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DOI
10.1515/sem-2023-0089

Publication date
2024

Document Version
Final published version

Published in
Semiotica

Citation (APA)
Arkhipova, D., & Janssen, M. F. W. H. A. (2024). AI recommendations' impact on individual and social practices of Generation Z on social media: a comparative analysis between Estonia, Italy, and the Netherlands. *Semiotica*, *2024*(261), 61-86. https://doi.org/10.1515/sem-2023-0089

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AI recommendations' impact on individual and social practices of Generation Z on social media: a comparative analysis between Estonia, Italy, and the Netherlands

https://doi.org/10.1515/sem-2023-0089
Received June 15, 2023; accepted February 26, 2024; published online March 21, 2024

Abstract: Social media (SM) influence young adults' communication practices. Artificial Intelligence (AI) is increasingly used for making recommendations on SM. Yet, its effects on different generations of SM users are unknown. SM can use AI recommendations to sort texts and prioritize them, shaping users' online and offline experiences. Current literature primarily addresses technological or human-user perspectives, overlooking cognitive perspectives. This research aims to propose methods for mapping users' interactions with AI recommendations (AiRS) and analyzes how embodied interactions mediated by a digital agent can lead to changes in social and cultural practices. For this, this work proposes a comparative analysis of central practices evoked by AI recommendations-mediated communication on SM among users in Italy, Estonia, and the Netherlands in the age category 18–26 years old. The data used in the comparative analysis was collected via semi-structured interviews and elaborated based on cognitive psychology and semiotics. This research highlights the contextual significance of AI recommendations as a mediator in creating new communication practices. Findings confirm that young adults often choose practices that would enhance their digital representations according to AiRS' dominant patterns and categories. AiRS impacts individual interpretations and practices and can further affect social and cultural levels.

Keywords: AI; AI recommendations; social media; affordances; scaffolding process; Generation Z

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1 Introduction

This research investigates how mediated communication on Social media (SM) shapes the practices and behaviors of their users, based on a case study conducted in Italy, Estonia, and the Netherlands. Mediated communication using digital devices among users has become a common practice (Eurostat 2019a, 2020a; Digital Education Action Plan 2018–2020). In recent years, we have witnessed the rise of algorithms providing social value (Janssen and Kuk 2016), which follow, measure, and evaluate the data related to individuals and provide customized recommendations. Moreover, SM has become more important after the various restrictions settled by governments in 2020–2021 due to the COVID SARS-19 pandemic (Suárez-González et al. 2021), limiting physical contact between individuals. SMs, like Facebook, Instagram, TikTok, and others, allow users to communicate by creating, exchanging, and interacting with texts (Baruah 2012; Bhandari and Bimo 2022). In this case, the notion of text is assumed as a broader term, based on the definition of Lotman (1992), here used to identify digital representations in the form of verbal texts in natural languages (English, Italian, Estonian, Dutch, etc.) as well as non-verbal representations, such as images, video, and audio. Most SM use Artificial Intelligence Recommendation Systems (AiRS) to sort, order, and display the most relevant texts to users based on previously collected data about their users' activities (Benrouba and Boudour 2023; Kim et al. 2023), often based on collaborative filtering methods (Zhang et al. 2022).

This research addresses the gap in the research on AiRS and investigates how users' learning process is shaped by the affordances SM creates. AiRS are essential in helping people navigate the vast volume of texts published and created on SM and other digital platforms (Wu et al. 2019). As a result, AiRS play a significant role in how our society operates today, relying increasingly on digital tools for assisted decision-making. AiRS, which supply highly personalized content, services, and texts, are responsible for creating most digital experiences. They can, therefore, be viewed as an automated decision-making process that aims to resemble the user's human reasoning closely. Several lines of research in academia and business are investigating AiRS, primarily concentrating on creating algorithmic structures (Duan et al. 2022; Kang and Lou 2022; Mariani et al. 2022; Sharma and Shafiq 2022), overlooking their effects on users. This study introduces a comparative text analysis as a method to map the practices among young adults based on their connection to regular interaction with AiRS-mediated texts in digital environments like SM.

Digital representations are the texts that AiRS manipulate to meet SM users' needs to increase interactions. Users may receive various posts from AiRS that affect how they perceive the context of their surroundings. The uniqueness of human perception of digital images seen on SM rests in the ability to classify them in meaningful ways similar to how one would classify physically experienced objects,

prompting responses accordingly (Damasio 1999; Hodzic et al. 2009; Zink et al. 2008). Following data from Eurostat (2019a), approximately 97 % of young adults aged 18–29 use SM. Young adults with basic or above basic digital skills are extensively involved in mediated communication for an average of 2 h per day on SM and other content-sharing digital platforms (Eurostat 2020a).

This research intends to develop a data-driven approach to the users' learning process in AiRS-shaped digital environments based on theoretical discoveries and ideas about how users interact with SM through their portable devices. A commonly used top–down strategy that offers users pre-selected categories in a big data-based approach (Tinati et al. 2014) is constrained in its ability to give profound insights to engaged agents, e.g., designers, users or businesses (Grover et al. 2022; Hancock et al. 2020). With the use of big data, it is possible to quantify only a part of the interaction process while entirely ignoring behaviors and practices that are not quantifiably stated online, not to mention how these interactions influence behaviors in other digital and physical environments (Keles et al. 2020). To overcome the limitations of the big data approach, we used semi-structured interviews as the data collection method. This research used qualitative methods to generalize and model the practices that emerge on personal and social levels in digital natives. This research followed a bottom-up approach to SM practices and their reflection in social and cultural dimensions. The chosen methodology is based on data collected from the users instead of top–down methods set on design-centered pre-selected categories that impact users' interpretations and practices.

This research employs semiotics to explore the impact of AiRS on the cognitive and decision-making processes of the user and cultural value creation. These ideas are explored through a comparative study of content-sharing social networking services (SM) used by Italian, Estonian, and Dutch residents. This research aims to find how the use of AiRS can influence its users. Specifically, it focuses on users' decision process in the context of interactions on SM as a tool for mediated communication, including leading digital platforms such as Instagram, YouTube, and TikTok, and others. This research examines users' knowledge and interpretations, personal opinions and evaluations, and emotions. This research proposes a semiotic approach based on Uexküll's (1972) works, applying them to the complexity of collecting data about human perception. In his practice, Thure Von Uexküll refers to a duality of self-descriptive qualities of interviewees' speech, on the one hand describing their own conscious and unconscious experiences and feelings and their reasoning, and on the other hand, thanks to the description process, identifying own reaction through the conscious cognitive process of categorization. In this way, semi-structured interviews, as a descriptive method, can shed light on users' needs, experiences, and affordances they find within AiRS-mediated digital environments. Affordances are functional qualities of an object within given environments that

users can adopt based on their needs (Gibson 1977; Ingold 2009). Affordances of AiRS for SM users are mainly measured within the big data approach based on the indicators defined by designers. Still, users' perspectives and emerging practices can be outside its scope. Users find their affordances based on their personal, social, and cultural needs. Repetition of the practices based on the AiRS' affordances within SM can foster a scaffolding process, impacting daily learning.

At the core, this research aims to explore the role of AiRS in scaffolding the practices young adults use in their communication. AiRS used daily are connected to users by data they are trained on and influence their interpretations, actions, practices, and behaviors during the interactions (online) and after (offline). It adopts an interdisciplinary perspective connecting several branches of semiotics, cultural and cognitive, and cultural studies related to AI and digital transformation. First, at the methodological level, this research investigates the possibilities of employing semi-structured interviews as a data collection method, translating the users' experiences into cultural texts. Second, at the analytical level, it aims to explore the correlations between the design of AiRS and their effect on users in particular sociocultural contexts, using semiotic tools for textual analysis. Based on semi-structured interviews collected in 2022–2023, with a sample group of 30 young adults aged 18–26 years from Italy, Estonia, and the Netherlands, this study aims to map the affordances and emerging practices of SM users. Ten participants were chosen from each country, respecting gender and social balance. Participants could express their experiences and reflection on SM use in 45–60 min interviews, which touched on their digital device background, their experience with SM and digitally mediated communication, and finally, their interactions with AiRS. The interviews were carefully transcribed to create a selection of texts for further semiotics text analysis. The methodology for text analysis is based on the isotopies as textual elements (Eco 1979, 1984; Greimas 1966: 96) and later analyzed according to intertextual connections, following theory on the semiosphere (Lotman 2005), a model of culture explained as a self-referential system.

Finally, this research proposes descriptive tools for comparative analysis of AiRS-mediated communication practices from individual perception to social and cultural levels. The main findings of this work provide an empirical analysis of emerging practices among young adults, which are highly shaped by AiRS used on SM.

2 Research settings

This research investigates SM practices among young adults aged between 18 and 26 years, also identified in the literature as Generation Z and digital natives. In cultural studies, *digital natives* are often categorized as a generation born after the

introduction of digital technologies, which some scholars identify as the end of the 1980s (Verčič and Verčič 2013). However, digital technologies used by communities may vary significantly based on various criteria, including accessibility and frequency of use. Therefore, in this research, digital natives are considered as users of digital devices with access to the Internet in the age before and during adolescence. This specific age category is chosen due to specific aspects of human brain development (Lusk 2010). This brings a specific historical point of the development in HCI, marking a possibility for individuals to interact instantly with other human and non-human agents through the texts mediated by digital platforms. Therefore, a significant change in technology as a matter of practice can be connected to the introduction of search engines (e.g., Yahoo, Google) and digital platforms for creating, exchanging, and sharing various digital representations as texts (Myspace, Orkut, Hyves, Tumbler, etc.), and wearable devices which can be highly personalized with access to the Internet (e.g., iPhone smartphone by Apple). The common accessibility to this type of wearable device marks a specific historical timeline for individuals born between 1996 and 2010 (Dolot 2018; Turner 2015). This division is not solely based on the age difference but rather on the context in which individuals had grown and which shaped their experiences influencing the practices with a digital medium. In our work, we define Generation Z as a part of society with access to digital devices, e.g., personal computers and wearable devices, at an early age. They also could access SM in early adolescence, which might influence their communication practices.

A significant scope of literature dedicated to digital natives and Generation Z addresses educational specificities and their role in the innovation of learning and work environments. Their practices significantly impact the communication and identity representation change on digital platforms (Correa 2016; Williams et al. 2012). Importantly, people between the ages of 18 and 26 years experienced two years of restrictions against the SARS-19 coronavirus restrictions, which unavoidably affected their social life and communication practices more than any other previous generation due to the specific period of personal development in high school, college or early career relationships. Digital environments, including SM, mediated all these fundamental European young adults' experiences. Therefore, the use of AiRS on these digital platforms might have affected Generation Z users' cognitive, axiological, emotional, pragmatic, and other dimensions.

Data on digital skills can highlight possible affordances that digital environments present to their users (Correa 2016). However, in constantly changing environments, such as AiRS-mediated SM, users are reinforced continuously to learn and adapt to adequately regulate their perception of digital stimuli and express contextually coherent behaviors. Today's significant scope of digital experiences is created by AiRS, delivering highly personalized content, services, and products (Zhou et al. 2012). They can be thus seen as an automated decision-making process aiming to

be close to the human reasoning of the user. Many scholars have studied AiRS, mainly focusing on developing AI algorithms. In contrast, this research uses a semiotic approach to explore how AiRS influence human decision-making and interpretative processes. This approach focuses on the users' cognitive, axiological, emotional and pragmatic dimensions to overcome the limitations of a narrow big data-based approach and provide the main cultural insights on AI-driven practices online and offline. Semiotics of culture can explore the impact of AiRS on the cognitive and decision-making processes of the user and cultural value creation.

Easy access to the Internet has a significant impact on cultural integrity and the practices of groups not only around Europe but around the world. Accessing the same information simultaneously can be categorized as factual news and opinions. The Internet has provided a platform for most people to share their opinions, and SM granted free and easy access to these opinions. Accordingly, AiRS of SM made it possible to valorize messages shared as opinions to become culturally valuable, sometimes overcoming the messages related to representing the facts. Finally, using AiRS on SM may increase social value by augmenting the contextual connection among algorithmic categories of the digital representation of facts and opinions.

To provide a sufficient dataset highlighting similarities and differences among users of SM and their AI-mediated communication practices, Italy, Estonia, and the Netherlands were selected as case studies. These three EU countries proposed various policies, including digital literacy, institutional level of familiarization with digital competencies, attitudes towards SM and statistical data on Internet users and daily time spent online. All three countries selected for this research defined equal access of the users to facilities, such as Internet connection, digital devices, and relatively similar cultural backgrounds in social structures and communication. Italy, Estonia, and the Netherlands are the countries of the European Union located in one economic zone with equal access to digital resources and norms and standards for evaluating the variables. Each country has a unique position regarding digital literacy, institutional level of familiarizing residents with digital competencies, basic or above basic digital skills among individuals and online social engagement practices (e.g., Ferrari et al. 2012). These three datasets (Eurostat 2019a, 2019b, 2020a, 2020b; Digital Education Action Plan 2018–2020; OECD 2019) were used to understand through a comparative analysis how AiRS influence human decision-making and interpretation processes within different social contexts (Table 1).

The report for the EU Commission in the chapter "Graduate Outcomes" (Digital Education Action Plan 2018–2020: 32) states that high school graduates have higher skills in SM and digital literacy than university graduates. It suggests that there is a difference in the practices used by these two categories in the digital sphere. According to data provided by Eurostat (2020a), there is a significant gap in SM use between the age categories of 16–24 and 65–74 among those who use the Internet with

Table 1: Digital literacy data by Eurostat.

Data collected by 2019/2020:	Italy	The Netherlands	Estonia
Presumed level of digital literacy	*Low*[a]	*Medium*[a]	*High*[a]
Institutional level of familiarizing residents with digital competencies (government practices of social inclusion in Information and Communication Technology)	*Low* (22 %)	*High* (81 %)	*Medium* (67 %)
Individuals who have basic or above basic digital skills	*Low* (42 %)	*High* (79 %)	*Medium* (62 %)
Active SM participation	*Medium* (60 %)	*Medium* (64 %)	*Medium* (53 %)
Number of Internet users from the total population (by 2017)	*Low* (36.39 million)	*High* (15.88 million)	*High* (1.15 million)
Daily time spent on the Internet by people aged 14–24 (by 2016)	*Medium* (3.67 h)	*High* (6.03 h)	*High* (5.28 h)

[a]Variables *Low*, *Medium*, *and High* are defined based on the relation to the data collected in other EU countries (data falls into the category of top three when indicated as *High*, and as *Low* when data is close to the other countries with lowest indicators).

the purpose of posting messages to SM sites or instant messaging, participating in social networks by creating a user profile, posting messages or other contributions, participating in social or professional networks, uploading self-created content to any website to be shared: in Estonia (65 % of the population involved overall, 94 % in the age category 16–24 y.o., 24 % in the age category 65–74 y.o.), in the Netherlands (71 % of the population involved overall, 92 % in age category 16–24 y.o., 43 % in the age category 65–74 y.o), and in Italy (48 % of the population involved overall, 79 % in age category 16–24 y.o., 15 % in the age category 65–74 y.o.). Therefore, it is possible to conclude that most SM users are young adults aged 26–27 and younger (by 2023) who spend a significant amount of time daily on SM. Comparative analysis of data collected in Italy, Estonia, and the Netherlands can provide valuable insight into how culture-specific patterns in communication might be reflected within digital platforms.

3 Data collection and analysis methodology: aiming for a holistic approach to users' experience in AiRS-mediated environments

3.1 Methods for data collection

This study grounds HCI within SM and young adults based on users' perceptions, interpretations, responses, and behaviors leading to practices within AiRS-mediated

environments. This research is guided by the premise that communication among individuals on SM is, instead, an interaction of individuals with a set of texts mediated by the AiRS agency. From this perspective, embodied semiosis is largely influenced by users' actions and the context of AiRS. In other words, this research proposes the tools to collect the data based on the holistic traits of users' perception, which both AiRS and users influenced.

A semi-structured interview is a method that allows respondents significant freedom in self-expression, which supports the chosen theory behind the aims of data collection. This approach is proposed to overcome the limitations of frequently used top–down ones, often used by designer- and objective-centered business strategies within digital platforms. Creating a methodology that would represent a holistic overview of the emerging practices in the context of the SM bottom-up approach is essential to understanding the impact AiRS can have.

Our approach to HCI presumes that users' behaviors are expressed online and offline, guided by certain social norms, which cannot be traced just by online interactions. Various companies, including the leaders in SM platforms, use multiple tools to understand how practices and personal and social values shift over time. This approach is mainly based on statistics and big data, when users' interactions are followed and used to predict and fulfill their needs (Bello-Orgaz et al. 2016; Duan et al. 2019; Trabucchi and Buganza 2019; Zhang et al. 2022). There is a significant scope of narratives and cultural texts connected to the perception of big data performance in society on personal and social levels. They describe a variety of attitudes, from fear and terror to a positive belief in the possible substitution of human agency in decision-making (Leone 2023). This study includes a line dedicated to social narratives present within the repetitive texts that are culturally important for selected social groups. Various studies suggests that AiRS can impact individual and group decision-making processes, enclosing their beliefs based on texts provided and contextual relations (Kubin and von Sikorski 2021; Yao and Ling 2020), impacting their online and offline behaviors (Tuten and Mintu-Wimsatt 2018).

3.1.1 The rationale for semi-structured interviews as a data collection method

Semi-structured interviews (Adams 2015) were selected as a method of data collection to map the experiences users have on SM. This project follows the EU guidelines regarding gender equality. An appropriate gender balance is ensured in recruiting respondents and other axes of identity: ethnicity, age, education, and profession within the selected age sample. The interviews were transcribed and decoded to identify isotopies (Eco 1979, 1984; Greimas 1966: 96) to create a verifiable argumentation supporting the framework on the influence AiRS can have on their users. Based on the structure of SM as digital environments, it is possible to presume that SM designers

hypothesized the following affordance to users' needs of direct and indirect communication with others online, contextual behaviors and practices online and offline, and needs to create and enclose communities for individuals. Modeling the communication process for an individual can be defined by several types of communication in the translation process: auto-communication (me-me), interpersonal communication (me-you) and communication to the impersonal addressee (me-them; Lotman 1990, 1992). Based on his classification applied to communication within the text, it is possible to presume that similar modeling can be found within SM to highlight the following affordances based on the communication needs:

– self-monitoring (auto-communication based on the texts);
– self-perception and self-identification (inter-personal communication based on the relation to the texts);
– self-representation and self-enhancement (communication based on relations to the culture as a collective representation).

The semi-structured interviews aim to find answers to the tier questions by asking them to the respondents repeatedly in the most convenient way that would require explicit answers and confirmation of the statement. The main questions highlight the possible effect of AiRS, as listed in Table 2.

The study was set in both a face-to-face environment and online via digital collaboration tools, e.g., Webex and Zoom. During the semi-structured interviews, participants were first presented with informed consent and then guided about the structure of the interview. Then they could answer the questions most related to their personal experiences with SM and AiRS. The interviews were audio-recorded, both online and in face-to-face settings. The records were carefully transcribed and, if needed, translated into English. All sensitive information that might have led to identifying the individuals behind the interviews was carefully removed. These transcribed records are the meta-data used for this research. During the interviews, all participants had an equal possibility to choose the place and time of the interview to create the most comfortable environment. Participants were free to talk about any aspect of their experience to minimize the role of the interviewer and the priming effect (Molden 2014). All participants (10 individuals in Italy, 10 individuals in Estonia, and 10 individuals in the Netherlands) signed informed consent to participate in the study and agreed to their anonymous quotes to be used. No personal or sensitive data was collected during interviews. The following was registered for each interview: whether a respondent belonged to the age category 18–26, and the selected country where the interviewee agreed to participate in the research. Each interviewee was assigned a coded ID, excluding accidental reference to their persona.

Semi-structured interviews as a method for data collection can provide an in-depth survey of the phenomena. The questions aimed to go through personal

Table 2: The main questions used during semi-structured interviews aimed at highlighting AiRS's possible effect.

Possible effects of AiRS derived from the literature	Tier question	Confirmation questions
Self-monitoring: AiRS can impact feelings and cause stress to SM users (Kramer et al. 2014).	What kind of experience do you have with other people on SM?	– In what kind of situations do you use SM? What (is a variety of feelings) do you experience while watching SM? – When you write posts or messages, what language structures do you prefer? (e.g., long messages, various short messages, audio record, video record?) What type of messages do you prefer to receive? What kind of message form makes you not comfortable? – Did you ever have a conflict because of SM? What kind of conflict: communication online or face-to-face?
Self-perception and self-identification: Users do not interact with individual texts on SM but rather within an AiRS-mediated context (Yao and Ling 2020).	How would you describe the contents you interact with on SM daily?	– Can you describe the posts you remember from your feed today? – Did you ever do something with reference to what you see on SM? (e.g., buying something or making a picture like someone else you see on SM before?) – Did it ever happen to you to choose something because you saw it on SM? Was it advised by someone you know in person?
Self-representation and self-enhancement: AiRS can change the online and offline practices of its users (Tuten and Mintu-Wimsatt 2018).	How do you think AI recommendations on SM influence you?	– Did you ever do something just because you wanted to share a representation of this experience of SM? Or because others from your SM did this?

experiences with digital devices, experiences and practices on SM and finally, perception of AI agency. The structure of this method for data collection allows us to ask open-ended questions and receive the independent thoughts of each individual, followed by clarifying questions that would help to receive a more profound understanding of personal experiences. Also, carefully selected conditions of semi-structured interviews can help get honest and open responses to potentially embarrassing, controversial, or awkward questions.

3.2 Semiotics approach to qualitative analysis

This research proposes a qualitative semiotic approach based on the text analysis of data collected during semi-structured interviews based on the concept of isotopy. Isotopy is used in this research to describe repetitive elements based on their common meaningful components within a context. In the case of an interview, speech is transcribed into the text as an act translation (Jakobson 1959; Torop 1999). Therefore, the wording chosen to describe a phenomenon of experience, as in the case of communication on digital platforms such as SM, is a syntactic aspect of translation. Therefore, culture can linguistically shape the interviewees' answers. The data collected during fieldwork and the interviews translate users' experiences into natural language. Transcribed interview data can be considered as a text, in semiotic terms, containing all the features of the text and can be analyzed as such.

Interviews also provide data about texts users encounter on SM through digital representations. Digital representations are shared online and exchanged by SM in the form of text in natural language (e.g., English, Italian, Estonian, Dutch) or the form of audio-visual representations. These texts, ordered by AiRS for each user, create a digital environment where users interact directly (in private direct messages) or indirectly (via posts, comments, likes, shares, and others). This process described during interviews represents a cultural translation based on individuals' perceptions and interpretations (Uexküll 1972). This interpretation process also presumes categorization at verbalizable and non-verbalizable levels (Valsiner et al. 2021). Therefore, based on the previous research, it was possible to presume that the process of verbalization, as a translation of one's experience into categories present within the cultural apparatus of natural language, can also be shaped by AiRS output and categories defined by the design of SM.

Selecting the relevant coding strategies that would serve this research is key for further semiotics analysis. Various literature taking root in the 1980s describes various coding techniques and later critical analysis (Deterding and Waters 2021; Kirk and Miller 1986; Weston et al. 2001). The texts obtained from data collection can

highlight the operating categories for the individual interviewed but also algorithmically created categories with higher values that users adopt, represent the affordances, and transform into practices. This research employs several approaches to address the main research questions, how users create practices within digital platforms and what role these practices have in their self-identity and behaviors, online and offline. First, it considers digital platforms as environments and approaches them from Gibson's (1977) and ecosemiotics perspectives. Therefore, it presumes that SM users are present with affordances that shape the interplay between a user and AiRS. Second, the questionnaire of interviews is based on the cognitive sciences approach and aims to identify social and cultural values, highlighted as isotopies in participants' responses. It also refers to a biosemiotics aspect of the speech-to-text translation when identification and naming of own experiences define subsequent actions, as also pointed out by Uexküll (1972) in a psychosomatic aspect of human communication when users' experience is translated through the capacities of natural language. Finally, this research uses Lotman's concept of the semiosphere (2005) to generalize the findings to social and cultural levels. Isotopy presupposes a phenomenological experience (Sonesson 2017). Developed by Greimas in *Sémantique structural* (Greimas 1966: 96) and later broadened in the works of Eco (1979, 1984), the notion of isotopy is used as a taxonomy of interpretation strategies. Similar to the categorization process, the result of an isotopy analysis is a list of terms ("lexemes") having some contextual features ("classemes") in common (Sonesson 2017: 7). Therefore, in this work, the textual analysis can provide common isotopes within given texts. The isotopies highlighted in the texts will stand for the affordances that users find within their practices on digital platforms and later offline.

This research uses the theory of the semiosphere (Lotman 1992) to find the generalizations within individual and group practices. The *theory of the semiosphere* applied to digital platforms as a descriptive tool by Bankov (2020) highlights the systemic relations between the agents: users, designers, and algorithms within communication systems with core theoretical features that can be found in practice. In this way, the translation process sorts its elements from the center to the periphery and back, which is fulfilled by AiRS mainly based on users' inputs. This way, the highly valued outputs can be defined within the platform (e.g., viral posts) and users' reception, within their reaction expressed through the semi-structured interviews. This way, identifying central and peripheral values within isotopies expressed by users would help map the connection between AiRS' impact on users and further scaffold individual practices into cultural transformation. Building from the scaffolding process, practices transform into values that can be identified as more central or peripheral to the culture. This way, our research aims to highlight how algorithmic impact is evaluated and adopted by Generation Z users, how they identify it within the culture they live (Italian, Estonian, Dutch), and provide a

comparison based on the textual context, whether it is considered positive or negative in their daily practices, from online to offline.

Summarizing, the first step includes the translation process from speech to text. The second step is the coding process, which presumes to identify the meaningful elements and the isotopes within the selection of texts. This results from the interviewees' cognitive process of categorizing affordances they find on SM into natural language. The third step uncovers intertextual relations of the highlighted isotopies to the structure of SM and AiRS.

4 Comparative analysis: analysis of young adults' practices in social media environments

4.1 Speech-to-text

All collected interviews were successfully transcribed into text and all potential information that might disclose or affect the interviewees was removed without affecting the data quality. According to Lotman (1976), text can be analyzed from three main perspectives: contextual connection to the given culture, connection to other texts, and within its own structure. In this research, we argue that the description of own cognitive and physical states related to texts online and digital representations can be analyzed through these three perspectives giving a broader overview of the impact AiRS have on SM users.

This research underlines that the phenomena of AiRS as an agent in digitally mediated communication is not fully studied and has to be approached from various perspectives to grant holistic descriptive models to potential societal changes. However, AiRS cannot be researched separately from the environment in which they are exposed to users; this research aims to generalize the possible impacts AiRS may have on 18–26 year-olds in the way they (AiRS) sort, prioritize, and order contents with which users interact. Semi-structured interviews were transcribed and then translated into English when needed. It was essential to translate transcripts into English to analyze texts uniformly. Data were analyzed using thematic coding using the English transcripts with initial codes collected and reviewed, duplicates removed, and similar codes grouped.

The answers in Table 3 imply that emotional and physical detachment from digital representations is a learned practice to deal with digital representations manipulated by AiRS in order to increase engagement. Young people acknowledge the manipulative aspect of AiRS on SM by assigning a higher value to the elements that provoke the most engagement and are keen to avoid individual texts that apply

Table 3: Comparative table of repetitive sample answers on self-monitoring between Italian, Estonian, and Dutch groups (speech-to-text).

AiRS impact on users' needs and affordances (stimulus, feelings and response)	Italy	Estonia	The Netherlands
self-monitoring (based on the context)	"I like to share content like stories or posts sometimes, but I don't post a lot, and I use it mostly to inform myself."	"I don't have any problem with the recommendation algorithm, I even find it helpful. Once, I needed a new sofa, I purposely searched for a sofa I liked for two days, and then the algorithm just kept recommending the options I liked. And I found the sofa I have now, like in two weeks." "When there are too many emotions in the post, I feel like it will be fake or just provocative."	"I am very selective in what vibe I want to create on my Instagram. It should be a safe place, encouraging me and making me feel better about myself. I want my algorithm to stay very personal to me." "During lockdown, I felt very isolated and burned out because of university and workload. And on Social, everyone just writes how the university is supposed to be the best years of your life. So I started to look for the people who may feel like me, and people reached out to me, thanking me that I shared my story and that they felt the same about this pressure."

to highly emotional responses. However, this practice does not identify attitudes towards groups of texts as a part of the SM digital environment. And avoidance of sharing own digital representations, especially of own body (e.g., face), indicates the need to protect the perception of self-identity from this aspect of AiRS on SM. In other words, AiRS may increase the feeling of vulnerability in Generation Z, which makes them share less online.

As Table 4 shows, the design of SM leads users to employ AiRS to monitor their own identity with respect to digital representations of other individuals, as these

Table 4: Comparative table of repetitive sample answers on self-perception and self-identification between Italian, Estonian, and Dutch groups (speech-to-text).

AiRS impact on users' needs and affordances (stimulus, feelings and response)	Italy	Estonia	The Netherlands
self-perception and self-identification (based on the comparison to others within the context)	"When the war started in Ukraine, I was constantly on SM, updating myself on the news. I had this feeling that I needed to know more stuff about what was going on. The more anxious I felt, the more I tried to find out about it. But then I stopped because it did not give me anything, just emotional rollercoasters." "I don't really like my face on SM. I guess I sometimes feel like I am not enough." "If I would lose my account, I would be sad, but only because there are some posts from years ago. But I don't feel like an owner of it. Zuckerberg owns it, we are visitors here."	"I prefer not to post because people can be extremely rude, and sometimes you may look for support online in some group, but people just may write angry comments for no reason. Something they would never say in person." "My friend edits her photos a lot, I don't think that's a necessarily a bad thing because you can see that it is edited. Real skin doesn't look like that. The problem is when you cannot spot that it was edited." "I don't like to stand in front of something and just pose, it feels unnatural to me, I prefer a photo of a moment, even if it would not be that beautiful." "My pictures on Instagram never look perfect, so I don't try to take the same photo over and over again."	"I am more an observer." "I really like to see things I relate to on SM, which makes me feel better. I don't follow perfect people, like exercising all the time or eating healthy all the time. Toxic perfection and toxic positivity, like Kardashians, is what's not for me."

digital representations are perceived as the facts of reality and not AiRS-mediated texts. Many users adopt a narrativization tool from SM as daily practices, which often appears unrealistic and stressful. Through the responses can be traced avoidance of

stress from social pressure and stress due to social pressure. As a practice, it can be deeply rooted in self-identification but also in self-representation.

In different ways, the citations from Table 5 refer to standardization of representation, separation of physical self and self-representation, implies to AiRS quality to categorize digital representations based on qualitatively similar elements (e.g., "Instagramable place," meaning a place in which digital representation would be typical to Instagram and therefore considered valuable or beautiful). This results in a more unified digital environment, which affects how people perceive it. Users' perceptions of the physical world are influenced by how they see the digital environment of SM, which converts unified aspects from digital representations to regular physical activities.

In addition, emotional regulation via the digital environment (self-help) implies that AiRS is a tool exposing their users to similar content based on the previous selections that allow young people to create a cognitively safe environment (e.g., "unwind," "distract myself" from anxiety or uncomfortable physical surroundings), where each next element confirms to expectations, gives a feeling of predictability and may prevent users from being exposed to new or disturbing information.

4.2 Text analysis and isotopies

The interviews were transcribed to obtain a text that can be analyzed to highlight isotopies. As a concept of structuralists' approach in semiotics, isotopies are often used in text analysis to highlight the main thematic elements. Various typologies of isotopies are used to establish common themes through the operation of recurrence. The recurrence can be syntactic and semantic regarding correspondence between figurative and thematic or discursive and narrative levels (Eco 1976; Greimas and Courtès 1982). At the core of the concept of isotopy lies the notion of repetition, which allows the extension of the text to a broader context. Applied to the analysis of texts of the interviews, highlighted isotopies identify the main narratives shared among different users and how they are translated between different social groups in the context of the AiRS agency. Scaling up to the level of generalizations on social and cultural levels, highlighted isotopies can be positioned at the center of the interpretation in the decision-making process and processes within the semiosphere, respectively.

As a fundamental part of the narration process, isotopies allow texts to create connections between seemingly disparate elements and themes, ultimately enhancing the richness and complexity of the narrative. Identification of isotopies

Table 5: Comparative table of repetitive sample answers on self-representation and self-enhancement between Italian, Estonian and Dutch groups (speech-to-text).

AiRS impact on users' needs and affordances (stimulus, feelings, and response)	Italy	Estonia	The Netherlands
self-representation and self-enhancement (based on what is desired to be shown to others)	"I have several accounts, one is for everyone, and one is private. And one is just for me, as a personal diary. I would feel overwhelmed if I had everything on one account." "I really don't like to leave my phone on the table when I am out with friends because of constant notifications that pop up and can ruin a deep conversation or moment in general." "When I feel lonely, I sometimes feel the need to pick up my phone and distract myself with SM. Or when I am anxious."	"Sometimes, when I am out with one of my friends, she has many followers, and she constantly wants to film funny moments we have. But it is not the same when you live it and when she later asks to repeat the joke on a camera. But she is great with her Instagram; she knows how to pose to get a photo that looks amazing. But I would say, her in life and on Instagram are two different persons." "Once, I almost fell from the pier because we wanted to do a cool profile photos with my friends. I would say it was some kind of risky decision-making." "I would go on SM when I am in a queue or in the bus going somewhere. I find myself using SM a lot during exams period, it makes me feel less anxious."	"I don't often post because I don't want people to think that I have a lot of free time to spend on Instagram" "I prefer not to post because I do not like to be exposed." "Yes, surely, I want my photo to look a certain way when I post it. I may use some filter or color correction, but it is rare for me to pose in a particular way. I prefer to post photos of things around me. When I travel somewhere, for example." "Obviously, it has happened to me that someone in my friends would behave on Social they never do in real life, but I try to remove these kinds of people if what they do online is offensive to me." "Sometimes I just want to unwind from the world, and then I open Instagram." "Surely, sometimes I look around and think "Oh! This is an Instagramable place."

can help to underline patterns and motifs throughout the text, weaving together different ideas and events into a cohesive and meaningful whole. In the case of this analysis, isotopies are repeated patterns or motifs seen throughout a text, such as specific emotions, feelings, actions, and decisions users take during or after AiRS-mediated communication on SM.

The coding process was based on defining isotopies and the common meanings used in speech-to-text (interviews-transcribed-to-text). The meaningful isotopies were defined based on the context of the individual interviews, as unique texts, and then all 30 interviews together. The choice of wording to describe the meaningful isotopy was influential in the degree of emotional self-description to highlight the degree of narration reflecting digital representations on SM (Table 6).

Isotopies as a textual element and a tool for cultural analysis can be compared to the categorization within the algorithmic processing. Isotopies are formed based on narrative similarities and algorithmic categories – based on the similar values assigned to the elements. The position of the isotopies within the text and culture is based on meaningful repetitive elements, which can be compared to the categorization and filtering process within AiRS. AiRS shapes users' experience with elements assigned a higher value based on their repetition within a digital platform. Nevertheless, in the case of AiRS, it is *syntactic* element based, contrary to the *semantic* value of isotopies. These similarities suggest that AiRS may be able to impact the shared isotopies within the cultures, mainly by manipulating texts that operate within the culture. Therefore, this is a dual process when algorithms reinforce narratives within digital environments and culture, impacting SM practices and personal, social, and cultural levels of communication among individuals. It is important to note that while Generation Z has learned to highly adapt AiRS on SM to a need to manipulate and controlling own perception of the world and themselves within it to achieve desired results, it is still a two-sided process in which their values are based on information they receive from digital representations, including AiRS mediated on SM. From the semiotics perspective, AiRS perform a sorting function within digital environments like SM, aiming to mimic the semiosphere (Lotman 2005). As all AI tools are based on big data, AiRS can systematically introduce biases and reinforce discrimination (Janssen and Kuk 2016), which can be transformed into physical practices.

This research helped to identify the main isotopies through data collection and text analysis. These isotopies align with affordances which transform into practices among young adults in AiRS-mediated communication, focused on stress avoidance, standardization, emotional regulation (self-help), and emotional and physical detachment from digital representations.

Table 6: List of isotopies operated in the interviews in the age group 18–26 y.o. in all three selected countries.

Example of text	Cultural translation to axiological dimension	Highlighted isotopy in practice
"I prefer not to post because I do not like to be exposed" "I am more an observer" "I don't want people to think that I have a lot of free time to spend it on Instagram"	Many interviewees point out feeling social pressure or mental pressure from the digital representations online. They are well aware of tools for self-protection and avoid social comparison and judgment, which they try to achieve with AiRS training to be maximally personalized, yet it does not appear easy.	Avoidance of stress from social pressure/ stress due to social pressure
"Yes, surely I want my photo to look a certain way when I post it. I may use some filter or color correction, but it is rare for me to pose in a particular way. I prefer to post photos of things around me. When I travel somewhere, for example." "I don't really like my face on SM. I guess I sometimes feel like I am not enough."	Several interviewees point out that they feel that SM requires them to achieve some standards of representation, not only in the text (images, videos, etc.) but also in the physical world; many point out that they do not like some of their own traits and prefer not to post it online.	Standardization of representation, separation of physical self and self-representation
"When I feel lonely, I sometimes feel the need to pick up my phone and distract myself with Social media. Or when I am anxious. "	Almost all respondents specify that they use SM to impact their own mood, ranging from finding support for their own emotions (like collective experience) to imposing new moods and attitudes (e.g., avoiding anxiety, loneliness).	Emotional regulation via the digital environment (self-help)
"When there are too much emotions in the post I feel like it is going to be fake or just provocative post." "One of my friends, she has many followers, and she constantly wants to film funny moments we have. But it is not the same when you live it and when she later asks to repeat the joke on a camera. But she is great with her Instagram; she knows how to pose to get a photo that looks amazing. But I would say, her in life and on Instagram are two different persons."	Most of the respondents pointed out that they would have less trust in information shared on SM if it evoked a strong emotional response in them.	Emotional and physical detachment from digital representations, often as a way to deal with misinformation.

5 Findings and discussion: generalizations on social and cultural levels

Correspondence between AiRS categories and human-user categories is a dual learning process in which, on the one hand, algorithms are intentionally improved frequently via machine learning, while, on the other hand, users engaging with AI agents in digital environments adapt in various ways. Therefore, algorithmically high-valued categories can impact how central values are formed within a culture by shaping users' practices.

The isotopies indicated from the interviews point to common effects noted by the users. All of them are highly connected and can be based on perception and affordances that users may find within digital environments. This way, AiRS' use of SM induces Generation Z users to experience stress due to social pressure, adapting to standardization of representations and identity, and employing AiRS to their own needs by aiming to emotional regulation by purposeful stimulation, even creating coping mechanisms to deal with misinformation. Users 18–26 years old have a high awareness of the *echo chamber and filter bubbles* effect (Terren and Borge-Bravo 2021; Wolfowicz et al. 2021) when an internet user is exposed only to the selected information, which corresponds to a narrow topic and often aligns and to amplify user's own views and opinions (Guess et al. 2018). They purposely attempt to shape digital environments and stimuli to create a desired distorted world, shaping their perception of it. Young adults claim to "train algorithms" to show only desired messages. To achieve this goal, they may carefully select the AiRS, using the function "do not show anymore," and intuitively search for prospective messages that interest them. The experience of stress and exhaustion when the environment is not treated mindfully, the effects of being exposed to unexpected information can have adverse effects. As a solution, some mention a process of training algorithms, purposely searching for the relevant digital representation to create a digital environment that should correspond to desired results. In this case, young people do not look for AiRS to show them what they like but rather prefer to create an environment that would bring them to their desired future version of themselves. This way, some stated that they would be following a person they are not interested in as an individual but from whom they would like to learn certain skills. This way, the highlighted isotopies suggest that young people aged 18–26 years old feel social pressure to acquire new skills through digital platforms as a result of social pressure mediated by AiRS.

AI is acknowledged and accepted as an element of the environment. Most Generation Z users who participated in the interviews stated that they accept the data collection process about their activities online as unavoidable. However, they prefer not to overshare personal information online, feeling exposed and vulnerable.

Even the representation of their own face can be considered a potential threat that can be used in the future. Young adults are open to AiRS used on SM, but they feel the need to control it with the tools they have. These tools are based on own perception of a digital environment. The commonly used answer "I go on Social media just to distract myself from something" in most cases implied to the situations of physical surroundings when respondents experienced emotions and feelings marked as socially negative or unpleasant, e.g., boredom ("… when I wait in a line," "… while in the bus"), anxiety ("… before the exam," "… during self-isolation period"), anger, sadness, loneliness ("… I need a community of people who share my beliefs"). This way, individuals may use AiRS as a tool to impact their own identity and perception of themselves in the digital environment. Furthermore, as a feeling of identity is holistic, it necessarily affects general attitudes about oneself.

Generalization analysis of highlighted isotopies into general practices on social and cultural levels underlines the connection of the processes, where one is necessarily interdependent with another. In this research, we hightailed the following general social practices uniting them into a complementary model of operative categories between AiRS and users, as presented in Table 7.

Table 7: Possible generalizations of AiRS' impact on social and cultural practices in Generation Z.

Categories (individual and social value)	**Affordances (individual and social)**	**Practices (social and cultural)**
Openness to AI tools	Need to control AiRS	Training AiRS
Impact of digital environments on the perception of the physical environment	Need to create informational echo-chambers	Monitoring the digital environment in order to maximize it's effect on oneself
Cultural texts	Digital representations are perceived not as individual texts (e.g., a post) and not as a community, but as a digital environment for a particular user	Perception of oneself within the collection of texts, where their meaning is implied by their common elements, but each individual text rarely significant (scrolling the feed of posts fast without paying attention to each post separately)
AiRS on SM emotional contagion as a coping tool	Manipulate own moods and emotional states by emerging into digital environments	Users scroll their selected AiRS-mediated SM to deal with socially marked as negative emotions (anxiety, anger, boredom, sadness) to reach desired emotional and cognitive conditions

6 Conclusions and further research

This research contributes in various ways to the literature on AiRS and social practices on SM. This research highlights the contextual significance of AiRS as a mediator in creating new communication practices from individual perception and finds that the interpretation and decision-making results in changes on the social and cultural levels.

First, this research used a bottom-up approach through semi-structured interviews as a data collection method and qualitative analysis to map practices that incorporate online and offline behaviors. On the theoretical level, this research contributes a piece of knowledge on how the textualization process of SM users can be interpreted with respect to AiRS as mediating agents in communication. On the practical level, this research proposes tools for qualitative analysis by employing a semiotics methodology that allows the modeling of complex communication processes on SM.

Second, this study compares Generation Z practices on SM in Italy, Estonia, and the Netherlands. The differences in digital literacy suggested by statistical data (Eurostat 2019a, 2019b) did not find a significant correlation with the data collected during interviews. The interviews, translated into text and analyzed through the isotopy theory, highlight homogeneous findings. These findings helped to map repetitive meaningful elements in users' self-description process. Meaningful elements identified four main practices that directly relate to affordances AiRS provide on SM: 1) stress avoidance from social pressure, 2) adaptation to standardization of representation, 3) emotional regulation via digital environments, and 4) emotional and physical detachment from digital representations.

Finally, this research suggests social and cultural interpretations of how AiRS used on SM influence Generation Z users. By spending significant time online, young people learn about their identity based on what they see in texts of digital environments and adapt to AiRS-mediated narratives. They often choose practices that would enhance their digital representations according to AiRS' dominant patterns. Mediation of communication practices on SM leads the 18–26 year-old age category to have unified practices learned from AiRS, affecting their embodied interpretations.

This research proposes an exploratory mapping of AiRS' impact on SM users and suggests that further research is needed. The communication process on SM is complex. It includes several involved agents, designers, users, and AiRS, which impact each other in various ways. To improve AiRS as a tool and allow it to serve better, it is crucial to see it from the users' perspective. Further studies can extend findings on cognitive and bodily changes in SM users by creating a bigger scale approach, including other age groups, and adding other data analysis methods.

Acknowledgments: The authors declare no conflict of interest. This research was approved through the Bioethics Committee of the University of Turin, Prot. n. 0242950 del 09/05/2023 – [UOR: SI000045 – Classif. III/14].

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