Laid-back listeners, pioneers, and scavengers: a user perspective on algorithmic effects in music consumption

A user perspective on the Spotify algorithm and the perception of how it contributes to their listening behaviour.

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ABSTRACT

Online music streaming platforms allow people to have access to a whole catalogue of songs and artists to discover from the comfort of their own mobile device, wherever they are. Streaming platforms provide users with personal recommendations trough an algorithm. These developments caused concerns and raised questions regarding the effect this may have on peoples' music consumption. Although plenty of existing research has been done about this matter, there still is a gap concerning how people *perceive* the effects of the algorithm on their listening behavior.

Algorithms and AI are playing an increasingly important role in people's lives. Not only by using the music app Spotify but also with new developments such as chatGPT and OpenAI. Due to these developments people are suddenly becoming more aware of the possibilities that AI has to offer. It is therefore interesting to find out how people perceive the algorithm on Spotify, whether they are aware of it and whether they think that the algorithm influences their music listening behavior. This research focuses on a combination of these two developments and thus merges the research streams of algorithmic effects on music listening behavior with the research streams of technological acceptance of algorithms.

Through a qualitative approach, 14 in-depth interviews have been conducted to find answers to the research question: How do Spotify users perceive the Spotify algorithm and how do they think the algorithm contributes to their listening behaviour? This was followed by a constructivist grounded theory with which the researcher was able to identify patterns in relation to participant's listening behavior, their perception and technological acceptance of the Spotify algorithm and their ways of discovering music trough Spotify. Overall people are very positive about the algorithm on Spotify, they feel like the algorithm on the application helps them and is therefore perceived as effective and convenient. However, when it comes to the discovery of music, people feel like the algorithm limits them. In their opinion the algorithm is great when it comes to discovering music within their comfort zone, but does not encourage them to discover music outside of their comfort zone. In addition, the researcher was able to identify three types of listeners, laid-back listeners are a group mostly consisting of women, this group is the least aware of the algorithm, they mostly listen to their own playlists and spend less time listening to Spotify owned playlists. They mostly discover new music trough the radio or trough friends. The pioneers are a group consisting of both men and women, they are aware of the algorithm and use it to their advantage, they find it very helpful and spend more time actively discovering new music outside of their comfort zone.

Lastly the scavengers, consisting of only men, seem to understand the workings of the algorithm. However, they are a bit more sceptical towards the technology of the algorithm because they feel like it's not good enough yet, they expect more of it. They do however also see it as a convenient technology.

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1. Introduction

Music has been part of people's lives for as long as history dates back. For a very long time music was something very local, people were only able to listen to music produced in the country they lived in. However, the technological developments during the 20th century created a rapid change in the distribution and consumption of music. Due to technological developments like the introduction of the radio, music started spreading across mass audiences resulting in composers and artists being able to reach more and more people with their music, even globally (Montoro-Pons et al., 2021). Where my grandma was only able to listen to live music or music on the radio during her childhood, my parents were already able to buy their favourite songs and use cassettes and vinyl recorders to listen to their favourite music. During my own childhood I was able to listen to music trough CDs and in my teenage years, during the rise of the internet, through platforms like YouTube and being able download songs and listen to them on my MP3-player (Cihak, 2022). Throughout only three generations, the way people consume music therefore have already rapidly changed. However, it did not stop there.

The rise of internet led to the rapid development of devices containing media players, like smartphones. This has resulted in again a major change in the way people consume music. People did not want to pay for individual songs or albums on a CD, they wanted to pay for a service allowing them to search, discover and listen to music within a large archive. This resulted into the development of digital on-demand music made available on online streaming platforms which is now the fastest growing sector of the global music industry (Vigliensoni & Fujinaga, 2017). Music streaming platforms provide consumers with digital access to every song in a music catalogue via a paid subscription (Wikström, 2013).

The rise of digital music streaming platforms caused many changes within the music industry. One of these changes is the role of gatekeepers. Gatekeepers have the power over which song became popular and which song did not. Where first radio DJ's, journalist and other experts were seen as the gatekeepers for the music industry, a new kind of gatekeeper seems to have taken over their jobs. Instead of radio DJs announcing the newest songs to their listeners, it now shifted around to where radio DJs are playing the songs which are the most popular on streaming platforms (Bonini & Gandini, 2019). The role of the traditional gatekeepers therefore seems to be taken over by the music streaming platforms.

One of these platforms is Spotify, a popular music streaming platform with millions of users. In 2013, Spotify introduced what they called "a new and entirely personal way of discovering music". With this, Spotify referred to a recommendation system: a system integrated in the platform aimed to predict people's music preferences based on their previous listening behaviour (Eriksson et al., 2019). This recommendation system enabled

the tracking of listening behaviour in more detail than any previous music-distribution format, resulting in more data and insights on consumer listening behaviour than ever before (Maasø & Hagen, 2019).

Recommendation systems like Spotify's are driven by an algorithm. An algorithm is an automated system, run by artificial intelligence, which collects data about the users of the platform and organizes that data into a meaningful form to make relevant recommendations to the users (Karakayali et al., 2017). An algorithm is designed to provide recommendations that fit the preferences of the user. Algorithms therefore predict songs that the user may find interesting to listen to (Silveira et al., 2019). By introducing this system, Spotify was able to attend to their users by keeping track of their music preferences, and at the same time attend to the musicians who were uploading their music to the streaming platform, by making sure their music was being offered to the right audiences (Eriksson et al., 2019).

However, since the algorithm constantly offers consumers the songs they are most likely to enjoy, consumers seem to be getting hooked on what is recommended to them (Seaver, 2019). Research suggests that recommendation systems assume that listeners' music tastes and interests evolve according to a general logic derived from an analysis of the aggregated behaviour of millions of listeners, as a result, this seems to minimize people's unpredictable and unruly musical choices (Hesmondhalgh et al., 2023). Where people's music listening behaviour and taste was first influenced by human gatekeepers such as reviewers and DJs, it now seems to be influenced by an automated system through algorithms.

Algorithms play a growing role in people's life. From the perspective of the consumer, studies have shown that people generally consider algorithms as a transparent and accurate system that is convenient and useful for them (Shin, 2020). Algorithms are enhanced by artificial intelligence, resulting in the fact that they are already faster and more accurate in predicating human behaviour than humans themselves could ever be (Jussupow et al., 2020). With the rise of companies allowing people to use artificial intelligence in their advantage, like OpenAI and Chat GPT, people now have easy access to AI and are able to use it in their advantage while preforming daily activities. As a result, people are becoming more aware of the possibilities these technologies are capable of. Due to this significant change, there has been more and more interest into how people deal with these technologies.

When it comes to algorithms on music streaming platforms, people have been making use of an algorithm for years. They might, however, not be fully aware about this. Algorithms affect people's listening behaviour. Importantly, algorithms seem to be reducing people's consumption diversity. This is a result of people mostly listening to what is recommended to them through the algorithm (Anderson et al., 2020). As the study done by

Hesmondhalgh et al (2023) mentioned, due to the algorithm, music taste of listeners evolves with information based on the combined music listening behaviour of millions of listeners. As a result, people mostly seem to be recommended music which is considered to be popular. In addition, Seaver (2019) mentioned that as people are getting hooked on the music that is being recommended to them, the algorithm plays a significant role in their music consumption. In response to these effects, there has been growing critical and academic interest in the social and cultural impacts of algorithm driven streaming platforms and the way they operate (Prey et al., 2020).

We already know how listening behavior changes objectively, however, it remains unclear how people themselves think about these changes and the role of the algorithm. Do individual Spotify users also experience this manipulation of their taste in music? Or do they perceive the algorithms to be a useful tool only? To get a better understanding on this phenomenon this study will focus on how consumers perceive the algorithm on Spotify in relation to their listening behaviour. Are they aware of it and does it add value to their discovery of new music? Do they feel like it changes their listening behaviour or is this a process which consumers unconsciously go through? These questions are thus far unanswered. To find answers to these questions this study will be conducted with the following research question: How do Spotify users perceive the algorithm and how do they think the algorithm contributes to their listening behaviour?

Within this paper I combine two research streams. Firstly, the existing research stream about the algorithm on the streaming service Spotify, how the algorithm works there, what influence the algorithm may have on people, how people themselves influence the algorithm and how different personalities play a role in this (Anderson et al., 2021; Bonini & Gandini, 2019; Hesmondhalgh et al., 2023; Hracs & Webster, 2021). Plenty is already known about these topics. However, because we do not yet know how people experience this themselves, I combine this stream with the research stream that focusses on how and why people do or do not use new technology. Examples of this are the folk theory, the technological acceptance model, and the theory on hedonic motivation (Armentano, et al., 2015; Siles, et al., 2020; Tamilmani, 2019). By merging these two research streams together this paper will be able to focus on how people experience and perceive the Spotify algorithm. By doing so this study will add to the existing literature on the algorithm in relation to music consumption by looking at how people perceive the algorithm in relation to their listening behaviour and how different types of Spotify users have different perceptions on the algorithm. By finding out whether people are aware of the effect the algorithm, and the role it may play within the shaping of their listening behaviour, the outcomes of this research will be relevant to the research debate about how people perceive and accept algorithmic technologies and how this music listening behaviour is perceived to be affected by it

(Hesmondhalgh, et al., 2023; Prey, et al., 2020). In addition, it will be interesting to see how people perceive the algorithm as a technology in relation to their daily activities, like listening to music. This may provide us with information and estimations on how people deal with developments such as OpenAI and ChatGPT, this will add to the societal debate regarding the rapid developments of artificial intelligence playing a significant role in people's daily activities.

2. Literature review

2.1 The introduction of the algorithm

When creating an account on Spotify and logging in, a user immediately is being offered a wide selection of playlists. Over three billion playlists on Spotify have been created by Spotify users themselves. On top of that, Spotify also offers playlists which have been created by Spotify, or in other words, the Spotify algorithm. The algorithm can be seen as an info-mediary: an automated system offering the consumer exclusive and accurate data about their music taste. This algorithmic curation does not just shape what content is offered to people, but also look how it is received (Hesmondhalgh et al., 2023). This is done through the collection of data about the consumers micro-interactions with music. By keeping track of behavioural signals like saves and skips, streaming services can design algorithms to pay attention to these signs to decide which song to recommend next (Goldschmitt & Seaver, 2019). The algorithm can then be optimised to drive further music discovery, music listening habit formation and the replaying of songs (Hracs & Webster, 2021).

According to previous generated data, the Spotify algorithm seems to work very well since the playlists which are generated by the Spotify algorithm are the most followed playlists on the platform. The algorithmically generated playlist "Today's Top Hits" counts over 22 million followers (Prey, 2020). The 35 most followed playlists on Spotify are all Spotify-owned playlists, which earned their popularity due to the natural outgrowth of the algorithm (Prey et al., 2020). As one can imagine, these algorithmically generated playlists play a significant role in people's music consumption, and perhaps also play a role in consumer's listening behaviour.

2.2 What affects listening behaviour?

People develop their preferences for musical styles during late adolescence or early adulthood (Holbrook & Schindler, 1989). The music people listen to during late adolescence and early adulthood has been proven to be remembered better later in life, and even remains preferred by people compared to music listened to at an earlier or later age. In addition, characteristics such as race, class, gender, the level of education and the music one's parents listen to also have been proven to play a role in the development of music tastes (Ter Bogt et al., 2011). However, music listening behaviour can also be seen as an individual process. Not only what kind of music a person listens to, but also factors like when, where and how the music is listened to plays a role in the shaping of music listening

behaviour. People listen to music during a lot of different situations, like socializing, traveling, exercising or even while falling asleep. It is therefore embedded into people's daily activities and routines. By keeping track of this streaming services can capture precise information about people's personal preferences, which can be used by the algorithm to make the right choices (Anderson et al., 2021).

In addition to different situations and locations, the music someone listens to can also be influenced by someone's emotions and moods. This also works the other way around; someone's mood or emotions can be influenced by the music they listen to. This can be explained by the fact that music activates specific brain area's which are related to emotion and creativity (Anderson et al., 2021). However, musical preferences are not only dependent on the way people regulate their emotions, and current situation, but also on their personality. For example, people who are neurotic and therefore have a low emotional stability are more likely to use music to strengthen their emotions. This is a theory introduced by Kleć et al. (2023), who makes use of the five-factor model and relates this to people's music listening behaviour.

According to the five-factor model there are five different personality structures which may have an influence on music listening behaviour. According to the five-factor model, the most distinctive individual differences in people's thinking, feeling, and behavior patterns are supported by five different personality types: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. All these types of personality traits seem to play a role in people's listening behavior. People who fall under the category of openness to experience seem to listen more to complex music like blues, jazz or folk and more rebellious music like rock, alternative or heavy metal. When it comes to extraversion, agreeableness and conscientiousness, upbeat and conventional music like country or pop, seems to be preferred. People who lean more towards neuroticism seem to lean more towards classical music. It has been assumed that people who have similar personalities have similar interests and behavioral patterns. People who score high on openness and agreeableness for example seem to have a broader musical taste compared to people who have other personality traits (Kleć et al., 2023). However, personality traits are not only related to music genre preferences but can also be linked to music browsing strategies. Spotify offers specific playlists which can be linked to a mood, an activity, or a genre. A study done by Ferwerda et al. (2019) shows that there seems to be a relation between a person's personality and their browsing strategies. People who fall under the openness to experience personality are more likely to listen to music based on their mood. Conscientiousness people on the other hand are more likely to listen to music based on their activity. And neuroticism seem to be a mix between activity and genre (Ferwerda et al., 2019). It however remains unclear what the role of the algorithm is within this process.

2.3 The Algorithm's effect on music consumption

As established, people's music listening behaviour is a complex phenomenon which is being influenced by many different factors. And while streaming platforms allow people to have access to a whole catalogue of songs and artists to discover from the comfort of their own mobile device, this also brings challenges for people since they have endless libraries to choose from. The algorithm helps people to guide them through these libraries and find the music they prefer to listen to. As a result, people have become increasingly reliant on algorithmic recommender systems to find and discover music (Freeman et al., 2022). However, although the algorithm helps and guides people through the endless music libraries Spotify has to offer, it does not mean people are being recommended a wide variety of music. The algorithmic processes on Spotify seem to play a significant role in this (Nowak, 2016).

The algorithm seems like a very technological process over which consumers have no power, however, algorithms are actually driven by people. When consumers are using the Spotify app by listening to a song, the algorithm evaluates the song's performance based on the earlier mentioned behavioural signs like number of plays, the number of skips, the number of plays which finished the song completely and the number of users that included the song among their favourites. When these algorithm parameters are picking up on a song being listened to many times the song will be more likely to be visible in the Spotify-owned playlists, which due to its popularity will reach many listeners. It can therefore be argued that people play a role in the music which the algorithm seems to promote. Consumers are responding to data to such an extent that they're practically just facilitating the machine process of the algorithm and in return the algorithm is facilitating back to consumers (Bonini & Gandini, 2019). Thus, people seem to be only offered new music and artists within their comfort zone (Nowak, 2016). As a result, algorithms have led to a decrease of diverse music consumption, however, when people drift away from the algorithm their consumption diversity increases again (Hesmondhalgh et al., 2023).

2.4 The technological acceptance of algorithms

As mentioned earlier, algorithms are enhanced by artificial intelligence. The development in artificial intelligence technologies have introduced significant changes in people's lives, like it did with the music recommendation systems taking over from gatekeepers. Despite the increasing presence in people's daily lives, the average human being finds it very difficult to understand how the algorithm works and what the consequences of such an algorithm are (Sartori & Bocca, 2022). This can be perceived as

worrisome due to the fact that algorithms are now all around us when making use of digital devices which are connected to the internet. Therefore, algorithms play a big part in people's daily lives. To get a better understanding about the way people feel about artificial intelligence and algorithms it seems logical to first get an understanding of why people use technologies.

During the 20th century when technological developments were arising, people were mostly using technology for extrinsic reasons, which refers to the activities people preform to achieve a goal other than the activity itself. During the 20th century extrinsic motivation was the main driver for the adoption of technology, especially within mandatory environments where technology was being used to improve performances. However, as these technological developments have gotten better, the extrinsic motivation for using technology shifted towards intrinsic motivation. Intrinsic motivation can be defined by individuals performing a certain activity with the goal of experiencing pleasure and satisfaction related to the activity. People started using technological developments like a telephone to call people in case of an emergency, but as time went on telephones became smartphones which are being used for people's enjoyment and entertainment. This development can also be referred to as hedonic motivation, which can be defined as the fun or pleasure people derive from using technology, it is an important determining factor of consumer's technology acceptance and use (Tamilmani, 2019).

A theory which dives deeper in the consumers acceptance of technological use is the technology acceptance model (TAM) proposed by Fred Davis in 1993. The purpose of this model is to predict tool adoption and identify changes that need to be made in the system to achieve user adoption. The TAM proposes that people will use an application if they think it will help them perform a certain task better than without the application. However, the benefits of using the application outweighs the usefulness of the application (Armentano et al., 2015). When applying this theory to a recommendation system on music streaming platforms, the theory suggests that if consumers experience the recommendation system as useful and easy to use, they are more likely to accept the technology. In addition, research has found that Spotify users typically use their experiences with other algorithmic devices to create an understanding of Spotify (Siles et al., 2020). Therefore, if people have had a negative experience with an algorithmic system, chances are, they have a less positive attitude towards the algorithm on Spotify.

Lastly there is another theory which in a way counterbalances the TAM which Is called the folk theory. Folk theories are theories that individuals develop to explain the outcomes, effects, or consequences of a technological system, which forms people's reactions and behaviour towards that system. Folk theories observe what people think and feel about algorithms and how this leads to specific ways of acting (Siles et al., 2020). In the

case of the algorithm of Spotify, it would be the theories people use to explain why the algorithm chooses certain songs for them. It can be argued that algorithms often act like a black box, not offering the user any insight into the system logic or justification for the recommendations. People just have to accept what is recommended to them. A study done by Sinha & Swearingen (2002) shows that consumers would prefer some kind of transparency when it comes to recommendations made by the algorithm, in general they feel more confident in recommendations when they get to know why an item was recommended to them (Sinha & Swearingen, 2002).

The above-mentioned literature on algorithms and music recommendation systems can help give a better understanding on such systems work and gives an insight into how consumers are influenced by and have an influence on the algorithm. In addition, it adds to the discussion on the influence of algorithms on people's music consumption. However, we know less about how people themselves perceive the algorithm and how, through their eyes, their music consumption is being affected by the algorithm. By bringing together the literature on technology acceptance and the theory on music listening behaviour, this thesis aims to gain further insights into how and why people use such recommendation systems, and how their practices are shaped by an algorithm.

3. Method

3.1 Choice of method

Since this study focusses on describing and interpreting how people give meaning to their experiences with the algorithm, a qualitative approach has been used (Kelly et al., 2006). The choice of method within this qualitative approach is in-depth interviews. In-depth interviews provided an opportunity for the researcher to learn about the Spotify use and algorithm perspectives through the perspective and experience of those using it. Trough in-depth interviews the participants of this study were able to share their story and their own experiences (Boeije, 2010). This was very applicable when it came to finding answers to the research question: How do Spotify users perceive Spotify algorithm and how do they think the algorithm contributes to their listening behaviour? As the name implies, in-depth interviews seek deep information and understanding.

3.2 Sampling

In order to gather the most relevant participants, purposive sampling has been used. Purposive sampling is a non-probability sampling method, meaning judgement and convenience determine whether a unit will be sampled from the population. Spotify is a global platform with millions of users, this makes the population quite large. It was therefore necessary for the researcher to select individuals from the population who have some experience of using the platform (Sarstedt et al., 2017). To make sure the participants had enough experience with using the music streaming service Spotify, the participants were required to be a paying member of the application for at least two years. Both men and woman were allowed to participate, ideally, an even amount of men and women. In addition, the researcher set an age limit between the ages 20 – 30 years old. The reason for this is because this age group can be considered to fit into generation Y, which consists of people born between 1985 and 2000. This generation went through youth and adolescence by listening to music trough CD's and watching MTV. While stepping into adulthood this generation was introduced to the technological changes in the music industry trough streaming services like Spotify. This group therefore has experience with discovering and listening to music without the influence of an algorithm, and later adjusted to having their music listening behaviour being influenced by music streaming services where an algorithm is active. They have had to adapt to these changes and are therefore an interesting group to study within this matter (Nowak, 2016).

To recruit the participants, the researcher published a recruitment message on the social media platform Instagram. Within the message it was made clear that for research

purposes people who are Spotify users are wanted for in-depth interviews, it was also stated that it would take about 45 minutes of their time and they had to be a premium member. This post was made public and shared by various people. People were able to apply for participation by commenting on the post. The researcher received various applications from people who were willing to participate in the research. From these applications the researcher made sure the chosen participants were not considered to be family or friends. Another important factor was an equal division between men and women. The initial applications were mostly from woman, however, an equal amount of both genders was preferred. Therefore, the researcher deviated partly from purposive sampling to snowball sampling. In this sampling method, the researcher asks the existing participants whether they know someone who fits within the recruitment demands. In this case, especially men between the age of 20 – 30 who have been a Spotify premium member for at least two years (Naderifar et al., 2017). From all the received applicants the researcher contacted the participants who met the requirements and scheduled a time and place for conducting the in-depth interview. Since the research was keen on having an equal number of men and woman it was aimed to recruit fourteen participants.

3.3 Conducting the interviews

To conduct a successful interview, it is important for the participant to feel comfortable and safe. The location should be neutral but also allow the participant to feel free to share their experiences (Broom et al., 2009). The researcher therefore left it open to the participants where they felt most comfortable to meet for the interview. Either the Erasmus University, at their own house or at the researcher's house. Overall, it was a mix between the participant's house and the researcher's house. Before the interviews started the researcher made sure the participants were feeling comfortable, making sure they had a drink and starting off with some small talk about how their journey was and how they are doing in general. The researcher then made sure all the participants signed the consent form (See appendix A). Within the consent form was stated that the data which will be gathered trough the interview will be treated respectfully and anonymously, and that participation is completely voluntary. Next to that the consent form stated that the interview will be recorded for analysis purposes. In addition, the consent form made clear what the research is about and how the gathered data will be used. After the consent form had been signed the interview could start.

The in-depth interview was guided by a topic list (See appendix B), which is a list the researcher prepared beforehand with relevant topics to discuss during the interview. There was a fixed order in which these topics were addressed. Therefore, the interviews could be

considered semi-structured interviews (Showkat & Parveen, 2017). During the interviews the researcher constantly compared the results gathered from the interview done previously. This process of constant comparison allowed the researcher to find deviant cases or to discover interesting findings. The researcher then compared these findings to the theory and was able to dive into this deeper during the interviews which came next. This adds to the validity of the research (Silverman, 2011). One of these findings was the fact that many Spotify users make use of their liked songs, this is something which the researcher had not yet discovered trough the literature review and was therefore new information. When the researcher noticed a few participants used the liked songs as their main playlist, the researcher began asking specific questions about this matter. Which later resulted into valuable findings regarding the different type of music listeners. Moving back and forth between the data and the theory and applying that into further research is also called abductive research or abduction. This type of research suits the recommendation of the grounded theory which is the analysis method used within this research which will be elaborated on more further on (Timmermans & Tavory, 2012).

All the in-depth interview lasted for about 40 – 50 minutes and ended by asking the participant whether they had something to add to or to ask regarding the interview. The data gathering process officially ended when no new information was being gathered and the researcher learned all there is to be learned by doing in-depth interviews and thus saturation had been met (Johnson, 2011).

3.4 The analysis

After the researcher finished the 14th interview, saturation had been met and there was an equal division between the male and female participants. Since the researcher was able to transcribe every interview within 48 hours after the interview, the researcher was able to start the data analysis quite quicky. The data analysis has been done through a constructivist grounded theory. According to constructivist grounded theory, there are multiple versions of reality. Whatever the results are, research will always be an explanatory picture and not an exact picture of reality. Unlike the grounded theory, no new theories have been formed, instead the constructivist grounded theory has led to new forms of explanations and understanding about social phenomena which have been collected through the interviews (Dumitrica & Pridmore, 2019). The first step in the process of a constructivist grounded theory is getting familiar with the data. Although the researcher has conducted the interviews and transcribed the interviews, it is still important to afterwards read through all the gathered data to get more familiarized with what has been found. While re-reading through all the gathered data notes were taken on parts which seem valuable for

findings answers to the research question. The next, and first step within the actual analysis was to generate open codes. During this step the data has been categorized in to get a clear overview. In order to make this process go smoothly, Atlas.ti has been used. All of the transcripts were uploaded into this system and offered the researcher the possibility to create codes easily. The researcher was able to identify 83 different codes within the data. From these 83 codes the researcher then grouped some of the codes in order to get a clear overview during the next step, axial coding, which is where open codes are grouped together and organized into groups. By creating different mind network webs within Atlas.ti the researcher was able to find connection between codes and find overarching themes within the data. Lastly the researcher created selective codes which is the final step of the analysis. Selective codes narrowed the findings down to three main codes which represent the main findings of the research. In table 1 an overview of the coding process based on the findings within the study which consists of a summarized but representative overview of the 83 open codes, the axial codes and the three main selective codes. Within the result chapter these findings will be elaborated on further.

Table 1: Analysis table

Open codes	Axial codes	Selective codes
Listening based on mood	Listening behaviour	Music listening behaviour on Spotify
Listening Spotify owned playlists	Listening situations	
Listening own playlists		
Listening liked songs		
Listening based on activity		
Listening based		
Discovering smaller artists	Discovery of new music	Music discovery trough the Spotify algorithm
Being put in a box	Exploring music libraries	
Discovering music on the radio		

Discovering music trough Spotify owned playlists New music Friday Diversity of music		17
Influence on Algorithm Influence of algorithm Usefulness of the algorithm Feeding the algorithm First interaction with algorithm Negative experience algorithm Separate algorithms	Perception of Algorithm Spotify Perception of algorithm on other applications Influence on the algorithm	Perception and acceptance of the algorithm

4. Results

Within this chapter an overview of the results of the interviews will be provided and connected to the existing literature to get a clear view on the listening behavior of Spotify users and the role of the algorithm within this phenomenon. This has been done by defining three main themes within the found results: Music listening behaviour on Spotify, Music discovery trough the Spotify algorithm and the Technological acceptance of the algorithm. Within the result section direct quotes from the fourteen in-depth interviews have been used. To ensure anonymity of the participants pseudomonas have been used.

1. Music listening behavior on Spotify

1.1 Perception of Spotify

Overall, the participants perceive Spotify as an application which offers a music library with an endless number of songs. Mindy mentioned she sees Spotify as a place to find all her favorite songs. "I would describe the app as a gathering place where you could find all your favourite songs." In addition, Milo perceives Spotify as an application where you can listen to the music you like, but also discover new music. He mentioned: "It is an app where almost all music is played, from big artists to small artists. They have already created a lot of playlists automatically, so you can listen to a little different music or stay with what you like." Here Milo already hints towards the use of the algorithm a bit by mentioning that the Spotify playlists are created automatically.

All the fourteen participants mentioned they use the application on a daily basis. Mostly while traveling, both by car and by public transport. But other activities like while cleaning the house, reading a book, going to the gym and while studying have also been mentioned. Sarah for example uses it through different moments during her day "Sometimes I use it as my alarm clock. And on the way to work and back home. And also, when I'm at home when I'm cooking or reading books, I turn it on." This is in line with the findings by Anderson et al (2021) on listening behavior being an individual process, which takes place throughout different situations during the day. Liam for example mostly listens to music on Spotify when he is at home "Most of the time when I am just doing some chores in the house. Or maybe also when I'm gaming, I put on music." Listening moments showcases a more complete picture of a person's daily activities and routines. This allows a streaming service like Spotify to capture precise information about the personal preferences of their users.

1.2 Spotify use based on personality

Existing research (Kleć et al., 2023) showed that there is a strong relationship between personality types and listening behaviour. In this research too such relationships were present. Although this study focusses more on the user perception of algorithmic effects on listening behavior and not their personality types, it is still quite an interesting observation that even when not being literally asked about their personalities, the research was in fact able to discover different types of music listeners. Based on the differences in listening behaviour among the participants, the researcher observed three main types of listeners: The laid-back listeners, the pioneers and the scavengers. Besides being driven by different perceptions and usage of the algorithm on Spotify, these types were also partly divided along gender lines.

1.2.1 The laid-back listeners

The first group which could be identified is the group of laid-back listeners. This group consists of Spotify users who mainly make use of their liked songs and the playlists they created themselves. Out of the fourteen participants, six participants have been identified as a laid-back listener, of which five participants identify as a female and one participant identifies as a male. One of these participants was Sandra, she stated "I think I will go to the library, and I go to the liked songs. And I just do the shuffle and I listen to all the songs that I that I liked." Another participant who can be seen as a laid-back listener is Sarah, when asking her how she on a daily base decides what to listen to she mentioned: "Usually I just turn on what is already on when I open Spotify and just press play. Because it's on songs I like and because I'm often in a hurry to get to work on time." These findings show that these types of listeners just want to listen to music without thinking about it too much. They do not really feel like spending time to think about what they want to listen to which is a big difference compared to the group of people considered to be pioneers. These findings are in line with the findings of the research done by Ferwerda et al. (2019) on the relation between personality traits and browsing strategies.

It seems like this group is not very aware of the algorithm. They are not a big user of the algorithm but are also not against it. When asking Jasmin why she does not really make use of playlists created by Spotify she mentioned: "I think because I'm a strange listener. I listen to Dutch music, then I listen to Sam Smith. And then another artist. So my daily mixes are kind of a mess." When the researcher proceeded to ask if she feels like Spotify does not really understand her listening behaviour she responded with: "Yeah but I get that they don't get me [laughter]."

1.2.3 The Pioneers

The next group which could be identified are the pioneers. Pioneers are people who enjoy the algorithm and use it to discover new music within their comfort zone. And sometimes even outside of that. Out of the fourteen participants, six participants fall under this group. From these six participants two identify as a woman and four participants identify as a male. Pioneers are more likely to create their own playlist, listen to playlists created by Spotify and sometimes even actively spend time to discover new music. James for example mentioned he sometimes dedicates his time to discovering new music and artists on Spotify. He mentioned:

> Sometimes I scroll through Spotify in the evening on the couch and then I think? Oh. I'll go through a list of hip-hop. And then look at which artists I don't know yet and then I go and look up the artists and see what kind of albums they have. So that too is just to explore.

Someone who mostly makes use of playlists created for her by Spotify is Olivia, she stated: "I mostly prefer the daily mix lists by Spotify since I think it's very on point. It's very often updated, and it's always based on what I listen to in the past. Like in the last few days." Participants who fit into this group are overall very satisfied with the playlists which have been created by Spotify, some even called the playlists convenient. One of these participants was Liam. He enjoys listening to different types of playlists during the day. He mentioned:

> Well, I think it's very convenient. Like when I have been listening to the same playlist all week and I feel like I want to listen to something else, I can just click on a Spotify playlist. Like the chill mix or the rock mix, it depends on what I am in the mood for.

Interesting to see here is that Liam mentions he decides what he wants to listen to based on his mood. This is in line with the findings of Ferwerda et al. (2019) who claim that people who fall under the openness to experience personality are more likely to listen to music based on their mood. Which would suggest pioneers fall under the personality category of openness to experience.

Pioneers actively makes use of the algorithm to help them find the right music for them. This especially happens trough playlists made by Spotify like the Daily mix playlists, which are personalized playlists made by Spotify. When asking Tom how he feels about using the daily mix playlists he mentioned:

Quite positive to be honest. Because most of the time when you like certain songs you also like the artists that make them, so most of the time in the weekly mixes, I believe that you could also pick which type of artists are in the mixes. So that way you can't really go wrong.

When comparing this group to the five different type of personality traits introduced by Kleć et al. (2023), this group again seems to fall mostly under the category of openness to experience. One of the reasons for this is that this group seems to have a broader musical taste compared to people who have other personality traits. However, although this group likes to explore different music libraries, not all of the participants within this group are fully positive about the Spotify owned playlists. One of these participants is James. Although he enjoys discovering new music trough Spotify owned playlists he sometimes prefers to stick with his liked songs. When asking James why he prefers listening to his liked songs over a playlist made by Spotify he answered the following:

The algorithm never knows exactly what I'm up for. Sometimes I just like to listen to what is in my own library. I know what is in it. So yes, sometimes it's the fact that there isn't a good list of everything I like to my knowledge.

Which again hints towards the fact that pioneers like to listen to music based on their mood and sometimes the algorithm does not know what mood they are in.

1.2.4 The scavengers

The last group can be identified as scavengers. This group of participants is rather small. Only 2 out of the 14 participants seem to fit within this group, which both happen to identify as a male. The people who fall within this group are very aware of the algorithm. They understand how it works and, although they perceive it as a convenient development, they wish the algorithm would do a better job. In a way they feel like the algorithm does not work well enough yet. Personality and browser wise this group can be considered to be a mix of laid-back listeners and pioneers since they also make use of their liked song and enjoy creating their own playlists. They are however quite skeptical towards the algorithm, especially when it comes to new music recommendations. Since the five-factor model is focused on listening behavior and not on algorithm perspectives it is challenging to link the scavengers to a personality type, therefore the researcher was not able to connect this group to one of the five personality types. However, the findings are in line with what Kleć et al. 2023 mentioned regarding people who have similar personalities having similar interests and behavioral patterns since there certainly are behavioral patterns visible here regarding the views on the algorithm.

One of the participants who is considered to be a scavenger is Gabriel. He mostly makes use of his liked songs. "Honestly, I would just go to my library, my liked songs, pick one, put it on shuffle because I liked them all for a reason." When asking him why he does not like listening to Spotify owned playlists he mentioned the following:

> I mean, that's a bit obvious. The poor thing doesn't have enough data on me to know me that well. I would love the AI to be smarter. Like a lot of people aren't ok with giving a machine too much power over you emotionally, but I would love to have it so well, that it will make me fall in love with the music I listen to.

The other participant who falls under this category is Matt. He perceives the algorithm as useful, however according to him the music he gets recommended is not diverse enough and the algorithm could use some work. When asking him about using Spotify owned playlists he mentioned:

> Sometimes a song comes along that I think damn that's a good song that suits me really well. Then I'm glad I hear that song and then I'll add it to a list. But sometimes I also hear a song and then I'm like why would Spotify think I like this? So, it still differs, such an algorithm can still use some work.

These participants are therefore not against the algorithm, they are just not satisfied enough with it yet.

2. Music discovery trough the Spotify algorithm

2.1 Discovery of new music on Spotify

A big part of using music streaming platform Spotify is the discovery of new music. Although there seems to be a distinction between the three different types of listeners, all of them mentioned they use the platform to discover new music. However, the group which uses Spotify as their main source for discovering new music are the Pioneers. The different ways of discovering music which have been mentioned by participants are trough the Spotify owned playlists, but also trough actively scrolling through different genres and playlists. One of the participants who does this is James who is considered to be a pioneer. When asking him how he usually discovers new music he mentioned the following:

> That's very broad. I think a combination of a certain things, Spotify is important in that, like the discover playlist or the daily mixes. But sometimes I just scroll through in the evening on the couch and then I think? Oh. I'll go through a list of hip-hop. And

then look at which artists I don't know and then I go and look up the artists and see what kind of albums they have.

When asking one of the laid-back listeners, Rafael, about his music discovery on Spotify he mentioned that he does sometimes use the Spotify owned playlists, as long as the recommended music are in the same category of what he prefers to listen to. Rafael quoted: "From the playlist I get related things right. I mean, I'm also very open to, you know, listen to new things. But as long as they're in the same, like similar category." This again shows that laid-back listeners are less open to discovering new music outside of their comfort zone, which is one of the consequences of the algorithm and in line with what Nowak (2016) mentioned regarding algorithms leading to a decrease of diverse music consumption. However, since the laid-back listeners do not mind staying within their comfort zone, they might not mind this development.

Gabriel, a 'scavenger', on the other hand does not like to stay within a comfort zone when it comes to music. When asking him if he uses Spotify owned playlists to discover new music, he stated:

Here and there just to test out new songs. So, like scavenging and finding new songs. Usually, I like to see like what they have to offer and how well they know me. Most of the time it's not so well so then it's like ok skip.

This shows how 'scavengers' are more aware and sceptical about what is being recommended to them, in a way they are testing the algorithm to see how good it is according to them. Which is an interesting development since the algorithm is driven by people, and people do have an influence on what is being offered to them. However, in a way Gabriel's behaviour is in line with the findings by Nowak (2016), about people only being offered music within their comfort zone. Since Gabriel is very aware of how the algorithm works, he seems to consciously try to avoid letting it decide for him. He mentioned:

The algorithm tries to feed you what you've liked for a while. It could be just for a week. But if you've done it consistently and have kept allowing it to feed you and you kept reacting to it. It will assume that that is the only thing you like and will keep giving.

If Gabriel is one of the personality types of openness to explore, he might feel like the algorithm is constricting his possibilities to explore and decrease him music consumption, which can be seen as a limitation.

2.2 Limitations of music discovery on Spotify

However, the scavengers are not the only group who have noticed this. In line with Freeman et al. (2022) and Nowak (2016) all the participants felt as if their consumption was constrained by the algorithmic recommender systems to find and discover music. Participants felt like they only get offered new music within their comfort zone, like they are being put into a box filled with only music they are certain they will like. And the algorithm makes it quite difficult for them to go to another box. This makes it harder for participants to discover new genres. Sarah, for example, observed that:

> Through the algorithm that you get the same recommendation all the time. I must consciously look for new music and new artists myself. So, I stay in the same bubble with the same artists, and I like them. But at some point, I also get tired of listening to them too much for a while and then I want something new.

Another participant who noticed this is Sandra, when asking her if the algorithm offers her the right music to discover she stated the following: "Well, I like the songs that it gives me, so, in that way it does give me the right choices. But yeah, I don't always want to be put in that same box." Both these participants fall in the group of laid-back listeners which shows that even though laid back listeners like staying in their comfort zone, they are aware they are in a way being constricted.

What's interesting to see is that the laid-back listeners feel like it is very difficult to get out of the box they are being put into whereas the pioneers are more optimistic about having an influence on which box they are being put into. Milo for example mentioned:

> The moment you click on something or listen to something a lot, they put you in that bubble. But they are very quick to turn things around, so if you listen to something else a lot then you get a little fifty fifty or a lot of that again.

Which is in line with what Hesmondhalgh et al. (2023) mentioned regarding being able to increase your music consumption by drifting away from the algorithm. Another pioneer who experienced this is named Olivia, when being asked if she has an influence on the music Spotify offers, she answered the following:

> Yeah, especially whenever I'm in a mood to discover new things. So, I'm searching a lot for new names and then click through another artist profile then click through another and then a few days after that I get different kind of recommendations and I see myself clicking on it. And I'm like, oh, an indie chill out. Oh, I listen to indie a lot

these days and then I discover new things and I see an artist and then click through and that keeps me going.

Similar findings were gathered when asking Tom whether he believes Spotify puts its listeners in a box, he mentioned: "If you let them, yes. Because like I said, if you look up different genres as well, then I don't think that would be a problem for you. But if you don't, then you could get boxed in very fast." This shows that someone must actively look for new music and artist to diversify what Spotify recommends to them, and more importantly, that the pioneers are aware about this.

However, although the participants feel like it's the algorithm which causes this, in a way people are responsible for this phenomenon themselves since algorithms are being fed by its users. One of the participants who is considered to be a scavenger named Gabriel made a connection to this by saying :

The AI is modelled the same way the human brain is. The more attention you give to a certain aspect of it, the more connections it builds towards that. So, the second you try to deviate from it, it's like ok. But if you don't make enough connections here, it's not strong enough to always go back, so it's always sending you down the same path, which is limiting.

These findings are in line with what Bonini and Gandini (2019) mentioned about the fact that as a user's, you are in a way facilitating the machine process of the algorithm. This again shows participants are aware of this process, however, scavengers seem to have a more negative look at this in comparison to pioneers.

2.3 Discovery based on mood

When talking to the participants about their discovery of new music it got brought up a few times that they usually only discover music when they are in the mood to do so. When they are not in the mood they prefer to stick to their own playlists or their liked songs, this seems to be the case for all three of the music listening types. Jasmin, who is considered to be a laid-back listener, for example mentioned: "Sometimes I just want to hear my own music because it's comforting and I know what I can expect. And sometimes for example, when I'm on the road or have to travel further, then I like to hear new songs." What Jasmin is saying can be linked to the different browsing strategies introduced Ferwerda et al. (2019). They mentioned that people who listen to music based on activity, like when driving, can be categorized as conscientiousness according to the five-factor model. Another participant, named Olivia, who is considered to be a pioneer, mentioned she likes to listen to specific

Spotify owned playlists based on the mood she is in. When discussing why she prefers listening to Spotify owned playlists Olivia mentioned:

> I'm not always in the mood to create my own playlist, sometimes I just want to like press a button and then feel like oh this is exactly the mood I was I was looking for. And then Spotify made it up. And to me, that's very helpful.

According to Ferwerda et al. (2019) listening based on mood can be linked to the personality type openness to experience which seems to be very fitting for pioneers, which Olivia is considered to be.

In addition to listening to music based on browser behaviour findings by Anderson et al. (2021) also mention that music arouses emotions and memories, it influences people's moods and activates brain areas related to emotion and creativity. These findings are in line with findings of this study. Rafael for example mentioned he sometimes likes to rediscover old songs when he is in a melancholic mood because it brings back memories:

> Yeah, I think when I'm in that melancholic type of moods then I go for specific decades, you know, like early 2000s or. Yeah. Is it that one like summer of 2012, you know, like I have memories from that summer and then I listen to songs which remind me of that summer.

By listening to music which reminds him of his childhood, he brings back memories and evokes his emotions.

2.5 External factors in the discovery of new music

Since Spotify is a place where user can listen to billions of songs, chances are, they discover new music while listening to music on the application. However, not all the participants mention Spotify as their main source to discover music. An interesting finding is that for some of the participants, the radio still plays a significant role in the discovery of new music, especially for laid-back listeners. This is for example the case for Jasmine, she mentioned the following: "It is usually just when I hear something new on the radio that I like then I find it on Spotify, and I add it to my own playlist. It's perfect for me." The radio mostly seems to be listened to while driving a car or working at an office. Mindy for example stated:" When I drive to work sometimes, I have the radio on. But then I remember the name of the songs that I like and then when I arrive at work I search for it via Spotify." These findings suggest that the radio still plays an important role in people's lives when it comes to the discovery of new music, however, it seems like Spotify does play an important role in this process since that's where the participants will mostly listen to the song after discovering it

through the radio. This contradicts the findings by Bonini and Gandini (2019), who stated that streaming platforms have caused a shift in the music industry. According to their study people now discover song on Spotify, which they later are introduced to on the radio. However, according to the findings of this particular study the radio still remains to play a significant role in the discovery of new music, especially in the lives of the participants who are perceived to be laid-back listeners. In addition, Bonini and Gandini (2019) also mentioned the interesting fact that radio playlists are generated with the support of algorithmic systems, people who discover music trough the radio are therefore still being influenced by an algorithm, just a more general one. While on music streaming platforms, each company has developed its own proprietary software for data analysis, radio stations seem to make use of a similar algorithm. This would assume that the algorithm on Spotify would lead to more diverse and personal listening behaviour then the radio does.

In addition to the radio friends and family also remain to be an important factor when it comes to the discovery of new music. In a way Spotify has made it easier for people to share music with family and friends. Therefore, this is not a surprising discovery. Trough sharing a playlist or making blend playlist Spotify users are easily able to share their favourite songs with their loved ones. Liam for example mentioned: "I have shared a playlist with my friends. And they're also adding new artists into the playlist and then I hear it and if I like it then I can look that artist up." These findings are in line with the study done by Holbrook and Schindler (1989), which already showed that when people develop preferences for popular musical styles during late adolescence or early adulthood, these preferences are usually shaped among friends' groups and tend to remain the same for the rest of people's lives. Sharing your music taste with friends is therefore an important aspect of music listening behaviour, even with streaming platforms entering the market.

Another external factor which seems to play a role is social media platforms like TikTok and Instagram. By watching short videos with music behind them participants are able to discover songs which they then later add to their Spotify playlists. One of the participants who does this is Tom, he mentioned:

> Like for example, I'm on Instagram and then there are these reels and then there's a certain song that just blows up on Instagram and probably also on TikTok. I feel like those songs are also getting pushed on Spotify a little bit more.

Someone who mentioned all the above-mentioned external factors is Sarah, she stated: "Yes mainly through the radio and Instagram and through friends. I also have a group of friends that we send music to each other. I think that's the feeling from back in the day. But

that's still there". Sarah linking back to 'back in the day' is a very logical thought and is again in line with the findings by Holbrook and Schindler (1989).

3. Perception and acceptance of the algorithm

3.1 The perception of the algorithm on Spotify

Though most respondents claimed to know what an algorithm is, only a few of them were able to provide a definition that is in line with what Karakayali et al. (2017) defined as an algorithm which is; "an automated system, run by artificial intelligence, which collects data about the users of the platform and organizes that data into a meaningful form to make relevant recommendations to the users." It is quite interesting to see that the algorithm, which is something which people use daily, is not clear to everyone.

One of the participants whose findings are in line with Karakayali et al. (2017) defined as an algorithm is Matt, who is one of the participants considered to be a scavenger. He explains the algorithm as:

> Basically, a computer system that keeps track of what you're listening to and then looks at what other people listening to this? And then they look at what else those people are listening to. Based on that, they'll look like okay, well you'd probably like that too.

Matt seems to be very aware of the fact that the algorithm is set up in such a way that it looks at millions of users and groups similar users together based on their listening behaviour, this is in line with what Hesmondhalgh et al. (2023) mentioned. They stated that due to the algorithm, music taste of listeners evolves with information based on the combined music listening behaviour of millions of listeners. Another participant who explained it in the same line, but more technical is Rafael. He defined an algorithm the following way:

> An algorithm is a very complicated formula that uses a lot of variables which are tagged depending on, let's say what you pick, right? Then all these variables are put in this very complicated formula. And then based on that, you get that specific combination which decides what is recommended to someone.

What's interesting here is that Rafael is considered to be a laid-back listener, when comparing him to the other laid-back listeners he is the only one who really understand how an algorithm works. He also happens to be the only male participant who falls into the category of laid-back listeners and works in IT where he works with the so-called formulas,

so this could play a role. What's interesting to see here is that although both the definitions of these participants are in line with the definition by Karakayali et al. (2017), they both did not mention that an algorithm is run by artificial intelligence.

However, not all of the participants are aware of the algorithm on Spotify. Both participants who did not know what an algorithm is are laid-back listeners. When asking them who they think creates the Spotify owned playlists they did in a way explain how an algorithm works. Katy for example mentioned: "I think Spotify knows what I'm listening to, what I like then and based on that they are able to make a list like that, which I think is pretty clever actually." However when asking Katy if she ever heard of an algorithm, she answered: "No, never." When comparing this to the pioneers they overall know what an algorithm is, they just seem to find it more difficult to give a technical explanation on what it is and how it works and give a simpler definition to it. These findings are in line with the study done by Sartori and Bocca (2022) who mentioned that despite the increasing presence in people's daily lives, the average human being finds it very difficult to understand the workings and consequences the algorithm. One of the pioneers who did a pretty good job explaining it is Olivia, she described an algorithm the following way:

> It's like this feed which is created especially for you and the app is analysing what you like or what you listen to or your history of searching or anything. And then it puts together this feed for you and it shows the app what you like to see and that is presented for you to click through and discover new things, or to click on the things that they are showing you.

In a way this is correct, however she does not seem to realize that the algorithm is also based on people who have a similar listening style.

3.2 The acceptance of the algorithm on Spotify

Even though not all of the participants fully understand how the algorithm works, overall, all the participants are quite positive about the algorithm on Spotify. They see it as helpful, convenient, and something which helps them save time. It helps the participants to guide them through the endless libraries of music and to discover new music and artists within their favorite genres. These findings can be linked to the technology acceptance model (TAM) which suggests that people will use an application if they think it will help them perform a certain task better than without the application (Armentano et al., 2015). When asking Liam whether he perceives the algorithm as something positive or negative in relation to his listening behavior he mentioned:

I would say it's positive because I am able to listen to the music I like. Also, when I'm just looking for something new, maybe a new artist. Spotify also makes a playlist with that artists or that genre so I can explore that a little bit better.

In addition, Milo even said the algorithm helps him to discover a new genre and therefore diversified his listening behaviour. When asking him if the algorithm has had an influence on his listening behaviour he said:

Yes, I think by offering new artists that you have never heard of or normally do not listen to. Then you might expand it a little what you like. I only liked rap before this. And now I really listen to a little bit of everything. And I think Spotify has had an effect on that.

As these findings show, the algorithm on Spotify plays a big role in people's music consumption. When asking Mindy how it makes her feel that an application know her music taste she mentioned:

I think that's very good in terms of technology. Because you are also offered songs that can really become new favourites. So, I think that's a lot of fun. On the other hand, it is of course a bit the usage behaviour, the keeping an eye on people. But yes, I think, I don't mind that much either because we just live in a world where that just happens all the time.

Interesting to see here is that Mindy mentions she understands the more negative sides of the algorithm, however she does not mind it because the benefits of the algorithm are more important to her. These findings again can be linked to the TAM since Mindy experiences the recommendation system on Spotify as useful and easy to use. The same goes for Lilly, although she had never really thought about it before, she does not mind that an algorithm knows her music taste because to her it's useful:

Well, I guess the Internet knows a lot of things about you, so that they know my music taste I guess it's not the worst thing? I think I can only benefit from that. They will promote mostly music that I like so I don't really mind that.

These findings suggest that people do not see their music taste as something which could be considered private information, which therefore makes it ok to share, in addition, the benefits of being recommended the music they like outweighs them having to share their usage behaviour with an application. Which again can be linked to the TAM. Even though

not all the participants have a clear understanding of how the algorithm works, all the participants perceive the algorithm as useful because it helps and guides them. In addition, the theory of hedonic motivation explained by Tamilmani (2019) can also be linked to these findings, people seem to use the application Spotify for fun and pleasure, listening to music is something they enjoy doing. So, if their hedonic motivation is positive, they are more likely to accept the technology.

3.3 Having an influence on the algorithm on Spotify

All of the participants feel like they have an influence on the algorithm on Spotify. They notice that the more they listen to something the more they get that kind of music recommended. When asking Matt if he feels like he has an influence on the music which Spotify offers him he agreed upon this by saying: "Yes, I do think that if I listened more reggae, that would come up more, yes." When asking him if he had experience this before he mentioned: "Well, I also started with listening to rock music and then in 2019 somewhere I start listening to rap again and then I noticed that my entire Spotify list was full of rap songs. So that's how I noticed it". This again is in line with Bonini and Gandini (2019) and their mentioning of how consumers are facilitating the algorithm.

One of the participants who did not really understand how an algorithm works is Katy, however, when asking her whether she feels like she has an influence on the music Spotify is offering her she did mention she notices that Spotify knows what she likes: "Well, they show me the music I'm listening to, so they know what I like and they try to put that through" This shows that even when someone is not aware of how an algorithm works, they still notice the effects of the algorithm. When asking Lilly if she feels like she has an influence on the algorithm, she mentioned that when she compares the playlists she is being offered by Spotify, to the playlists her friends get offered and notices a difference, she stated:

> I think you have. Because if I look at playlist from my friends or people in my environments then then you see that are totally different. So, I think you can really influence it. It's just that if you're always listening to the same kind of things, Spotify just sticks with that. So yeah, you really have to change your own listening behaviour to change Spotify's algorithm.

So, although she feels like she has an influence on what is recommended to her, she does mention you really need to feed the algorithm in order for it to recommend new music, which relates back to the findings of participants feeling like they are being put into a box and is again in line with the study done by Nowak (2016) on people only being offered new music and artists within their comfort zone. One of the participants who notices he has an effect on

what he is being offered by the algorithm is Milo. He mentioned that the music he is being offered changes based on his daily activities by saying:

> I think so, say in times when I study a lot, I listen to very quiet music and then that playlist (Daily mix) is mainly full of quiet music, whereas in times when I am free and then I work out a lot and then I go outside a lot, then I have a lot of upbeat music and then I get offered that a lot.

These findings suggests that the algorithm picks up on people's listening behaviour quickly. Which is again in line with the findings by Bonini and Gandini (2019). When asking Olivia whether she feels like she is feeding the algorithm or if she feels like the algorithm is feeding her, she stated:

> Good question, I think I am feeding the algorithm for sure since I am listening to things and then that makes up the algorithm. So, without me there is no algorithm. But It's also fitting me, of course, since they put together a whole new page for me and come up with recommendations, and that is feeding me also, since I get to discover new things and yeah, it's like a bit both ways.

A similar answer has been given by Rafael, when asking him the same question he answered: "I think it's like a what's the word, symbiotic. Like from both ways. Right, you first feed it and then it feeds you back. So, it's like a give and take relationship."

3.4 Perception of the algorithm as a whole

To get a clear understanding on how people view the algorithm on Spotify, the researcher also asked the participants about the general perception of an algorithm by asking the participants about their first experience with an algorithm. Almost all of the participants linked this experience to advertisements, especially on social media platforms like Instagram and Facebook. One of the participants who mentioned this is Mindy. She stated:

> The first time I noticed this was on Instagram. Like when you click on something once and then you keep coming back to that advertisement for weeks. And that you feel that you are talking about something with your partner and then all of a sudden you also get commercials about it. So especially in advertising.

When asking Lilly how she believes the algorithm works she even used the example of an advertisement. She explains the algorithm the following way:

An algorithm is something that checks your habits on the Internet or on music a listening app. And then based on that recommends you similar things. So actually, all apps do that. Basically. Yeah. If you look up socks, then every app will recommend you socks. Yeah, that's how I would explain it.

Interesting to see is that participants perceive algorithms on platforms where advertisements play a role, more negatively than the algorithm on Spotify, where participants can use the application without advertisement. When asking Matt if he ever had a negative experience while using an algorithm he made a link to YouTube, he mentioned:

Yes, especially with YouTube, because then you just click on something because you think it might be fun and then as you watch you think okay no, I don't like this. But now your whole feed is full of just those kinds of videos and then I think I don't want to see this but then it's in there for weeks. I find that irritating.

From these findings it seems like the algorithm on YouTube adapts a bit too quickly, which is not what participants seem to want. However, when asking the participants whether their negative experience with an algorithm also has an effect on their perception of the algorithm on Spotify, none of them agreed to this. Which is interesting when comparing these findings to the folk theory which explain the outcomes, effects, or consequences of a technological system, which forms people's reactions and behaviour towards that system (Siles et al., 2020). According to this theory a negative experience with the algorithm will lead towards a negative attitude towards that technology on other platforms as well. However, within this study that does not seem to be the case. Overall participants see the algorithm on Spotify separately from other algorithms. Milo for example mentioned he had a negative experience with the algorithm on Instagram, when asking him if this negative experience on Instagram had an influence on how he sees the algorithm on Spotify he answered: "No, I think it's specific to a platform so it's a company that just makes an algorithm anyway, I think, so I also think they're two different things. Two different programs."

5. Discussion & Conclusion

5.1 Main conclusion

This chapter will focus on answering the research question: How do Spotify users perceive the Spotify algorithm and how do they think the algorithm contributes to their listening behaviour? Through the analysis of the in-depth interviews the researcher was able to find answers to this research question. It can be concluded that people are overall very positive about the algorithm on Spotify, they feel like the algorithm on the application helps them guide trough libraries with millions of songs to find the music they like to listen to and is therefore perceived as effective and convenient. However, when it comes to the discovery of music, people feel like the algorithm limits them and puts them in a box. In their opinion the algorithm is great when it comes to discovering music within their comfort zone, but it does not encourage them to discover music outside of their comfort zone, in a way they feel like this limits their music listening behaviour.

In addition, an interesting finding within this study is that there are different types of Spotify users. The researcher was able to detect three types of listeners. Laid-back listeners, pioneers, and scavengers. All three of these groups seem to have a different way of using the app, perceiving the algorithm, and discovering new music which therefore plays an important role in their music listening behaviour. Laid-back listeners, who are mostly women are not very aware of the algorithm, they do however think it is fine that such an algorithm exists. They mostly listen to their own playlists and do not spend time discovering new music outside of their comfort zone and therefore discover less new music on the app. Pioneers, who are a mix of both men and women, on the other hand seem to be the most positive about the algorithm, they find it very helpful and spend more time actively discovering new music by scrolling through different libraries Spotify offers outside of their comfort zone, they perceive the algorithm as less limiting compared to the other listeners. Lastly the scavengers, who are only men, seem to understand the workings of the algorithm really well, however as a result, they are a bit more sceptical towards the technology of the algorithm because they feel like it's not good enough yet, they expect more of it. Therefore, they mostly listen to their own playlists. When looking at the role gender plays within this process the laid-back listeners are mostly woman, the pioneers are a mix of men and women, and the scavengers are only men. These findings show that there is a possibility that gender does play a role when it comes to music listening behaviour.

5.2 Discussion

When it comes to the research streams of algorithmic effects on music and the research streams of technological acceptance of algorithms, this research has three main

contributions. First it highlights the findings of the technology acceptance model by showing that people indeed will use an application if they think it will help them perform a certain task better than without the application. In the case of Spotify this is the use of the algorithm in relation to their listening behaviour. People perceive the algorithm as a very useful tool because it helps and guides them through endless music libraries. In addition, when it comes to platforms where advertising plays a big role, like YouTube and Instagram, people are less positive about the algorithm. Reasons for this are the fact that advertisements are often repetitive or not relevant. However, people still remain using these applications because the benefit of the application still outweighs the usefulness of the application. Which is in line with how Armentano et al. (2015) described the technology acceptance model. These findings strengthen the technology acceptance model and adds to the research stream of technological acceptance of algorithms. In addition, the folk theory (Siles et al., 2020), which is also part of this research stream has been challenged by the findings of this research. According to the folk theories people's opinion and behaviour towards an algorithm are formed by the outcomes and effects of such a system, this would suggest people see the algorithm as a whole. However, within this research it was found that a negative experience with the algorithm on a platform like Instagram and YouTube does not play a role in how people see the algorithm on Spotify, they see this as separate systems. This again adds to the research stream of technological acceptance of algorithms by giving new insights into how people perceive algorithms on different platforms.

Secondly, Spotify users also see a downside when it comes to the algorithm on Spotify which is in line with the findings by Freeman et al. (2022) and Nowak (2016), which is that the algorithm keeps them in a box when it comes to the discovery of new music and thus their listening behaviour. They feel like the algorithm only offers them music within their comfort zone which limits them when it comes to their discovery of new music. However, although Spotify users see this as something negative, it does not have an influence on how they perceive Spotify, since all of the participants perceive the application as useful and convenient. This is an interesting finding because this adds to both the research on technological acceptance and the research on algorithm effects on music listening behavior. In a way these findings make a connection between the study done by Freeman et al. (2022) and Nowak (2016) on how the algorithm plays a role in music listening behaviour and the paper written by Armentano et al. (2015) about the technology acceptance model. This research brings these studies together by showing people are aware of the downside of the algorithm and how their music behaviour is affected by it and it also shows the benefits of the algorithm weigh more than the limitation since they still see the algorithm as a positive technology. In addition, adds to both research streams by bringing in a user perspective on this matter.

Third, by using a constructivist grounded theory approach, this paper developed three main types of Spotify users. Laid-back listeners, pioneers, and scavengers. This is partly in line with the five-factor model introduced by Kleć et al. (2023) and the study done by Ferwerda et al. (2019) on the relation between the five personality types and how browsing behavior on music streaming platforms can be connected to the different personality types. The results of this study especially show similar findings when it comes to pioneers and people who fall under the personality type of opens to experience and their browsing behavior. When it comes to the laid-back listeners and the scavengers, the personality types and browsing behaviour were not similar enough and therefore could not be linked with certainty. This can partly be explained by the fact this study did not focus on personality types and this was therefore not covered in the interviews enough to really make a clear statement about this. Therefore, further research is suggested on this topic to find clear answers to the matter. This research does however add to these studies by adding the social demographic factor of gender into the different groups, since there were clear gender differences between the three types of music listeners. Within further research it would be interesting to see whether these also apply to the five-factor model and the browsing behaviour also differ when it comes to gender.

5.3 Limitations

This study has provided some valuable information regarding the study field of algorithm acceptance and music listening behaviour. However, there are also some limitations to this study. One of these limitations is linked to the participant gathering, since the researcher used Instagram as a medium to gather participants, this way of sampling could lead towards a sampling bias due to the fact people from the same network will be gathered. In addition, the demographic location of the participants is quite limiting. Since the interviews were done in real life, most of the participants live in and around Rotterdam since this was most convenient for the researcher. However, the participants did have different ethnical backgrounds which compensates this limitation. Within this research no investigation has been done on the geographical background of the participants. Within further research it would possibly be interesting to look into this and perhaps to study people who live in different countries to find out whether geographical factors play a role in algorithmic perceptions and listening behaviour.

In addition, this study only focussed on generation Y. However, as Holbrook and Schindler (1989) mentioned, people develop their preferences for musical styles during late adolescence or early adulthood. It would therefore also be interesting to look into different generations when it comes to people's perception on the algorithm. It would for example be

interesting to look at younger generation since their music preference has not been shaped yet and they have learned to interact with the algorithm from a very young age. An assumption would be that a younger generation might have a different opinion or perception on the algorithm because they possibly do not remember a time without such technology. It would be interesting to find out if this generation also is aware of the limitations of the algorithm. On the other hand, looking at an older generation would also be interesting. Especially since they have been introduced to an algorithm at a later point in life, thus far after the shaping of their music preference. Assumptions are this generation might be more sceptical towards the algorithm since they have been introduced to it on a later age and might not be as interested in for example discovering new music. It would therefore be interesting to see if there are perhaps generational differences between personality, music listening behaviour and technological acceptance of the algorithm.

Lastly, the focus of this study was to find out how people perceive the algorithm and the role it plays within their listening behaviour. However, during this study the researcher discovered the three different types of listeners which could partly be related to the study done by Kleć et al. (2023) regarding the five-factor model. This was which was an unexpected finding since the study initially did not focus on user personality, but on user perception. Due to time restrictions the relationship between the findings of this study and the five-factor model could not be closely looked into. For further research it would therefore be interesting to find out whether the theory of the five-factor model can be linked to the findings from this study to discover if there is a link between people's music listening behaviour and someone's personality. Further research is advised on this topic to get a better insight.

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Appendix A

Consent for participating in research

For questions about the study, contact: (Contact information researcher)

Description
You are invited to participate in a research about your experience with and perception on the Spotify algorithm. The purpose of the study is to understand how consumers perceive the algorithm and whether it contributes to music listening behavior. Your acceptance to participate in this study means that you accept to be interviewed.

In general terms the interview questions will be related to your Spotify use, your music listening behavior and your ideas on and experiences with algorithms.

Unless you prefer that no recordings are made, I will make an audio recording of the interview. I will use the material from the interviews and my observation exclusively for academic work, such as further research, academic meetings and publications.

Risks and benefits
As far as I can tell, there are no risks associated with participating in this research. I will not use your name in the study. Participants in the study will only be referred to with pseudonyms, and in terms of general characteristics such as age and gender, etc.
You are always free not to answer any particular question, and/or stop participating at any point. Every time I want to accompany you in any activity, such as going through your Spotify application, I will ask you your permission again.

Time involvement
Your participation in this study will take 40 – 50 minutes. You may interrupt your participation at any time

Payments
There will be no monetary compensation for your participation.

Participants' rights
If you have decided to accept to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty. You have the right to refuse to answer questions. If you prefer, your identity will be made known in all written data resulting from the study.

Otherwise, your individual privacy will be maintained in all published and written data resulting from the study.

Contacts and questions

If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact –anonymously, if you wish— (Contact information supervisor)

Signing the consent form

If you sign this consent form, your signature will be the only documentation of your identity. Thus, you do not need to sign this form. In order to minimize risks and protect your identity, you may prefer to consent orally. Your oral consent is sufficient.

I give consent to be recorded during this study:

Name   Signature   Date

I prefer my identity to be revealed in all written data resulting from this study

Name   Signature   Date

This copy of the consent form is for you to keep.

Appendix B

Interview guide

Concept	Interpretation/Meaning	Questions
Spotify use	Basic information about Spotify use, how often do they use it, how do they use it. To determine if they are active users or not.	• Can you tell me how often you use Spotify? • In what situations do you use Spotify? • Do you listen to playlist? If yes, what kind of? If no, why not? • Who do you think created the Spotify owned playlists?
Perceived usefulness	Do people consider Spotify as useful when it comes to the discovery and consumption of music? Hedonic motivation	• To what extent do you feel that Spotify offers you the music you wish to listen to? • How do you feel about that? • Do you feel like you have an influence on the music Spotify offers you?
Folk theories	Has people's perception on what the algorithm is shaped the way they feel about Spotify and the algorithm on Spotify?	• Have you ever heard about an algorithm? / Can you explain what an algorithm is? • Can you tell me more about when you first heard about how an algorithm works? How did you feel about this? • Do you feel like your first experience / interaction with an algorithm had an effect on your further experiences with the algorithm?
Technological acceptance	How do people feel about the algorithm as a technology? Does it help them discover the music they like, and does it offer them what they want to hear?	• Can you tell me to what extent, in your opinion, the algorithm makes the right music choices for you?

		• Do you feel like you have an influence on the algorithm on Spotify? Can you explain to me why?
		• On which other platforms do you 'use' the algorithm? / Do you feel like the algorithm also makes the right choices for you in other applications? Why?
Discovery of new music / artists	How do people discover new artists? Does the algorithm play a role in this? Has the way people discovered new music / artists changed over the years?	• How do you usually discover new music? • How did you discover new music before using Spotify / music streaming platforms? • How has Spotify changed this process?
Populair culture	How does popular culture influence music listening behaviour and does the algorithm play a role in this?	• Would you consider yourself someone who listens to 'popular' music? • Do you feel like the algorithm plays a role in what is considered popular music?
Activity idea	Get insight in real Spotify use of participants	• Can we go through your most listened playlists and see what they are like? • Can you take me to the process of how you decide what to listen to on an average day? • Can you show me the songs you have listened to over the past 2 days, explain how you decided to listen to these songs.

Appendix C

Participant overview

Gender	Age	Occupation	Place of Residence	Type of listener	Name
Female	28	Speech therapist	Rotterdam	Laid-back	Sarah
Female	26	Marketeer	Tilburg	Laid-back	Lilly
Female	27	Digital marketeer	Eindhoven	Pioneer	Olivia
Female	23	Facility employee	Rotterdam	Laid-back	Katy
Female	24	Cremation centre employee	Rotterdam	Laid-back	Sandra
Female	26	Growth marketeer	Rotterdam	Pioneer	Mindy
Female	30	Team manager	Delft	Laid-back	Jasmin
Male	25	Functional Manager ICT	Spijkenisse	Scavenger	Matt
Male	26	Physical Therapist	Rotterdam	Pioneer	Liam
Male	26	Engineer Student	Rotterdam	Pioneer	James
Male	28	Media student	Rotterdam	Scavenger	Gabriel
Male	26	Medicine student	Rotterdam	Pioneer	Milo
Male	27	Business owner / Elderly care	Rotterdam	Pioneer	Tom
Male	30	Traineeship in IT	Rotterdam	Laid back	Rafael