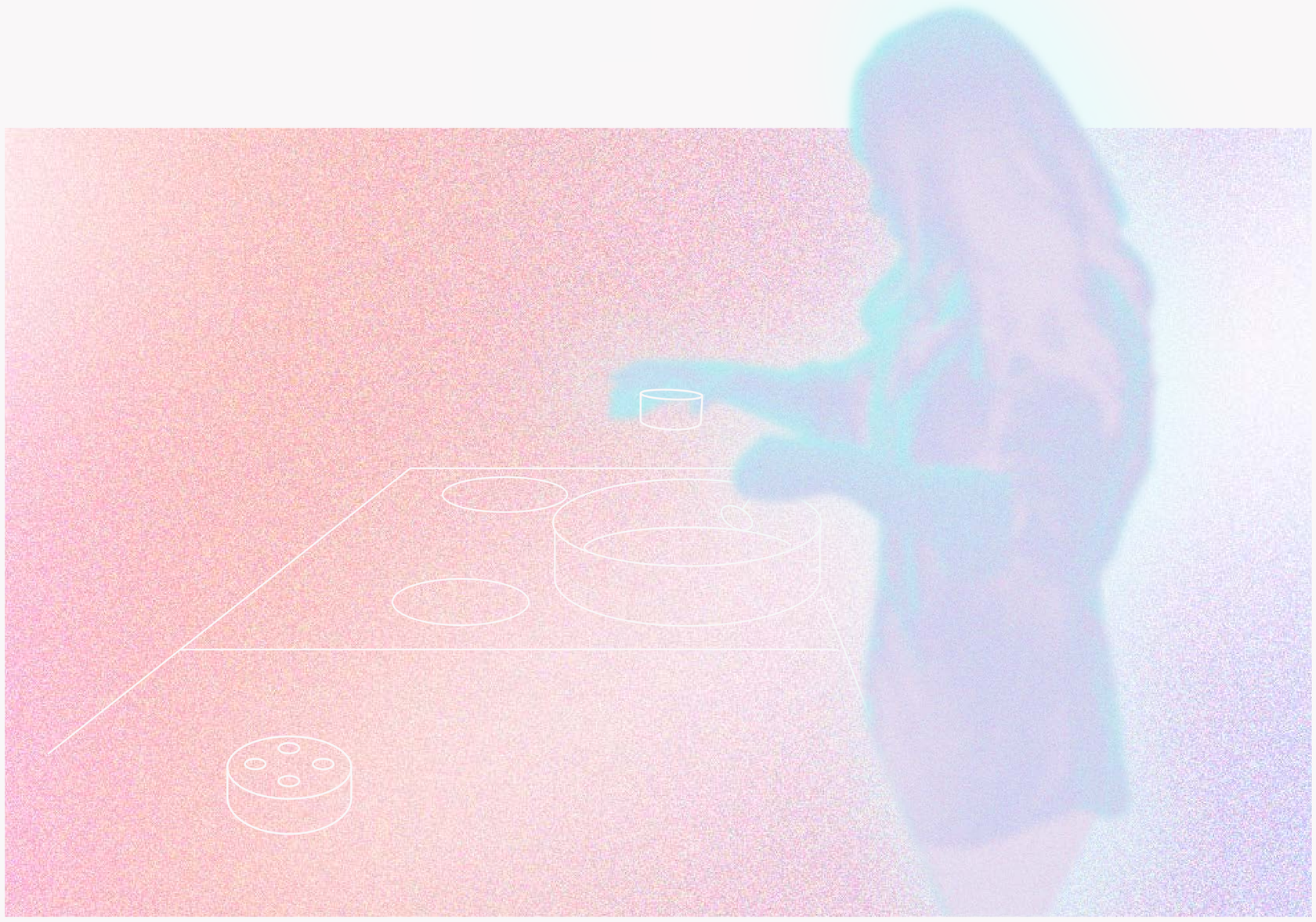
Or sometimes utterly impossible.

> *I can't really find a way to communicate with this app or service to say that's not what I want, or at least that is not everything I want..*
>
> ***Female, 30 (Shanghai, China)***

Consequently, some users today are starting to feel increasingly let down by algorithmic systems in general due to their experiences of recurring algorithmic mishaps. They show symptoms of what we call algorithmic fatigue. When first consumer services utilizing artificial intelligence entered the market in the late 2000s, many users initially found them revolutionary – "absolutely magical," as one of our interviewees recalls the early days of AI-powered music streaming services. Today, users' expectations have become much higher. Although users still lack the technical understanding of how algorithms work, their growing day-to-day experience of using algorithmic systems has provided them with a clearer perception of what they could reasonably expect from these systems.

When the reality repeatedly falls behind their expectations, users start wondering if this is all that algorithmic systems have to offer.

> *...they are called 'smart assistants' but they are not all that smart.*
>
> ***Male, 40 (Helsinki, Finland)***



The margin error of hundreds of miles

Lindsay, a 22-year-old university student who lives in Pennsylvania, USA, belongs to a generation grown accustomed to interacting with personal digital assistants, such as Siri or Cortana. Lindsay regularly resorts to the assistant on her phone when she wants to check spelling or verify simple facts, for example. However, she is wondering why digital assistants are still "so dumb", even if they have been available for consumers for years.

Particularly one recurring incident irritates Lindsay. While she can mostly drive in her home town without online map services, she would sometimes like to use them when the traffic is congested, for example, to find out if there is a faster way to get to her favorite coffee shop that she often visits many times a week. Without exception, the attempt to use the online map service in this situation fails.

Unfortunately for Lindsay, there is another coffee shop with the same name in Massachusetts, a six hour drive. Time and time again, the digital assistant in her phone picks the wrong coffee shop and attempts to direct her there.

> *...Like it should know better if I always pick this one (the coffee shop). It does not need to offer me the Massachusetts one, I'm not going six hours to a coffee shop.*
>
> ***Lindsay, 22 (Lancaster, PA, USA)***

USER EXPECTATIONS

When she drives, Lindsay cannot choose the correct location in the online map service manually. Therefore, she expects the digital assistant to find the right coffee shop without her assistance and do this quickly and without errors. This will allow her to concentrate on driving.

RELATIONSHIP WITH THE ALGORITHMIC SYSTEM

In this situation, Lindsay would prefer the digital assistant to find the best driving route. She has no interest to take an active role in the decision.

THE MAIN TENSION

The digital assistant cannot provide a correct answer to Lindsay's information request, and Lindsay is left on her own to figure out the route to her destination the best way she can. In practice, this usually means that she has to pull over on the side of a street, get her phone, switch on the online map service and look up the address of the coffee shop by herself.

Maintaining the cooking swing

29-year-old ***Kasperi*** is a hobbyist cook who likes to cook for his family. When he cooks, he often plays music from the family's smart speaker, located in the kitchen. The role of the music in these situations is to help Kasperi to hold onto the right cooking tempo or "swing", as he calls it.

USER EXPECTATIONS

When Kasperi cooks, he does not want to listen to any specific music genres or artists but expects to hear a continuous musical stream that will provide the right tempo and mood for his cooking. He thinks that good cooking music is upbeat: not too fast, nor too slow (and definitely not heavy music, either, even if he sometimes listens to it in other situations).

While Kasperi cooks, he also does not want to spend a lot of time choosing or changing the background music.

RELATIONSHIP WITH THE ALGORITHMIC SYSTEM

Kasperi would not object to utilizing AI-generated music recommendations to minimize the time spent selecting the cooking music.

THE MAIN TENSION

The mood- or activity-based playlists offered by Kasperi's streaming service are not uniform enough for providing a continuous, upbeat musical background for Kasperi's cooking, which forces him to skip songs. This takes time and interrupts the cooking "swing". Sometimes the suggested recommendations also leave Kasperi wondering about the system's logic or possible hidden motives — commercial or other — behind them. He does not understand why some of the recommended songs seem so misplaced.

> *…It's almost like this [the song] has just been thrown in there for some completely external reason. I'm even analyzing if it has been brought there because the service wants to discover a reverse user experience and see if someone stops using these [music streaming services] if there are things like that here.*
>
> ***Kasperi, 29 (Vantaa, Finland)***

Kasperi has started preferring playlists compiled by other users of the music streaming service to find more suitable cooking music. He feels that they provide a better fit for his cooking.

Design implications

When people prefer to remain passive towards an algorithmic system, they are content with allowing the system to do its work, as long as it does the job well enough. They want to focus their attention on another activity, not the interaction with the system.

The same is true about the understandability of the system. In the passive mode, people usually do not want to dedicate much time and effort to learn how the algorithmic system works, simply for the sake of knowing. They expect to be able to proceed smoothly with their main activity, which would be disrupted if they studied the parameters of algorithmic decision-making more closely[3]. While some people are genuinely concerned about the black-box nature of AI-powered systems, they, too, are rarely willing to pause their activity in a situation like this. Instead, they trust that their precautions – such as placing the smart speaker in a room where no discussions about sensitive subjects typically occur – and the legal and regulatory framework which binds system providers will give them enough protection as a user.

All this completely changes when an algorithmic system makes an error, however. Suddenly, the passive user disposition completely vanishes and people become very motivated to understand why the algorithmic system has failed to deliver the results they want. They start questioning the system's logic.

It is these moments of frustration and confusion when people in passive use situations most need explanations about working of algorithmic systems but currently are not often getting them enough.

CLARITY

When an AI-powered system makes a mistake or completely misjudges the user's present needs, people hope for specific explanations that address the particular insecurities and misgivings they have about algorithmic decision-making. They wish to know why the algorithmic system has failed to produce expected results since the correct results seem obvious. They want to understand if they could do something differently to make the system work better in a similar situation next time.

Sometimes positive surprises may require explaining. A typical case like that is when an AI-powered service that a person uses has a noticeable impact on the algorithmic decision-making of another service, and the person is offered no clue as to why or how this is happening. For example, a person who has just been listening to an artist in a music

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3 *For more information, see Acquisti et al., "**Nudges for Privacy and Security: Understanding and Assisting Users' Choices Online**".*

streaming service immediately receives targeted ads about the artist's new record when she opens a shopping app, as happened to one of our interviewees.

In our interviews, users sometimes described situations like this as simultaneously thrilling and disturbing. To them, these incidents revealed the hidden web of connections between AI-powered systems, which they, as users, had no way of inspecting or controlling.

ACTIONABILITY

From the actionability point of view, the key problem for users who would prefer to stay passive towards the algorithmic system is their inability to stop the system from making the error that it – sometimes repeatedly – does. People often think that the problem they encounter would be easy enough to fix and feel annoyed about not being able to do that. This makes them feel disempowered and increases their frustration with algorithmic decision-making, which sometimes leads to a decision to stop using the algorithmic system for that purpose altogether.

Users may conclude, for example, that it is easier to use an Internet conversion tool to convert Fahrenheit to Celsius degrees rather than endure the smart speaker rambling about the mathematical formula behind the conversions – time and time again.

In passive use situations, people want to have more effective and immediate ways to let the system know what it is doing wrong. In other words, the agency that they would wish to obtain is ***reactive***. As long as the system works as expected, users are happy to stay passive. However, when it fails, they want to have effective and easy ways to provide rapid feedback to the system to make it work better – after which it may again continue working unassisted.

CONSISTENCY

When people wish to adopt a passive user mode, their willingness to invest time in learning about algorithmic decision-making greatly varies, depending on whether the system can produce satisfying results. This also has implications on how people expect the algorithmic system to respond to their common pain points and algorithmic insecurities.

When an algorithmic system stays in the background and provides expected results, it may often be enough for people to know that the service provider has an ethical and regulatory framework that it follows. To make people more aware and confident about the frameworks, service providers in these situations could experiment with different kinds of nudges

for increasing privacy and data security. In other contexts, it has been proven that with the right nudges, it is possible to push users to create stronger passwords for online services, for example[4]. Similar methods might work here.

However, this approach will not provide enough information for users in the passive use situations where the algorithmic system fails their expectations. During these occasions, users have precise questions in their mind that need answers: they want to know why the algorithmic system made an error and what they can do to make the system respond correctly in a similar situation later on. Answering these questions promptly will make the AI-powered system seem less like a black box to users and increase users' satisfaction with algorithmic decision-making.

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4 *A Carnegie Mellon University study from 2012 showed that incorporating password meters that judged the strength of the user's password was an effective way to make users create longer passwords. See Ur et al., **"How Does Your Password Measure Up? The Effect of Strength Meters on Password Creation"**. There is also an extensive library of academic studies about other ways of nudging users for adopting better privacy- or data security -related online behaviors. For an overview of those, see Acquisti et al., **"Nudges for Privacy and Security: Understanding and Assisting Users' Choices Online."***

CHAPTER 4

Guiding AI for more accurate results

We see the desire to guide an AI-powered system when the system is perceived as a tool for attaining a present goal or aspiration. This often happens when people use video streaming services. Users would want to instruct the recommendation system to make sure AI will produce recommendations that better match their present intentions. People understand that they can’t expect the algorithm to tune into their precise needs in the moment, so the ability to proactively nudge the algorithm before the recommendations are displayed would go a long way to improving their experience and minimizing the dreaded ‘endless scroll’.

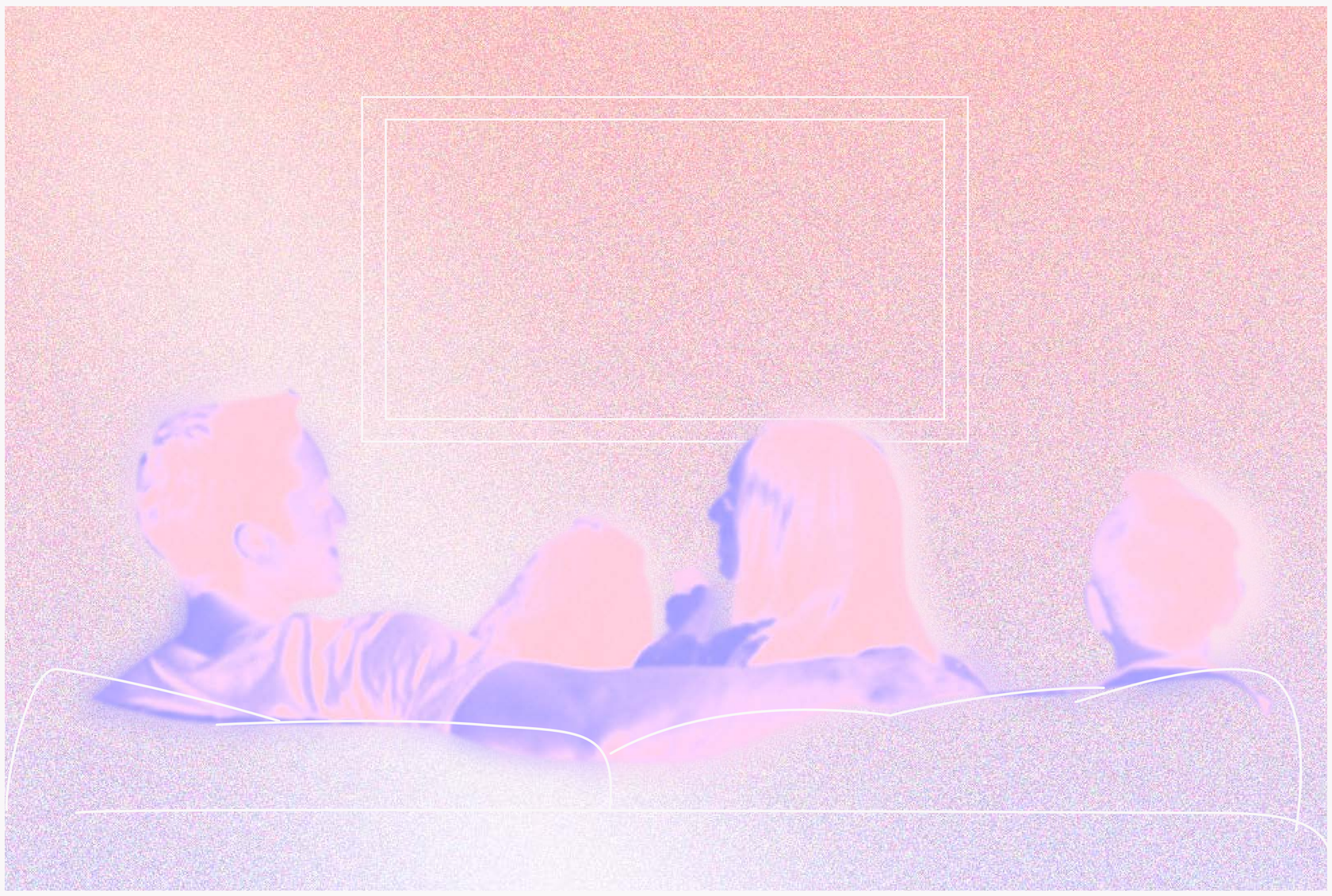
CHAPTER 4

People would want to have a guiding role in algorithmic decision-making when an algorithmic system acts as a vehicle for fulfilling immediate personal or shared intentions. In our study, this was most common when people used video streaming services.

> *A couple wants to spend a lovely evening at home by watching TV. The recommendation system of their video streaming service thus becomes a vital tool for spending relaxing time together. It can help the couple to find a TV show that will provide enjoyment for both.*

In these situations, people would often want to poke the video recommendation system in the right direction because they do not think that the system's recommendations without assistance are satisfying enough. They feel that currently, recommendation systems are often good at highlighting new hit films and TV shows, making it easy for users to spot the biggest crowd pleasers. They also acknowledge that recommendation systems occasionally help them find a good TV show or a film that is quite closely related to what they have already watched. Something that is a typical example of their favorite genre, or a sequel or a spin-off to a film or show they have already watched.

When there are no such obvious alternatives, problems that users of video streaming services encounter with AI-generated recommendations become more apparent.



Lack of subtlety becomes a problem

This is because the factors that affect people's choice of film or TV show change all the time: their energy levels, states of mind and momentarily preferences vary.

> *I wish ...that I could just say (to the user's video streaming service), hey, today I am actually really tired, so just give me something that I'm likely to be interested in. Or, today, I wanna be on the wild side. Do not give me anything that I have watched or heard before or even anything that my network knows about. Shoot, give it to me, and I'll watch it.*
>
> ***Female, 55 (Helsinki, Finland)***

And so do other things, such as timeframes with which users in these situations operate.

> *Naturally, the bigger boys already have so much going on that in order to get them sit with us for a while, I need to ask them for a couple of days before whether we could have a common film night on Friday, Saturday, or Sunday, and ask at the same time if they have something in mind that they would like to watch. Seldom, maybe never, do we just sit down and start scrolling (the video streaming services of the family).*
>
> ***Female, 49 (San Diego, USA)***

Because of such daily variation, every occasion when a user searches for new content becomes one of a kind, in a way.

This variation is currently poorly captured by the recommendations of video streaming systems.

> *Somehow, I feel that it (the AI-powered recommendation system) is a bit dumb. It is like, 'if you watch a film with a spaceship, you must be interested in all kinds of space thingies.'*
>
> ***Male, 28 (Helsinki, Finland)***

Repeatedly, users in these situations also feel overwhelmed because they find it hard to distinguish between recommended items. In their eyes, the recommendations seem to blur into a uniform formless mass. This often leads to prolonged browsing, which people

want to avoid, so they develop different ways to diminish their dependency on the system's recommendations. Users may, for example, resort to other sources of information (film and TV show critiques, commercials, or suggestions from friends or social media contacts) to get ideas on what to watch. Some acquire a habit of collecting potentially interesting films or programs on a personal list in their streaming service that they can consult when looking for something to watch. Others have go-to classics to resort to when having trouble deciding what to watch.

A common denominator for all these tactics is that they are developed to avoid the trap of unending browsing and scrolling, which, according to many, will often happen if they rely on AI-generated recommendations only.

To put it bluntly, the act of prolonged scrolling in these situations often indicates a failure of the recommendation system. People browse because the AI-generated recommendations do not correctly reflect their current aspirations or circumstances.

Expectations: Speed and precision

In the situations where users would like to guide algorithmic decision-making, they thus commonly operate with two primary parameters to evaluate AI-generated recommendations: the precision of recommendations and the system's ability to reduce the time spent choosing what to watch.

In both accounts, the recommendation system commonly falters.

Interestingly, however, when this happens, the leading cause of frustration for people is usually not the system's failure. Users in these situations do not expect errorless recommendations, which will unmistakably reflect their state of mind and other changing variables that impact their choice of what to watch. Today, people understand perfectly well how difficult that is for an algorithmic system when even the people who know them best regularly fail to give good recommendations.

What bothers people the most in these situations is their inability to guide the algorithmic system to perform better. The tools that video streaming services currently provide are too imprecise for this purpose.

Let's take an example that I like Adam Sandler's "Fresh", which I thought was really funny and different, and it was nice that Adam Sandler renewed himself and did that. Do I want to watch all the films that he has done over the past five years? No, I do not… If I like (click the 'like' icon in the service) Adam Sandler's "Fresh", you quite often see in these services that "Hey, by the way, here are all films that Adam Sandler has ever done".

Male, 40 (Helsinki, Finland)

Even the Aurinkomatkat (a Finnish travel company, specializing in package tours) website is handier in the sense that I (can type in the system that I) want such and such a budget, a family with kids, a swimming pool etc., and it will give me my options.

Female, 34 (Espoo, Finland)

In the mood for a European political satire

Michael, 62, is an avid user of video streaming services. He often watches TV shows from his smartphone before he falls asleep or when he is waiting in the car for one of the family's three sons to finish training. His taste in TV shows is relatively consistent. He nearly always watches fiction and prefers European and Scandinavian TV shows. He especially likes political satires and crime thrillers but is sometimes in the mood for an ambitiously made nature program. Despite having a rather clearly defined taste in TV shows, Michael often has difficulties in finding something new to watch when the previous TV show has come to an end.

> *It (the searching) almost makes you sweat. When you invest your time in (watching) a show, you would want it to be exactly what you want. And if it takes a ridiculously long time to search for a show, the breadth of the list (recommended films) bothers me.*
>
> ***Michael, 62 (San Diego, USA)***

USER EXPECTATIONS

Michael wants to find an entertaining TV show that will match his present state of mind and fit within the time slot he has available for watching. If he watches something while waiting for his son to finish training, for example, the time slot is precisely defined.

RELATIONSHIP WITH THE ALGORITHMIC SYSTEM

Michael would gladly resort to the recommendations generated by the video streaming services to make the search easier. As a fan of European and Scandinavian TV shows, he would also like to know whether the TV shows have subtitles or if they have been dubbed. He much prefers the subtitled ones.

THE MAIN TENSION

Michael complains that the listings of recommendations that video streaming services provide are too broad and heterogenous to offer any help when looking for a new TV show to watch. He now rarely browses them and instead tries to find a new show using the services' search function.

> *I have watched 'Bordertown'. If I take a look at what it (the service) suggests, there are…over 50 options. These are quite far from 'Bordertown', I think.*

The looming threat of Finding Nemo

Every Friday evening, ***Collin's*** family, who lives outside of Los Angeles, has a family get-together in their living room, including a pizza delivered and a streamed film that the whole family will watch together.

On a rare occasion, a new hit film that all family members want to watch has just arrived in one of the family's streaming services, so the decision of what to watch is easy. However, most often, the decision drags out, even if the parents have tried to make it easier by, for example, giving turns for each child to pick a movie. The family's eldest son, the 17-year-old Damon, prefers to watch action films, which are sometimes too scary for the 11-year-old Mathew, who, on the other hand, is a die-hard Pokemon fan. Meredith, 14, would occasionally like to watch teenage comedies but is often not backed up by her brothers.

> *"And you know, I love the depth of content on streaming services, but sometimes the choice can be overwhelming", sighs Collin, 50.*

On most Friday evenings, a compromise of what to watch can't be found between the three children without the parents' interference. When the children are faced with the threat of either having to watch Finding Nemo again – a film that the family often resorts to if no other movie has been found on time – or not getting to watch anything at all, a conclusion is reached, sometimes with considerable murmurs.

USER EXPECTATIONS

For Collin and his family, the Friday film nights offer a chance to spend lovely family time at least once a week, as the family members are often busy on other weekdays. For this reason, it is important to make sure that the chosen film will be entertaining enough to capture the interest of the three children (and preferably also the parents' who attend the film evening, as well).

RELATIONSHIP WITH THE ALGORITHMIC SYSTEM

The family would be willing to receive AI-generated recommendations to make the film selection faster. Currently, choosing a film often takes a long time for them, causing bickering between the three children and making the parents lose their patience.

THE MAIN TENSION

AI-generated recommendations cannot adequately accommodate the family's changing preferences. The energy level, state of mind and momentarily interests of each family member vary from Friday to Friday. On some Fridays, there are also work-related or other reasons that will delay the start of the film night, so the chosen film may have to be shorter

and needs to be found rapidly to allow for enough time to watch the entire movie before going to bed. The family feels that the AI-generated recommendations do not reflect this variation well enough. The children, who do the choosing, usually ignore them.

> *"It's (the AI-generated recommendations)..almost like noise to them, that doesn't influence what they wanna watch", describes Collin.*

Design implications

When people would want to guide an algorithmic system, they do that because – unlike in the passive use situations – the system plays a vital role. People want to relax, spend time with friends or family, or maybe follow the news, and an algorithmic system is a tool for accomplishing these intentions.

Compared to the passive use situations, also people's expectations towards algorithmic decision-making differ. When users would like to guide algorithmic decision-making, they do not think that the AI-powered system should deliver flawless results unassisted. They realise that it's too much to assume that the system could understand all variables that impact their expectations.

From users' point of view, therefore, it is not the errors that an algorithmic system makes for which they need explanations. The most important issue for them is how they could most effectively steer the algorithmic system in the right direction.

If they cannot do this effectively enough, using the system often provides no additional benefit as it does not make it easier to reach their intentions. When this happens, users often stop relying on algorithmic decision-making and try to find other ways to arrive at a preferred result. For example, in the case of video recommendation systems, this may mean turning to friends, social media, or other external sources for recommendations to decide what to watch.

CLARITY

When people would like to guide an algorithmic system, they need contextual and service-specific information about their possibilities to steer the system to produce more relevant results.

If an algorithmic system provides such possibilities, users should be informed how the use of these tools changes the system's working and indicate what other factors, such as commercial interests, may affect the results. In the case of video streaming services, for

example, users might find it helpful to receive explicit and actionable information about their chances of guiding and nudging the work of search or sorting algorithms. Such knowledge could help them steer the system to produce recommendations that better reflect their current preferences and situation.

ACTIONABILITY

Unlike in the passive use situations (where users aspire for a reactive agency to correct errors), people in these situations would want to guide algorithmic decision-making ***before any results are produced***. They want to make sure that the system does something, not that it does not.

Currently, many users are disappointed about the tools that algorithmic systems provide for such interaction. They find the existing tools ineffective and obscure and often feel very uncertain about how – or if at all – the use of these tools changes the working of algorithms. Some users of streaming services, for example, explicitly state that they do not want to use tools such as 'like' or 'dislike' because the benefit that they might get from using these tools seems not high enough, compared to the amount of work required from their part.

To make people feel more empowered in these situations, service providers should provide users with more effective yet convenient ways to poke the algorithmic system in a direction the user wants. Users of video streaming services, for example, would probably appreciate simple tools which allow them to make the recommendation system aware of the specific factors that the system should take into account at that particular time. This way, people could, for example, communicate how long the recommended films or TV shows should preferably be.

Another design idea could be to give users ways to indicate whether the system should learn from the user's behaviour. Considering that the circumstances in which people watch their video streaming service often change – as do their subjective preferences – , there may be rare or one-off occasions when the user wishes that their present choices will not alter the system's idea of their profile. As a concept, this remotely resembles using a private tab in a browser. The same result could be achieved by offering people easy tools to erase certain exceptional events from their watching history retroactively.

This would also make it possible for users to communicate if the system is consistently giving false recommendations based on misleading data in the person's past user history, which happened to one of our interviewees. She had been sick for two weeks, during which she preferred to doze off whilst watching light-hearted soaps from her video streaming service. After her recovery, she wanted to indicate to the system that she no longer wants recommendations for soap operas but instead hopes to return to her usual watching preferences. This, however, turned out to be impossible. In the end, she had to create a new user profile to get rid of the faulty recommendations.

CONSISTENCY

In situations where people want to guide algorithmic decision-making, their key pain point is their inability to steer the system proactively. An algorithmic system best acknowledges this by being open about its constraints and promoting a form of algorithmic intelligence that has limitations and works best when users guide it.

Service providers need to understand that people in these situations do not want to know everything about the system's algorithmic decision-making. They want to receive relevant information about effective ways to steer the system in the right direction. Taking this perspective as the starting point, system providers should create better tools for guiding algorithmic decision-making and actively advocate these tools. While doing that, service providers should also be more transparent about other factors that affect the outcomes of algorithmic decision-making in the particular situation where the user finds herself in.

CHAPTER 5

Collaborating with AI to explore new things

When people want to learn new things or evolve their tastes, they often wish to adopt a collaborative role with the algorithmic system. This is a situation where the journey is more important than the destination, and the user's past actions do not necessarily predict their next moves. In these situations, people often find AI recommendations helpful initially. However, as they progress in their exploration, they start to feel like they are reaching the limits of their echo chambers. At this stage, users would like to have a 'dialogue' with the algorithm to inform it of their evolving interests. This is where a layered algorithmic approach could be beneficial, making it possible for users to alternate between an active, collaborative role and a more passive one.

When people would like to collaborate with an algorithmic system, they often perceive the situation as a chance to ”evolve and develop as a person”, as a 22-year interviewee from Pennsylvania, USA, described to us. They want to learn about a topic or develop their taste. For users, such instances of personal development typically do not appear as solitary or isolated experiences. Instead, they form a longer-lasting chain of events during which people build their expertise on something or discover new sides of themselves.

> *A person watches a movie in a film theater about the birth of underground house music in Chicago and becomes interested. She then searches for the artists heard in the film on her music streaming service and continues to listen to them. Later on, her interest in house music holds, so she keeps exploring the music genre, both in streaming and elsewhere.*

Seen this way, the situations during which people engage in personal development become more like journeys where the outcome (if there even is one) often matters less than the journey itself. The exploration starts when people develop an interest in a new topic. At this point, their requirements are usually quite broad and unspecified. When people become more knowledgeable about the subject, their interest becomes more specific, leading them in a new direction in the personal exploration – and later, maybe, to yet another direction.

That is how the personal journey continues, but such twists and turns are part of the fun for most people. They keep them engaged and interested and, more importantly, make them feel that they are – to paraphrase our interviewee – still evolving as a person.

Against this background, it is easy to understand why situations where people engage themselves in exploration and learning are so important. They provide people with chances for expressing and exploring who they are and what they like. So, if something in these situations hinders or slows down their exploration or personal evolution, it becomes a problem. Currently, this is what often happens with algorithmic systems.

No sense of personal journey

Let’s say, for example, that a user of a music streaming service does indeed become interested in house music and starts to listen to it. The service’s recommendation system soon registers such changes in her listening patterns, and the user starts getting suggestions for similar music and artists. At this point, users of music streaming services often find AI-generated music recommendations useful. The recommendations help them to develop a general understanding of their new interest.

Tensions often begin to build up, however, once the user’s interest deepens and evolves. The person who has started liking house music is eager to learn more about her new favorite music style and venture to the less trodden house music territories but does not

know where to get started. She wants to find something interesting to listen to – something that is close enough to what she already likes but different enough to give her a sense of evolution or progress.

At this point, AI-generated recommendations presently often let users down. They are not sensitive enough to people's developing tastes and interests, so they cannot assist in their exploration – a fact that has not gone unnoticed by users themselves, either. In our interviews, users of streaming services talked about getting stuck in an echo chamber or pointed out that recommendation algorithms cannot make "a leap".

> *I think that these suggestions (recommendations) rely really strongly on what I have listened to, but they do not reflect my taste in music in some broader way.*
>
> ***Female, 32 (Helsinki, Finland)***

Of course, many experienced users have found ways to continue with their exploration, even if they do not get much assistance from AI-generated recommendations. They often resort to friends, family members, colleagues, knowledgeable peers, critics, or social media influencers broadly interested in the same thing. These personal "lighthouses", as one interviewee called them, help users to drill deeper into their interest by giving suggestions and recommendations that go beyond the most obvious ones.

Some users have also developed ways to work the algorithms of streaming services more to their advantage. It is pretty common, for example, to use the search function as a tool for personal exploration, even if such activities require a lot of time and patience and do not always provide results that will help the user to make a "leap".

> *At one point, I wanted to listen to rap music from other countries, so I would just make up (a search term) such as 'Mexican hip hop or rap' and then try to find a playing list. Then I would go to France and next to Sweden and listen to what they had there. But I do not listen to the TOP lists so much (anymore) because I think they are quite similar everywhere.*
>
> ***Male, 35 (Helsinki, Finland)***

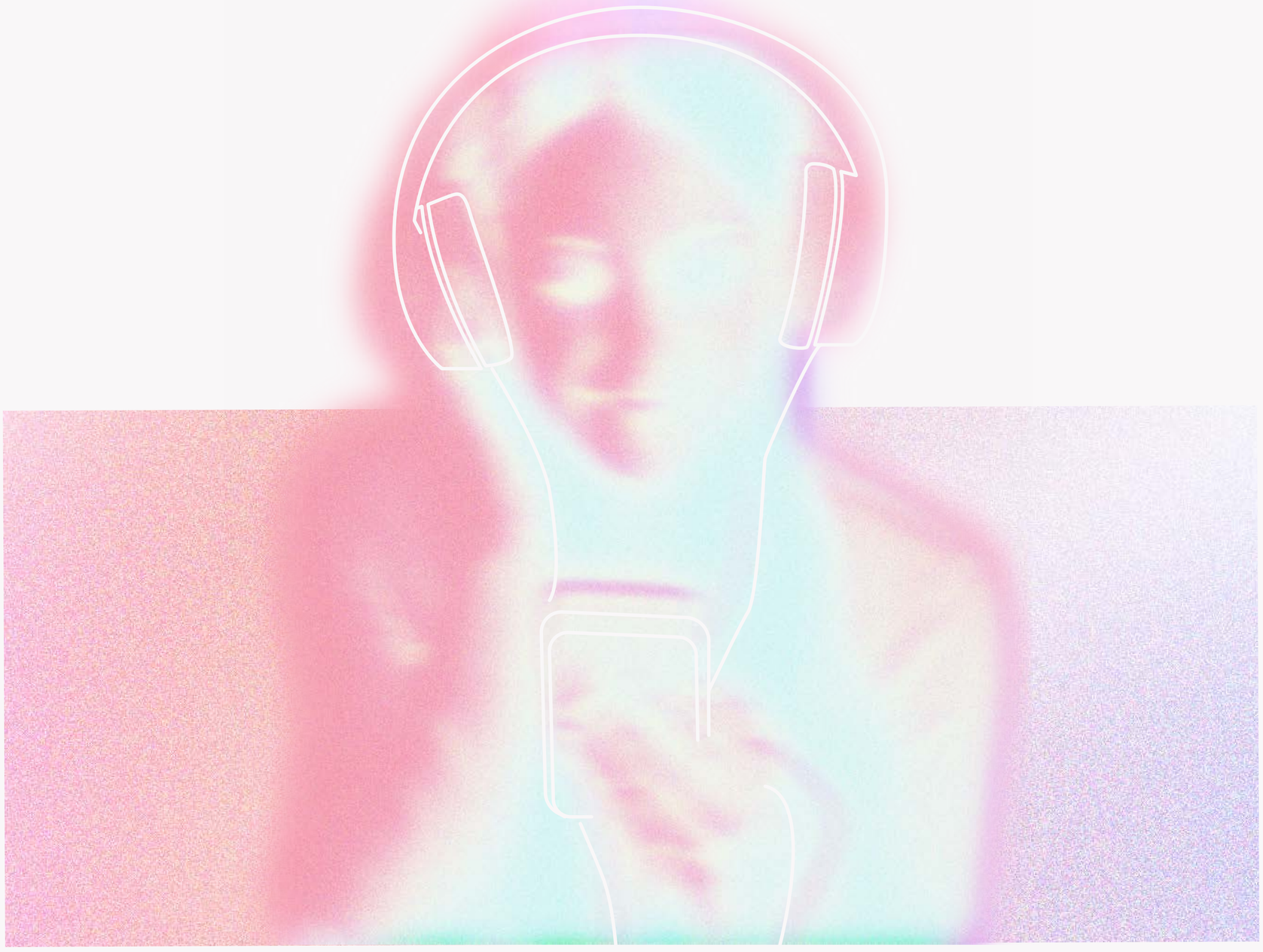
CHAPTER 5

Expectations: Evolving and collaborative

To better serve people during their explorations, algorithmic systems ought to work more like human “lighthouses”. When people turn to their personal “lighthouses” for advice and ideas, the exchange between the two parties is a form of a dialogue. Both parties exchange views and change the course and the outcome of the situation.

In situations where users would prefer to collaborate with an algorithmic system, they aspire for a similar relationship. The system does not have to perfectly predict what will spark users’ interest next – human ”lighthouses” cannot do that either. But it ought to provide them with chances for real interaction and collaboration – a discussion if you like.

The frustration with the system in these situations is born from users’ inability to engage in such interaction. An algorithmic system is only reactive – it reacts to the changes that have previously happened along the user’s personal journey. From the user’s point of view, however, these changes may have already become far less exciting, and the person is eager to go forward. Unlike in the interaction with the human “lighthouses”, users are incapable of communicating this to the algorithmic system and cannot exchange views about where to go next.



Breaking away from my musical bubble

A 36-year-old music lover ***Mark*** has been interested in a variety of music ever since he was a child, and as a younger man, he also played in some bands and DJ'd occasionally. In New York, his home city for the past two years, he regularly goes to electronic dance music raves.

Mark has been a subscriber of a well-known music streaming service for many years. He is relatively content with the service, except for one big but. Mark feels that the service's recommendations algorithms reduce him as a music listener into a lukewarm, simpler version of himself and offer songs that are too predictable and safe. They rarely provide interesting surprises or happy musical encounters outside of his comfort zone.

As a music fan, Mark has developed many ways to break free from his musical bubble but feels that they require quite a lot of effort. To be exposed to a wider variety of music, he has, for example, started subscribing to the recommended playlists of some carefully chosen friends whose musical tastes are far enough from his own. His music streaming service lets him subscribe to the friends' daily and weekly recommendations where he, from time to time, finds new artists or songs. This solution, he suspects, might only provide temporary help, though.

> *As time goes by, our personal [musical] bubbles may start resembling each other too much, and I have to find more people whose daily and weekly recommendation links I can ask for.*
>
> ***Mark, 36 (New York, USA)***

To be exposed to a greater variety of music, Mark also actively compiles collaborative playlists in the streaming service with some friends or colleagues, listens to the newly released playlists by two music media he likes and exchanges tips for new songs or bands on WhatsApp with friends. Earlier, when his music streaming service offered a possibility to search music from specific record labels only, Mark also did regular searches on the names of his favorite labels. This gave him a chance to browse the music that the labels had released recently. Performing searches like this in the streaming service is no longer possible.

USER EXPECTATIONS

When Mark is in the mood for finding interesting new music to expand his taste, he hopes to encounter music that seems refreshingly different to the music that he usually listens to but not too foreign. He wants to be happily surprised and intrigued by the new music but not perplexed by odd musical suggestions that do not seem to have any connection to where his musical interests currently lie.

RELATIONSHIP WITH ALGORITHMIC SYSTEM

Mark already has a habit of regularly checking the recommendations that his streaming service produces for him, so he would have no objections to get assistance from an algorithmic system when he engages in a musical exploration to expand his taste in music.

THE MAIN TENSION

Mark thinks that the daily recommendations provided by his streaming service are too close to the music that he already listens to all the time, so they rarely offer any real discoveries. On the other hand, the list of weekly recommendations, which, he thinks, has been designed to help users to find new music, may include new music by an artist that he has listened to 10 years ago but not recently.

All in all, Mark feels that the AI-generated music recommendations that his music streaming service offers are often too trapped in the learnings from his past. They are incapable of adequately reflecting the “curvature”, or development, of his taste. Instead of resorting to the AI recommendations, Mark therefore currently relies mainly on the various human ”lighthouses” in his life to get fresh ideas about new and interesting music. Sometimes, he also finds new artists when he attends an electronic dance music rave.

CHAPTER 5

Design implications

Most people find it fun and meaningful to delve into the things they are interested in, and when they get a chance to focus on these things, they want to be actively engaged. For many, the acts of personal exploration and learning may be as rewarding as their outcomes.

In light of this, it is easy to understand why users would want to take an active part in algorithmic decision-making in these situations. When an algorithmic system places them in a passive role with no means to influence algorithmic decision-making in real-time, the service fails to serve users' greatest need in the situation. The system also often delivers outcomes that seem outdated, inaccurate or too similar to the results the system has provided earlier to reflect their evolving tastes and interests properly.

In a way, an algorithmic system thus delivers a double whammy for users in these situations. It deprives them from adopting an active role in a situation where all they want to do is be active. And it provides them with results that are of very little help, without giving them any means to put algorithmic decision-making to better use in the situation.

To better serve users, AI-powered systems ought to provide users with meaningful ways to engage in personal exploration in close cooperation with the algorithmic system. An interesting reference point here might be to think of the interaction between people in similar situations. When two people are in contact, they may not always know each other that well, and even if they do, they might still have difficulties understanding each other's aspirations and intentions. In such situations, humans try to overcome their shortcomings by adopting a respectful, listening attitude towards each other and communicating in an open-minded manner. Could an algorithmic system have a somewhat similar relationship with users when people wish to collaborate?

CLARITY

In the situations where users aspire to adopt a collaborative role, they most wish to understand how they could engage in a deeper interaction with the algorithmic system.

Presently, one of the key problems that make the outcomes of algorithmic decision-making imprecise and irrelevant from users' point of view is the systems' insufficient capacity to take into account the experiences that take place outside of the system. These experiences may be highly formative for the user and push their tastes and interests to evolve rapidly.

To better address this problem, AI-powered systems ought to provide users with knowledge about how the data that the system currently has about the user (or more precisely, about users who behave in the system like them) could better be fitted with the user's

subjective experiences, which play a crucial role in the evolution of their interests. For example, a user might find it helpful to learn more about how the algorithmic system organizes and analyzes data and get a general understanding of how these decisions have affected the way the system presently categorizes them.

ACTIONABILITY

Equipped with a better understanding of some of the key factors in algorithmic decision-making, users should have tools to interact with the system in a more fast-paced and collaborative manner. The tools that users currently have at their disposal are not good enough for this purpose. They cause only incremental and gradual changes in algorithmic decision-making, and their effects often remain opaque.

For many, simple new tools for interaction would probably be enough since their main ambition is to inform how their interests have evolved and see the system react to this information. Users in these situations could, for example, benefit from having more effective ways to integrate the recent inputs of the human “lighthouses” in their lives into the algorithmic system. Presently, their impact on users’ evolving tastes and interests is still poorly registered by algorithmic systems because the interaction between users and their personal “lighthouses” usually takes place in social settings outside of these systems.

Alternatively, (though this may be difficult) system providers might also explore ways to provide “human lighthouse-like” experiences within the service. When people interact with their “lighthouses” outside of AI-powered systems, they do that because they want to widen their perspectives and understanding. As an effort to learn more, people thus momentarily wish to step into the shoes of their “lighthouses” and see what they have seen. These types of experiences are currently not possible in algorithmic systems as the systems do not provide users with ways to temporarily “break free” from their user profiles and histories – people cannot experience the systems as anyone else but themselves.

In addition to these ideas, easy tools to organize and play with the data existing in the database of an algorithmic system could also be attractive to users, as long as they were able to play with the data without having to worry how such actions affect algorithmic decision-making on a longer term. Currently, users of streaming services, for example, sometimes struggle with the problem of an AI-powered system getting too much “wrong” data, which makes the system draw false but often uncomfortably sticky conclusions about the user’s preferences. Because of this, some of our interviewees were cautious about using their personal user profiles in streaming services for gathering knowledge about a topic that they were only interested in professionally. They were worried that submerging oneself in a subject of professional interest would distort the recommendations they received from the system in their leisure time. The obvious first step for solving such problems would be to make it easy for users to create parallel profiles within the system for different purposes.

CONSISTENCY

In collaborative use situations, users' algorithmic frustrations may best be addressed by advancing a notion of co-intelligence between the algorithmic system and the user. Such a view is grounded on the understanding that both the user and the AI-powered system have particular strengths and weaknesses. However, when the two have a more balanced and interactive relationship, their strengths become greater and weaknesses lesser. For this reason, neither party should work all alone.

To build this type of relationship, providers of algorithmic systems could concentrate on experimenting with new tools that allow users to interact with AI-powered systems on a more equal footing. This might mean that the development of algorithmic systems should be understood as a process of building more "layered" algorithmic systems capable of offering users a different degree of subjectivity or agency in different situations. When users find it important to engage in algorithmic decision-making as part of their personal exploration, they should have tools at their disposal that will allow them to do that. And when these same users wish to remain relatively passive (and in most use situations, they probably do), they can do that equally well.

CHAPTER 6

From imperfect algorithms to perfect interactions?

AI has come a long way, but it's time for the design of AI-powered platforms to account for the myriad roles people play when interacting with them. At its core, the way people use AI in their everyday lives often falls short of their needs in the contexts they use them. The design could empower people to participate in algorithmic decision-making to the extent they want, whether it is correcting the system's mistake or steering it in the right direction. This could be the key to creating frictionless, delightful interactions that better complement the realities of people's day-to-day lives.

CHAPTER 6

The goal of this report has been to make a case for more versatile and actionable algorithmic systems. We have described various everyday situations where people currently get annoyed by independently working algorithmic systems because of not having effective ways to steer or collaborate with the systems or even correct their errors.

To conclude the report, we want to make a broader claim:

Algorithmic systems can only be true companions in people's everyday lives if they allow humans to be – humans.

This means acknowledging that people are sensual flickering creatures with changing needs and aspirations. Their situations and circumstances vary. They have feelings. Sometimes they act rationally but often not.

There are times when being active and engaged is what makes the entire situation worthwhile for people. On other occasions, all they want is to adopt an autopilot mode and get things done.

When a person learns something new, a long and winding search or even temporary dead-ends may make the activity more meaningful and inspiring. Extreme speed or efficiency are consciously avoided. The same is true for social situations where the primary purpose is to strengthen a sense of closeness among family members or friends. The feelings of mutual trust and caring grow from people devoting their attention to each other without rushing. They get strengthened when everybody's needs are adequately heard. All of this requires time and dedication, often also repetition, negotiation and a certain idleness.

We think that developers of AI-powered systems for everyday contexts should adopt this understanding as their starting point. They should accept that the same principles which brilliantly work when building algorithmic systems for diagnosing rare diseases[5] or modelling the changes in the global climate patterns[6], for example, cannot be applied here.

In their everyday lives, people ought to be given a chance to be their sometimes indecisive, ineffective and unpredictable selves, and their diverse life situations and changing circumstances should be respected. Developers of algorithmic systems should not deprive people of this right by imposing a too rigid and analytical system of decision-making on them. Instead, they ought to start experimenting with more layered algorithmic systems that will be better at adjusting themselves in people's daily alteration.

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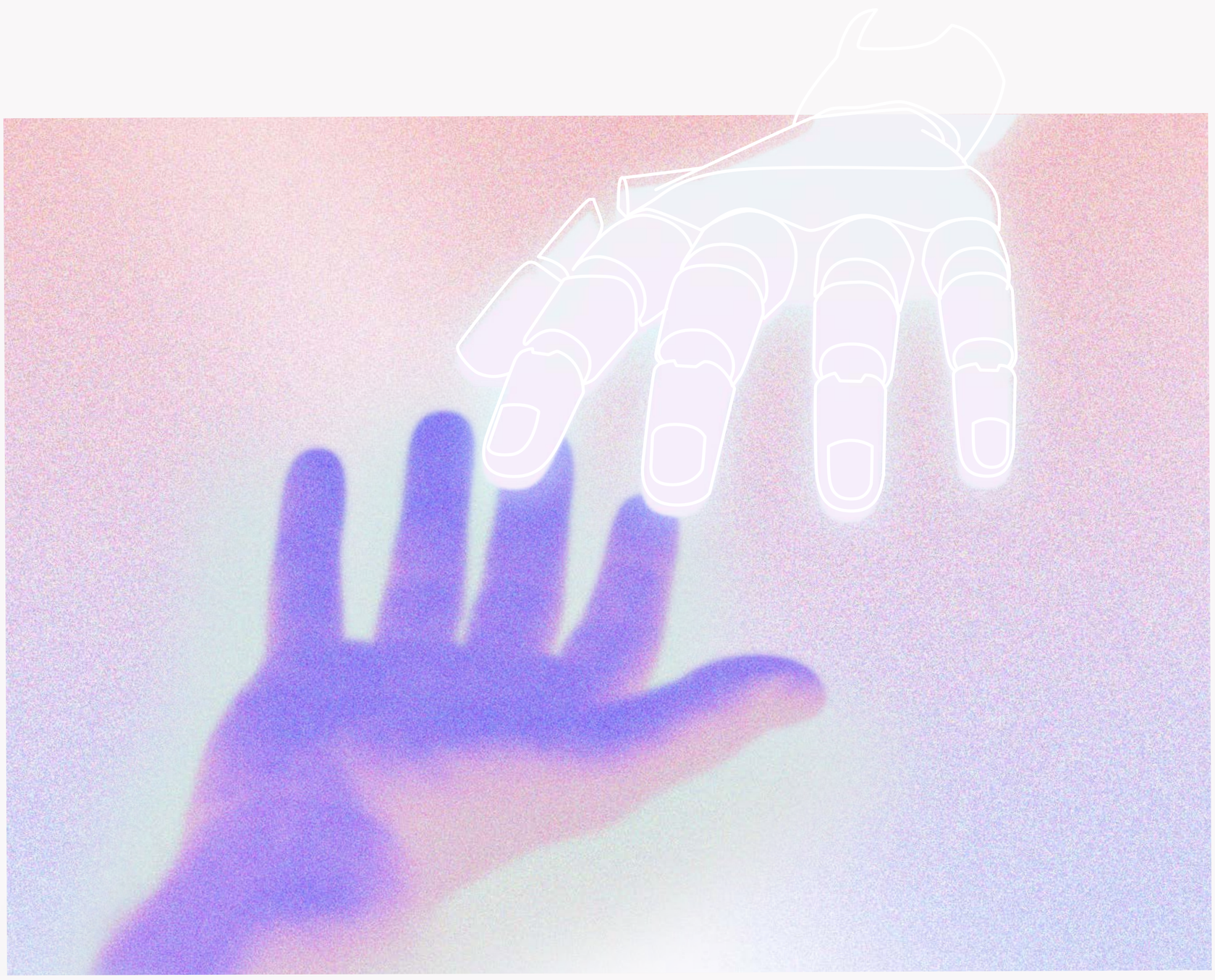
5 *Hsieh Tzung-Chien et al., "Pedia: prioritization of exome data by image analysis."*

6 *Jackie Snow, "How artificial intelligence can tackle climate change."*

They should allow users to assume a more active role in algorithmic decision-making when that is desired.

Yes, it is probably true that even users of more versatile algorithmic systems will most often prefer convenience and appreciate a relatively passive role – just as users of contemporary AI-powered systems do now. They will enjoy when algorithmic systems do things for them, automate activities and provide ease for their life. But in addition to this, they will also enjoy situations where an algorithmic system allows them to steer the system or, sometimes, even collaborate alongside it.



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The study in a nutshell

The Everyday AI research project, conducted by Alice Labs and the Centre for Consumer Society Research (CSRC) at the University of Helsinki, in collaboration with Reaktor, was begun in early 2020. Primary data for the study was collected between March and December 2020 by interviewing users of AI-powered systems in Finland, the USA, and China. The interviewees were users of digital assistants (smart speakers and voice assistants) and music or video streaming services in the home and leisure settings.

Altogether, 24 in-depth interviews were conducted, each lasting for about two hours. The original plan was to conduct ethnographic research in the chosen research locations. However, due to the global COVID-19 pandemic, the majority of the empirical data was gathered via semi-structured qualitative interviews online.

The decision to focus on digital assistants and streaming services, or to be more precise, on their AI-powered recommendation systems, was made for two reasons. The research team wanted to study algorithmic systems that have already become a common part of people's daily lives. And the team decided to focus its attention on systems where the process of algorithmic decision-making is easily discernible to users, thus choosing algorithmic systems where the user can directly interact with the system and observe the results of algorithmic decision-making.

Recommendation systems of streaming services and digital assistants are such systems. Recommendation systems produce personalized content recommendations without any active input by users, but they provide users with simple tools to give feedback. With digital assistants, users interact with the system in an even more direct way by providing commands to the system.

The ongoing research is funded by The Foundation for Economic Education. In 2021, the project team will continue fieldwork to refine the findings from the first year of research. The team intends to elaborate the preliminary design framework represented in this report, preferably in connection with existing AI-powered systems.

Engaging with EverydAI

How to move from imperfect algorithms to perfect user interactions?

Reaktor

Reaktor is a strategy, design, and technology partner for forward-thinking companies and societies.

Alice Labs is a strategy consultancy with a global client base and a unique expertise on understanding people's everyday lives. The company wants to drive impact and advance public discussion on the issues that it cares about.