Information Behavior, Information Horizons, and Social Media

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Abstract

Using Information and Communication Technologies (ICTs) and the World Wide Web for remote work, online school, or digital transactions are part of many people's daily lives. Where we once could find select information sources, people are able to find and produce large amounts of information that can express accurate but also false propositions. With this in sight, the study of information, or information science, and its research topics are of timely importance as they offer tools to investigate this phenomenon.

Today's major online services are social media. Information scientists can observe the users' activities concerning information, i.e., their information behavior. Many people accept social media as their source for information, social interaction, entertainment, or self-presentation. Conceptually, social media are part of people's information horizons, encompassing all accessed information sources when searching for information. On social media, people can influence their own and other users' information horizons. What implications does this bring for me as a user but also for society? This leads to the research idea of this dissertation: What is the information behavior of social media users and how are their information horizons conceptualized? One, live streaming services are investigated which are a new type of social media and through their synchronous nature offer the investigation of information production and consumption at the same time. Related, gamification elements, which are traditionally used to aid users in reaching certain goals, are successful on live streaming services. As a group potentially vulnerable to the information shared on social media, asylum seekers and their information behavior are investigated to understand how they use social media and what information needs they have. Gender-dependent observations are considered when analyzing the information behavior of social media users. Finally, as fake news can be an information source, we need to understand the social media user's role in its dissemination. To investigate these aspects, a mixed method approach was applied using literature review, survey research, interviews, case study, and content analysis.

What is new in this study? Information production has since been introduced for research models of information behavior and information science research and needs to be considered when talking about the information horizons framework. This was proposed and partly proven for the first time with this dissertation. The information behavior of users depends on their context; determined by being anonymous, the user's gender or finding oneself in changing circumstances. Social media is part of user's information horizons which is directly shaped and influenced by their respective information behavior. This is especially obvious with the dissemination of fake news. Concluding, contemporary facets of our current information era could be analyzed for various aspects on social media.

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1 Introduction to information behavior, information horizons, and social media

1.1 Information behavior

We are only in the beginning of the information era. The interaction with information and its creation is part of many people's daily lives — consciously or not. This has been true since the late 1990s and the formation of the knowledge society. It encompasses every economic sector and all individuals in every stage of life (Stock, 2000). With this in sight, the study of information, or information science, and its research topics are of timely importance (Stock & Stock, 2013). Information science investigates the effective communication of information, and its organization, representation, and retrieval (Saracevic, 2009), encompassing all aspects of human interaction with information and related, computers and digital media.

But what is "interaction with information" and why is it important to investigate? Wilson (2022) describes it as "a shortened form of *the behaviour of humans in relation to information*" (p. 12), a notion mirrored by Bates (2009). Wilson (2022) further states: "Information behaviour includes communication with others (orally or written), use of any kind of information resource, and the passive reception of information, such as watching TV advertisements, or reading unsolicited e-mail messages" (p. 12).

Initially, the research foci mainly lay on how people *search for* and *use information*. At the beginning of information behavior research, *information use* meant the affordances involved in incorporating the new information, physically or mentally. Examples would be to mark sections in a text or comparing the new information with existing knowledge (Wilson, 2000). Later, the term *information production* started to emerge. Kari (2010, p. 8) proposes the following aspects relevant to information behavior:

- information practices - almost any kind of human interaction with information;
- information search - the processes of information seeking and information retrieval;
- information processing - information is interpreted, analyzed and modified;
- knowledge construction - mental constructs are shaped or designed to function as a basis for thinking;
- information production - creating an expression of knowledge which others can also observe;
- applying information - information functions as a resource in some process;
- effects of information - changes brought about by information.

With the upcoming of digital technologies, Information and Communication Technologies (ICTs) and social media became part of many people's daily lives. And indeed, this affects and changes our information behavior. To reflect these changes, researchers started to incorporate the aspect of *information production* into scientific models related to information behavior research. Schumann and Stock (2014) propose the Information Service Evaluation (ISE) model to analyze the acceptance of information systems and its users, integrating information search and information production. Further models include not only the information seeker but also communicator (Robson & Robinson, 2013). Later, Savolainen and Thomson (2022) enhanced Savolainen's (2008) information behavior model with the aspect of *information creation,* i.e., *information production*. A model based on Kari's (2010) observations was developed, incorporating information production (Wilson, 2022). Additionally, the one-to-one as well as one-to-many communication channels (such as social media) are considered – users are able to reach many people at once when producing information, as also conceptualized by Scheibe et al. (2016). Scholars also speak of participatory online behavior where people are able to consume and produce content at the same time, which is termed produsage (Bruns, 2008). Where people once used ICTs and search engines to search for information, now, through online media and social media, people are able to produce (even a lot of) information (e.g., log data) and content (e.g., posts on social media), sometimes referred to as "big data".

We looked at various definitions of information behavior research and its components, but what about the users, why do they seek and use information? Before searching for information, a user experiences a *need* (Wilson, 1999). These needs are often imbedded into a *context* in which the user is situated (Savolainen, 2012). *Contexts* can be distinguished between (i) situation of action, (ii) task performance, and (iii) dialog. Courtright (2007) mentions the complexity of context as "elements of which include sociality, culture, institutional rules and resources, technological change, and power relations, and that are in turn shaped by information actors" (p. 291). Further, aspects such as gender, culture, or even living in an immigrant community are mentioned as a user's context (Courtright, 2007). Wilson (2022) describes the context of users as being "determined by their life-world, the multiple realities they experience in that world, and its spatial structure" (p. 18).

1.2 Information horizons framework

User's context and the interaction with resources is conceptualized by a framework proposed by Diane Sonnenwald (1999, 2005). Sonnenwald et al. (2001) describe that there exists an "information horizon" within a *context* and *situation* where one can act and search for information. If *academia* is the context, situations would be *teaching a course* or *writing a*

journal paper – situations which are typically not related to other contexts, such as family life (Sonnenwald, 1999). Therefore, within each context, there will be a flow of situations. The information horizons framework includes an offline "*social network*" (Sonnenwald, 1999, p. 1). Here, "social network" is defined according to communication and social sciences, not as online social media services or "social networking services". At that time, online social networking services (SNSs) as we know them today, were not a part of research. The information horizons framework is therefore comprised of three components:

- context (e.g., set of past, present, and future situations; citizenship, place, time);
- situation (the context of a situation);
- social network (e.g., colleagues, subject matter experts, documents).

Sonnenwald (1999) further describes: "Social networks help construct situations and contexts, and are constructed by situations and contexts" (p. 4). This means that users are able to influence their information horizons as it is possible to "act" with(in) it. The user may ask a question and be referred to another person or a different source. Thereby, the information horizon was expanded. The information horizon therefore consists of social networks, documents such as broadcast media and web pages, information retrieval tools, experimentation, and observations in the world (Sonnenwald, 1999). An information horizon can be restricted by social economics or politics, for example, someone may not be able to pay for specific information sources. To extend on the information horizons framework, Sonnenwald et al. (2001) incorporated the aspect of an "information horizon map" which visualizes the different information resources a person or group accesses.

Until recently, research on information horizons framework focused on the information search behavior of several and distinct user groups such as refugee and immigrant women (Zimmerman, 2018), Internet users concerned with self-development (Savolainen & Kari, 2004), college students (Sinn et al., 2019), or archeologists (Huvila, 2009). Sinn et al. (2019) argue that the information horizons framework should include *different aspects* of information search behavior. Specific types of behaviors can result in various patterns, depending on the information source or situation (e.g., looking for information on a new smartphone vs. health information). Therefore, scholars already express a need to expand the information horizon framework to reflect modern information practices and current information science research.

The focus of information horizons framework lies on the information search behavior of users, neglecting the information production. Nevertheless, the information horizon framework should be extended to include information production as this aspect has now become an important part of information behavior research with the advent of social media. As Diane

Sonnenwald (1999) says herself "[information horizons framework] is an evolving framework on human information behavior" (p. 1). And with this, we focus our attention to the medium and related topics on which the information search behavior and information production behavior was observed for this research compendium: social media.

1.3 Overview of social media: services, context, and content

In the following section, the related topics that are relevant to social media research and part of this cumulative dissertation will be explored. They represent current and important opportunities but also challenges of our time. Social media research is already heavily investigated by several research disciplines as social media can be considered a representation of a current society (Fietkiewicz et al., 2018; Quan-Haase & Sloan, 2017). Social media and especially social networking sites (SNSs) have since been part of people's daily lives as the technological advancements have shifted activities onto the digital world, such as e-commerce, banking, or communication with friends (Correa et al., 2010; Kaplan & Haenlein, 2010; Kietzmann et al., 2011). Users are now able to present themselves, nurture their social relationships or collaborate on activities online (Linde & Stock, 2011). The concept of *produsage* (Bruns, 2008) or *prosumers* (Toffler, 1980) describes social media users and user-generated content. Investigations on user-generated content is manifold as there exist various research avenues concerned with different kinds of social media services. These can be classified into social networking services (e.g., Facebook) (Knautz & Baran, 2016), video sharing platforms (e.g., YouTube, TikTok) (Khan, 2017), micro-blogging services (e.g., Sina Weibo, Twitter) (Gao et al., 2012), or social news aggregators (e.g., Reddit) (Leavitt, 2015), to name a few. The user's characteristics may also be center of social media research with contexts such as gender- or age-dependent aspects (Fietkiewicz et al., 2016; Joiner et al., 2005). The way people search for information changes and we can observe a new pattern of information (search) behavior. People are able to produce information while searching for information – posting a short video to ask their followers a question would be one example. These aspects showcase the continued importance of social media research especially considering the variety of social media platforms and their particular functionalities.

Live streaming services as social media

One emerging type of social media platforms are (social) live streaming services. A special feature of live streaming services is that viewers and streamers are able to interact with each other in real-time as the services provide a synchronous opportunity for communication. Research on live streaming services focuses on aspects such as information behavior of its users on specific services such as YouNow (Scheibe et al., 2016), the streamers' content creation and

motivations (Friedländer, 2017; Zimmer, 2018; Zimmer & Scheibe, 2019) or gender-dependent differences of favored content (Chen & Lin, 2018). Live streaming services can even present lucrative financial opportunities for streamers (Törhönen et al., 2019). Consequently, e-commerce live streaming has become popular – in China, it became a billion-dollar industry (Lu et al., 2018). The versatility of live stream applications opens up new research opportunities, as it influences how we communicate, buy products online or even learn new things (Payne et al., 2017).

Even if the research literature provides several investigations on live streaming services, a holistic framework is still needed to understand the prosumer's information behavior on live streaming services. How do users — streamers and viewers alike — interact on these services? Scholars also speak of parasocial interactions for this type of communication between successful streamers and viewers, and subsequently in the resulting of parasocial relationships (Wohn et al., 2018). This leads to the critical question if the concept of parasociality is not misused since it is characterized as a one-sided form of communication and relationship (Horton & Wohl, 1956; Giles, 2010). Apart from these aspects, are there other factors that motivate to use live streaming services?

Information behavior and gamification on live streaming services

One aspect mentioned that facilitates the user's motivation to continuously use live streaming services is gamification (Scheibe, 2018). Gamification is defined as "the use of game design elements in non-game contexts" (Deterding et al., 2011, p. 1) and is traditionally applied to help users reach specific goals, for example, education- or fitness-related (Hamari et al., 2014). Behavioral design aims at supporting users in reaching those goals and is an important aspect of gamification — how can the user be influenced by the system? These systems employ points, levels, or badges (Zichermann & Cunningham, 2011), appealing to intrinsic and extrinsic motivations of the system's users (Ryan & Deci, 2000). The successful implementation of gamification elements on various motivational information systems is remarkable (Koivisto & Hamari, 2019).

However, what gamification elements are used on live streaming services? Some studies revealed that gender impacts the perceived usefulness of gamification elements (e.g., Koivisto & Hamari, 2014). Does this context also matter for live streaming services and can further aspects be observed, such as geographical regions?

Context and user groups on social media

As information horizons framework acknowledges the context and situation of users and therefore categorizes them into groups depending on different variables, two user groups were considered for this dissertation.

One, user's gender was seen as context. Gender as a research topic for Internet usage has been heavily investigated, including social media, and can even be considered as one key variable when talking about social media research (Fietkiewicz et al., 2018). Muscanell and Guadagno (2012) observed that there indeed seem to be gender-dependent differences in the use of social media, especially SNSs. This proves gender to be an important aspect when talking about social media research. With different social media services, the information behavior may be influenced depending on the service's features and characteristics (Schumann & Stock, 2014) and may result in gender-dependent behavior as well. Further, if the user is anonymous, such as on services like Reddit (Zimmer et al., 2018), does this influence the information behavior?

Another context considered was the European migrant crisis in 2015. Some countries received a great amount of asylum seekers in a short amount of time (i.e., Germany) and were faced with several organizational and bureaucratic challenges (Barlai et al., 2017). During the asylum procedure and integration process, asylum seekers are faced with a great amount of new information and have their own information needs. To this end, asylum seekers are able to access crucial information through the Internet. The United Nations High Commissioner for Refugees (UNHCR) even proposes to actively support asylum seekers and refugees by providing information through the Internet and social media (United Nations High Commissioner for Refugees, 2016). It was further investigated how asylum seekers utilize social media for decision making (Dekker et al., 2018) or for integration (Alencar, 2018). However, what are the information horizons of asylum seekers in a new home country? What sources are accessed and further, what are asylum seeker's specific information needs?

Fake news on social media

Related to finding information – credible information with true propositions, fake news on social media is another important research topic of this dissertation. It is known that the content and language can be distinct for different types of texts on social media (e.g., tweets, blogs, or forums) (Veszelszki, 2017), and this may also reflect on the truth value of those texts. Information or rather, only knowledge, can be true or false as "information is not responsible for truth value" (Kuhlen, 1995, p. 41), therefore we should use terms such as "misinformation" or "disinformation" (Aïmeur et al., 2023). Misinformation may be disseminated on social media

platforms and can result in echo chambers (Cinelli et al., 2021). Metaphorical definitions of echo chambers and related filter bubbles include “a situation where only certain ideas, information and beliefs are shared” (Dubois & Blank, 2018, p. 1). Inside echo chambers and filter bubbles, fake news may be spread. With the development of technology and social media, we also face new challenges, as now, fake news can come in many forms: “clickbait, hoax, rumor, satire, propaganda, conspiracy theories, framing as well as content-based fake news including text and multimedia-based fake news, and in the latter, we can tackle deepfake videos and GAN-generated fake images” (Aïmeur et al., 2023, p. 25), where “GAN” describes “Generative Adversarial Networks”. Solutions are proposed to detect and minimize the spread of fake news such as “artificial intelligence-based methods; crowdsourcing, fact-checking, and blockchain-based methods; and hybrid methods” (Aïmeur et al., 2023, p. 25), but to what extend are they effective to counteract fake news? Apart from technology-based solutions, what is the role of the individual in the dissemination of fake news?

1.4 Research questions and framework

Based on these considerations, the research questions and a research framework will be presented. The proposed framework (Figure 1.1) builds on Sonnenwald’s (1999, 2005) information horizons framework and includes, as a novelty, the aspect of information production to appropriately investigate the information behavior on social media from an information science point of view.

Further considerations of this framework relating to established information behavior models are as follows. In contrast to Savolainen and Thomson’s (2022) work, this framework shall include various kinds of *social media* services instead of focusing on video sharing services (as in their case, YouTube). By incorporating different social media services, their particularities and user’s resulting behavior can be analyzed. Kari’s (2010) observation incorporates information production where it is described as “creating an expression of knowledge which others can also observe” (p. 8), which is fitting for the information behavior on social media. It should be mentioned that not all created information contains knowledge or even truth, as he also distinguishes between information production and knowledge construction. Here, the main concern is information production. Scheibe et al. (2016) propose a model to investigate the information behavior on social networking services and their users, albeit not considering the information horizons framework.

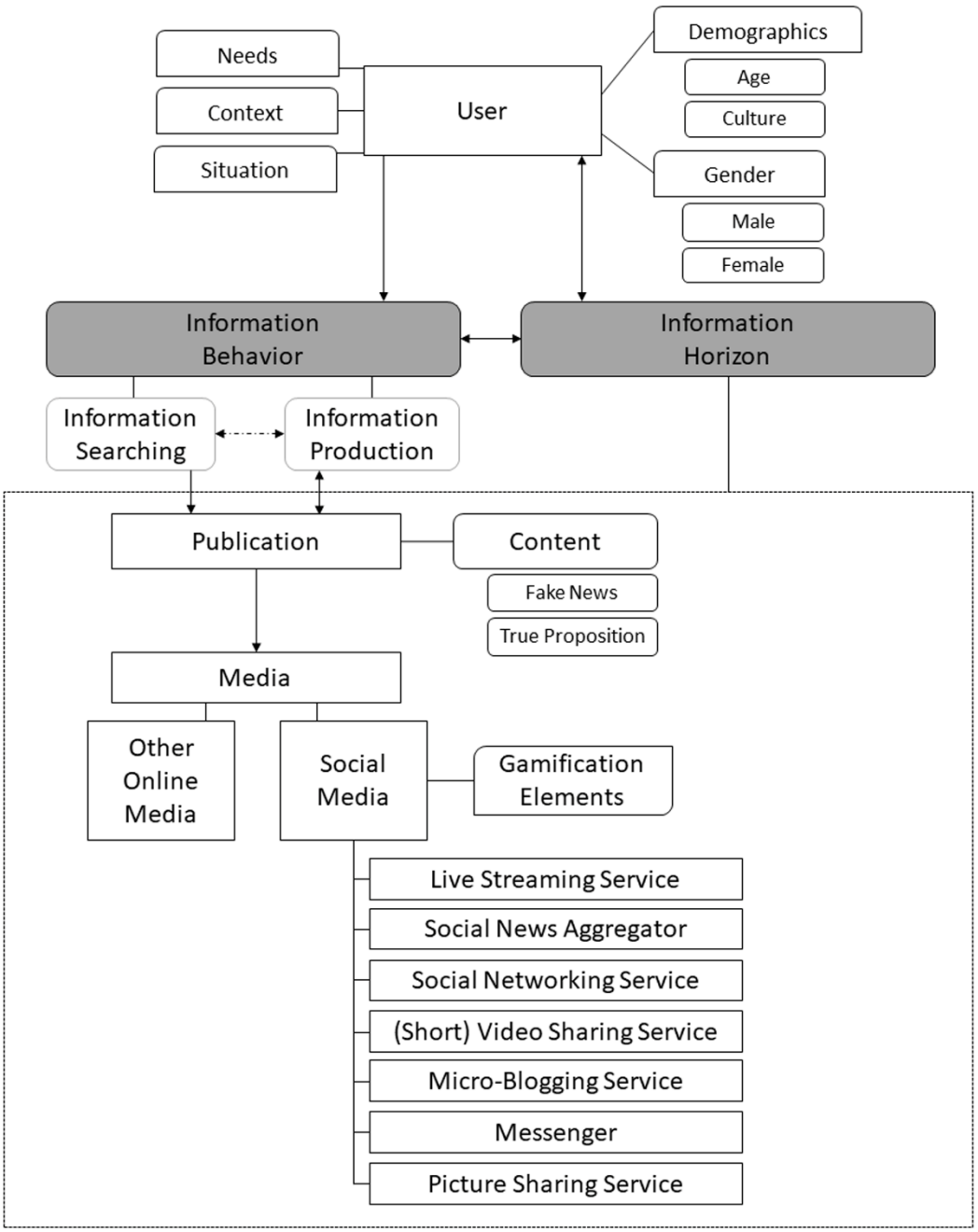

Figure 1.1: Research framework explaining the user's information behavior and information horizon
Arrows: interaction; Undirected lines: part of

Based on the information horizons framework, the *user* is embedded in a *context* and *situations*, comprising of (potential) *needs*, their *demographic background*, and related, *gender*. Following Sonnenwald (1999), users act inside their *information horizon* which is formed by various sources. As this research compendium is focused on online media, the framework includes *online media* and especially *social media*. For this research, the framework needs to be expanded to include the main characteristic of social media — interaction as well as information production and consumption (*produsage*). It is now possible to observe the *information production* and *information search* behavior as a probable *feedback loop*. When searching for

information, the user can do so by producing content and vice versa (e.g., creating a video to ask their followers a question). This feedback loop is also apparent between the user's information horizon and the information behavior, as both aspects influence each other. Depending on the accessed source, for example social media, the information behavior may change. This takes effect in contrast to sources where feedback usually does not happen, such as reading a book. Each publication that is produced or accessed by the user contains *content* which in turn may be *true* (*true proposition*) or *false* (*fake news*).

Utilizing the existing theoretical and conceptual understandings, this dissertation will be able to extend our current understanding on the information behavior of users on social media. Doing so, theoretical and practical implications may help scholars and policy makers to design and adapt social media services depending on the (various) users and their needs as they reflect our current society (Fietkiewicz et al., 2016). Further, the information horizons framework will be approached from a novel perspective by including information production of users. Keeping these considerations in mind, the overarching theme of this dissertation is proposed: *What is the information behavior and how can the information horizon of social media users be conceptualized?* To investigate the proposed aspects and extended information horizons framework, derived from the literature, four research questions (RQs) are put forward. These four questions will offer insights into various perspectives and serve as case studies in the areas of information behavior, social media, and context for information science research. They were chosen to investigate the framework for highly timely aspects of our current knowledge society and interaction on social media. As the information horizons framework considers a user's context and situations, and therefore categorizing them into user groups (Sonnenwald, 2005), the studies reflect this approach. The groups and contexts that were chosen can only represent a portion of the vast landscape of social media users and services but nonetheless are able to highlight the framework and some aspects of social media users.

First, a highly timely investigation of user's information behavior on the new social media, live streaming services and implemented gamification elements, is considered (Lu et al., 2018). Based on the synchronous nature of these services, our understanding on the special interplay of (simultaneous) information production and consumption and the resulting information behavior can be exemplarily observed. Further, gamification as an important feature of live streaming services was considered (Scheibe, 2018). As in information science research, the mechanics of an information system should be considered to gain a holistic overview of the interplay between the user and system (Schumann & Stock, 2014). Therefore, the first research question is proposed:

RQ1: What is the information behavior of users on live streaming services? What role does gamification play?

Based on the European migrant crisis in 2015 and the challenges faced by the countries and asylum seekers, they were considered as a particular user group of social media. Considering their new circumstances, the information horizons of asylum seekers who may experience a drastic change in their information behavior as well as their information needs were investigated. Therefore, it is possible to observe how and if social media influences asylum seekers for their information needs (United Nations High Commissioner for Refugees, 2016). As information horizons change (Sonnenwald, 1999), it is necessary to investigate how this is expressed in an extreme example. What information needs are expressed?

RQ2: What is the information horizon of asylum seekers? What is their information need and how do they use media and ICT to satisfy those needs?

Social media are broadly defined with various systems and so are its users. Therefore, we need to deepen our understanding on different user's characteristics, such as gender-dependent variations on (anonymous) social media platform usage. Taking gender as context into consideration for Sonnenwald's information horizons framework (1999, 2005), the following research question is proposed:

RQ3: Can gender-dependent differences be observed for the information behavior and information horizon of (anonymous) social media users?

Research about fake news on social media offers an additional rich insight into the information behavior of social media users. Firstly, the content of any publication may be true or false. When fake news is considered as part of user's information horizon, they need to be aware of its truth value (Aïmeur et al., 2023). Based on the user's information behavior, we may be able to understand why and how fake news is circulated on social media and how they become part of user's information horizons:

RQ4: How do users handle fake news as part of their information horizons?

Through these research questions, this dissertation aims at furthering our understanding of the academic literature in information science research on social media users' information behavior and information horizons. Like that, it is possible to observe the constant change in information science research and explore possible research avenues of the future as information practices are evolving with the times — involving all kinds of user groups and contexts.

So, to mirror Savolainen and Thomson (2022), information production as part of information behavior research should be further investigated in order to not only "reflect contemporary, 21st century new-media realities" (p. 519), but also changing information practices of our time.

1.5 Synopsis

The corresponding studies of this cumulative dissertation will be briefly presented in the following sections and approach the overarching research questions from different perspectives where each chapter contains its own research questions (Chapters 2-12). They report on users, social media, and content in information science research. The publications have been slightly altered which include corrections of grammatical errors, typing mistakes and fixing of sources as well as positioning of tables and figures to ensure formatting consistency.

Part I: Information behavior and gamification on live streaming services

Chapter 2: Zimmer, F., Scheibe, K., & Stock, W. G. (2018). A model for information behavior research on social live streaming services (SLSSs). In G. Meiselwitz (Ed.), L*ecture Notes in Computer Science: Vol. 10914. Social Computing and Social Media. User Experience and Behavior* (pp. 429–448). Springer.

As a special and emerging form of social media, live streaming services offer synchronous communication. These services allow users to broadcast themselves in real-time, either by using desktop PCs or mobile devices. Some of the services also employ gamification elements, fostering interaction between streamers and the audience. Can other motivations for live streaming usage be observed, such as media-focused motivations proposed by Blumler and Katz (1975), McQuail (1983), and Shao (2009)? It is described that media is used based on a need for information, socialization, entertainment, or self-presentation, as conceptualized by the Uses & Gratifications theory (Blumler & Katz, 1975, McQuail, 1983). But how do these aspects influence the user's information behavior—information reception behavior as well as information production behavior? Further, the user may act differently depending on his circumstances and displays different needs. To understand the user's information behavior on live streaming services, a holistic model was developed. How do users present this kind of information behavior?

Chapter 3: Scheibe, K., & Zimmer, F. (2019). Game mechanics on social live streaming service websites. In T. X. Bui (Ed.), *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences* (pp. 1486–1495). ScholarSpace.

Chapter 4: Zimmer, F., Scheibe, K., & Zhang, H. (2020). Gamification on social live streaming service mobile applications. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 12194. Social Computing and Social Media. User Experience and Behavior* (pp. 184–197). Springer.

As gamification elements encourage the interaction between the system and the users but also between the streamers and the audience, the implementation of gamification elements on live streaming services as an information system need to be analyzed. Live streaming, especially in e-commerce, is successful in China where over 200 services are already in use (Lu et al., 2018). It should be investigated what kind of and how many elements are employed. As gifting is an integrated part of Chinese culture, gamification offering gifting elements is seen as a more meaningful way of communication than text (Lu et al., 2018). It begs the question if cultural differences can be observed. Do live streaming services in China have different gamification elements in contrast to US-centered streaming services? Furthermore, are there variations of gamification elements in the desktop and mobile applications of live streaming services?

Chapter 5: Stock, W. G., Scheibe, K., Fietkiewicz, K. J., & Zimmer, F. (2022). Cyber social interactions: Information behavior in between social and parasocial interactions. *Journal of Information Science Theory and Practice, 10*(3), 15–23.

The asynchronous interaction of live streaming services is often described as a parasocial interaction. However, this displays a misunderstanding of the concept of parasociality, as it describes a completely one-sided interaction between a personality and the audience (Giles, 2010; Horton & Wohl, 1956). Live streaming services offer a backchannel for streamers either via chat windows or by communicating directly through the video live stream. This form of interaction has since been observed for business meetings, virtual school lessons and many other forms of online live communication where people may never meet the person “on the other side”. It is no longer timely to speak of this kind of interaction and relationship as “parasocial”, as there is nothing parasocial about it. Therefore, the findings on relationships between streamers and viewers are analyzed based on a literature review and a new concept is proposed: cyber social interactions.

Part II: Asylum seekers’ information horizons

Chapter 6: Scheibe, K., & Zimmer, F. (2022). ICT and media practices for integration – A literature review. In K. Scheibe & F. Zimmer, *Asylees' ICT and Digital Media Usage: New Life – New Information?* (pp. 85–126). DeGruyter Saur. (Knowledge & Information. Studies in Information Science).

How do asylum seekers use ICT, online and traditional media as well as social media for integration? What kind of media is helpful to them? Based on a search query used in Scopus and Web of Science (Fink, 2019), forty-four studies were analyzed. It was differentiated between ICTs that are applied, as well as problems that could be observed in relation to ICT and media usage. Further analyzed are all forms of media (e.g., traditional print media, apps, search engines) as well as various forms of social media (e.g., SNSs, live streaming, micro-blogs). Are

there varying motivations for the use of different media and ICTs of asylum seekers? What kind of information (e.g., health- or education-related) do asylum seekers need? What are the problems related to different motivations? Further, can specific means of information exchange be observed?

Chapter 7: Zimmer, F., & Scheibe, K. (2020). Age- and gender-dependent differences of asylum seekers' information behavior and online media usage. In *Proceedings of the 53rd Hawaiian International Conference on System Sciences* (pp. 2398–2407). ScholarSpace.

When the context of a person changes, so does the information behavior and information horizons. Few circumstances may be more different and severe than having to flee a home country. When having to migrate, less obvious problems will present themselves later when living in a new country (Williams & Baláž, 2012). Adapting to new circumstances, culture, and language are just a few of them. How does the information behavior change, based on these difficulties? What needs are expressed in a new country? What kind of media are accessed to satisfy those needs and make life easier? Do needs and motivations differ according to specific demographic aspects such as age and gender?

Part III: Gender aspects of information behavior and information horizons

Chapter 8: Scheibe, K., & Zimmer, F. (2022). Gender differences in perception of gamification elements on social live streaming services. In M. Khosrow-Pour, S. Clarke, M. E. Jennex, & A.-V. Anttiroiko (Eds.), *Research Anthology on Feminist Studies and Gender Perceptions* (pp. 405–422). IGI Global.

As a focus of gender-aspects in information behavior research on information systems, this study analyzes gamification elements on live streaming services. Are there differences in favored gamification elements of streamers according to their gender? Koivisto and Hamari (2014) observed that women seem to perceive gamification elements more positively than men. What kind of gamification elements are preferred by male or female streamers? Who is more inclined to spend real money by applying gamification elements?

Chapter 9: Scheibe, K., & Zimmer, F. (2020). User-oriented quality estimation of social news systems and its content: Gender-dependent assessment of reddit. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 12194. Social Computing and Social Media. User Experience and Behavior* (pp. 636–646). Springer.

Social media makes it possible for people to connect with each other. On Reddit, this is also probable while being anonymous (Leavitt, 2015). Reddit is a news service and information platform where users post and produce content on various topics in sub-communities, called "subreddits". The posts and content can be ranked according to votes by other users and commented on (Weninger et al., 2013). Information can be exchanged, as this is the focus of the

Reddit community (Stoddard, 2015). What information seeking behavior do anonymous users on Reddit present? Further, what motivations do users have to use a social news system like Reddit? Is there gender-dependent differences in the perception of Reddit as an information system and its content? How do the motivations to use Reddit differ among its users based on the Uses & Gratifications theory?

Chapter 10: Zhou, Z., Wang, Z., & Zimmer, F. (2023). Anonymous expression in an online community for women in China. In T. X. Bui (Ed.), *Proceedings of the 56th Annual Hawaii International Conference on System Sciences* (pp. 2051–2060). ScholarSpace.

Micro-blogging services such as Twitter and Sina Weibo (the latter being primarily used in China) are applied to share information via short messages. In countries where open expression is limited, anonymous posts can help to talk about personal issues. This is the case with (Sina) Weibo in China where an influencer called Qiaomai (荞麦) with 1.5 million followers started posting self-disclosed stories of women. This is a special form of information behavior as their stories are forwarded to an information broker who posts their issues for them. Their context dictates women to remain silent and save face according to Chinese culture (Xu et al., 2022)—what kind of stories do these women share? By expressing their issues, these users can influence other's information horizons and expand their own through reading similar stories.

Part IV: Fake news and information horizons

Chapter 11: Zimmer, F., & Reich, A. (2018). What is truth? Fake news and their uncovering by the audience. In C. V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media*. *ECSM 2018* (pp. 374–381). Academic Conferences and Publishing International Limited.

In information behavior research the behavior with the truth value of communicated propositions can be observed. People are presented with news on social media, but not all of them contain truth. Fake news can have various definitions but they all include that the news is "intentionally and verifiably false" (Allcott & Gentzkow, 2017, p. 213). However, what can constitute as verifiably true? What is defined as truth? Do people believe trusted news sources even if the story seems exaggerated?

Chapter 12: Zimmer, F., Scheibe, K., Stock, M., & Stock, W. G. (2019). Echo chambers and filter bubbles of fake news in social media. Man-made or produced by algorithms? In *2019 Arts, Humanities, Social Sciences & Education Proceedings* (pp. 1–22). Hawaii University International Conferences.

Research on fake news also concerns how and why stories are disseminated (Torres et al., 2018). Some claim the problem of fake news are algorithms, other blame the user of social media. Are echo chambers and filter bubbles really produced by algorithms? Or is the information behavior

of social media users at fault? How are cognitive patterns expressed when confronted with fake news? And do they have an influence on how people interact with fake news? How critical does a user need to be to be able to identify fake news?

The following section will highlight the methods used for each study (Chapters 2-12) to answer the research questions and describe the strengths of the methods used in information science research and this dissertation.

1.6 Methodology

Information science research offers tools to investigate users' information practices (Hu, 2015). Content analysis, surveys and interviews, case study as well as information system analysis allow the investigation of systems and social media users' information behavior. As has been suggested by information science scholars, users' information strategies should be described and analyzed by iterative studies incorporating multiple methods. Since this is applicable for observing information search behavior (Courtright, 2007), this approach was used to also study the information production behavior. By combining qualitative and quantitative methods, it is possible to analyze different perspectives and characteristics of users (Creswell et al., 2003), especially for social media research (Quan-Haase & Sloan, 2017). Qualitative data gives a first insight into a (new) research topic whereas quantitative data can be statistically analyzed to generalize results. Therefore, this research compendium includes the following research methods:

- literature review;
- survey research;
- interviews;
- case study;
- content analysis.

Each of the methods used for approaching the research questions have their own characteristics and opportunities, but also limitations. When conducting literature review, a holistic overview on the state-of-the art can be analyzed for a certain topic (Moher et al., 2009; Fink, 2019), providing the groundwork for future research and identify gaps in the literature. However, they usually do not reflect recent developments and as social media is constantly changing, new empirical data needs to be collected. Here, case study, survey, interviews, and content analysis serve as a methodological approach. By applying case study, interviews, and surveys, specific user groups can be investigated. Interviews usually result in qualitative data and offer researchers the opportunity to interact with study participants. Case studies focus on a specific

user group and give first insights into a new research topic. Surveys generate a larger pool of data and allow statistical analysis for quantitative data. Content analysis is applied to investigate documents (Krippendorff, 2018), but with social media, and in this case live streaming services, the live streams are the analyzed content. This is a new approach in content analysis. Due to the synchronous nature of live streams, researchers are able to interact with the participants. Of course, these are aspects that need to be carefully considered when conducting research to not influence the study participants. All of these methods allow a broad overview of users on social media by analyzing different data types. Following, the methods used for each chapter (2-12) are described.

In addition to empirical research methods, two theoretical models were developed to further our understanding on the information behavior of users of the new social media – live streaming services, also focusing on users' gratifications and their new way of communication *(Chapter 2* & *Chapter 5).*

A content analysis with the conventional and directed (inductive and deductive, respectively) approach was conducted to identify various live streaming services and gamification elements (*Chapter 3* & *Chapter 4*). With the directed approach, different live streaming services were analyzed for game mechanics and categorized as well as the literature examined via the conventional approach (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). Based on this, it was possible to categorize different gamification elements and live streaming services appropriate for analysis.

To gain an extensive understanding on the information behavior and media practices of asylum seekers and refugees for integration, a literature review was conducted (*Chapter 6*). The literature review is part of a comprehensive research project and corresponding research framework and is based on Fink (2019) and Moher et al. (2009) (PRISMA flow diagram). To retrieve the literature and enhance the overall recall of the documents, two scientific databases, Scopus as well as Web of Science, were utilized. Both are multidisciplinary databases and cover a wide research area. All documents were reviewed by two members of the research team. All in all, 44 documents were analyzed to extract themes from the literature on how asylum seekers use ICT and (social) media for integration.

For *Chapter 7*, a mixed method approach was applied by using interview and survey methodology (Creswell et al., 2003) to analyze the ICT and (online and social) media usage of asylum seekers in Germany. To generate qualitative data, semi-structured face-to-face interviews were conducted. Quantitative data could be collected with a questionnaire. Each interview took around 15 to 30 minutes. Adults as well as children were interviewed during

German language classes (as recommended by the German Federal Office for Migration and Refugees) and survey questionnaires filled out. The participants were asked about their needs when looking for information based on the Uses & Gratifications theory (information, entertainment, socialization, self-presentation). Descriptive statistics are used to analyze the data.

To answer the research questions in *Chapter 8*, a survey with 99 streamers of the live streaming service YouNow was conducted. Basis for the research questions are the Technology Acceptance Model (TAM) (Davis, 1989), flow theory (Csíkszentmihályi, 1975) as well as gamification and motivation (Deterding, 2012; Seaborn & Fels, 2015; Zichermann & Cunningham, 2011). YouNow serves as a case study as it employs the most gamification elements of live streaming services in the Western market.

For *Chapter 9,* online survey methodology was applied. All in all, 495 active Reddit users were asked about their usage of Reddit how they perceive its quality and what their search strategies are, following the requirements of the Information Service Evaluation (ISE) model (Schumann & Stock, 2014). Demographic aspects were investigated as well. The questions are based on Uses and Gratifications theory (Katz et al., 1974), and technology acceptance models (e.g., Chesney, 2006; Davis, 1989). Pearson Chi² and Mann Whitney U tests are used to analyze the data.

As a basis for the next study, posts of anonymous Chinese women were analyzed by using content analysis (*Chapter 10*). As face-saving is an important cultural aspect in China, survey or interview methodology was difficult to apply. The conventional approach for content analysis according to Hsieh and Shannon (2005) was utilized. Two native Chinese speakers coded the posts and Krippendorff's alpha (2018) was calculated to ensure reliability. As the retrieved documents are images, the text was extracted using an automatic *OCR tool5*[1], and mistakes were corrected manually.

Survey methodology and literature review was applied to answer the research questions of *Chapter 11*. A survey with 448 German-speaking participants was conducted to determine if people tend to trust the source or the content of news. Real news stories published by credible sources but also boulevard newspapers were used and for some articles, the news and source were switched. On a seven-point Likert-scale, the users had to rate how credible they perceived the presented news. To determine statistical aspects, Pearson-correlation was calculated.

[1] https://saas.xfyun.cn/ocr?ch=sa02

Quantitative and qualitative content analysis according to Krippendorff (2018) with the inductive and deductive (conventional and directed, respectively) approach (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005) was applied as well as literature review on truth theories conducted for *Chapter 12*. Further, to analyze the cognitive patterns of social media users, two paradigmatic fake news stories were used as a basis for case study analysis (Gombos, 2006).

This dissertation covers the topic of information behavior and the information horizons framework on social media. As a novelty, the information production behavior as part of the information horizons framework proposed by Diane Sonnenwald (1999, 2005) is considered. To examine the applicability of the extended framework, studies on the information search behavior are included to give a holistic view of users' information horizons on social media. In the next sections, the studies comprising this dissertation will be presented (Chapters 2-12) and are followed by an encompassing conclusion (Chapter 13) tying the results together and proposing future research avenues for information science research based on the findings of this dissertation.

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Franziska Zimmer: List of Publications (2017-2023)

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Part I: Information behavior and gamification on live streaming services

2 A model for information behavior research on social live streaming services (SLSSs)

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2.1 Introduction: information behavior on SLSSs

On social media, users act as prosumers [1], i.e., both as producers of content as well as its consumers [2]. Produsage [3] amalgamates active production and passive consumption of user-generated content. Social Networking Services (SNSs) are social media in which prosumers communicate among each other with the help of texts, images and videos. Typical examples of SNSs are Facebook[2] and Vkontakte[3] (in Russia and neighboring countries) [4]. Facebook-like SNSs are asynchronous [5], which means that the producer of the content acts at another time than the consumer of that content. There is (or, better, there can be) a closed circle of communication, if the consumer reacts to the producer's content by commenting, liking or sharing the information and if the producer gains knowledge about those acts. As the communicative acts take place in the passage of (maybe long) times, communication happens slowly. With the advent of social live streaming services (SLSSs) [6], communication between all involved prosumers comes to real-time meetings. Social live streaming services such as, for instance, Periscope[4], Ustream[5], YouNow[6], YouTube Live[7], Facebook Live[8], Instagram Live[9], niconico (in Japan)[10]; YiZhiBo[11], Xiandanjia[12], Yingke[13], YY Live[14] (all in China) or – for broadcasting e-sports resp. drawing – Twitch[15] and Picarto[16] are social media, which combine Live-TV with elements of Social Networking Services including a backchannel from the viewer to the streamer and among the viewers. SLSSs allow their users to broadcast their programs to everyone who wants to watch, all over the world. The streamers film either with the camera of a mobile phone or with the aid of a webcam. Some SLSSs employ elements of gamification

[2] https://www.facebook.com/
[3] https://vk.com/
[4] https://www.pscp.tv/
[5] http://www.ustream.tv/
[6] https://www.younow.com/
[7] https://www.youtube.com/channel/UC4R8DWoMoI7CAwX8_LjQHig
[8] https://live.fb.com/
[9] https://help.instagram.com/292478487812558
[10] http://www.nicovideo.jp/
[11] https://www.yizhibo.com/
[12] http://www.xiandanjia.com/
[13] https://www.inke.cn/
[14] http://www.yy.com/
[15] https://www.twitch.tv/
[16] https://picarto.tv/

(especially YouNow; Figure 2.1) to motivate their users to continuously apply the service. The main feature of SLSSs is the simultaneity of the communication, as everything happens in real time. Summing up, SLSSs are social media platforms with the following characteristics:

- SLSSs are synchronous,
- they allow users to broadcast their own program in real-time (as in TV),
- users employ their own mobile devices (e.g., smartphones, tablets) or their PCs and webcams for broadcasting,
- the audience is able to interact with the broadcasting users and with other viewers via chats,
- some SLSSs support gamification mechanics and dynamics, and
- the audience may reward the performers with, e.g., points, badges, or money.

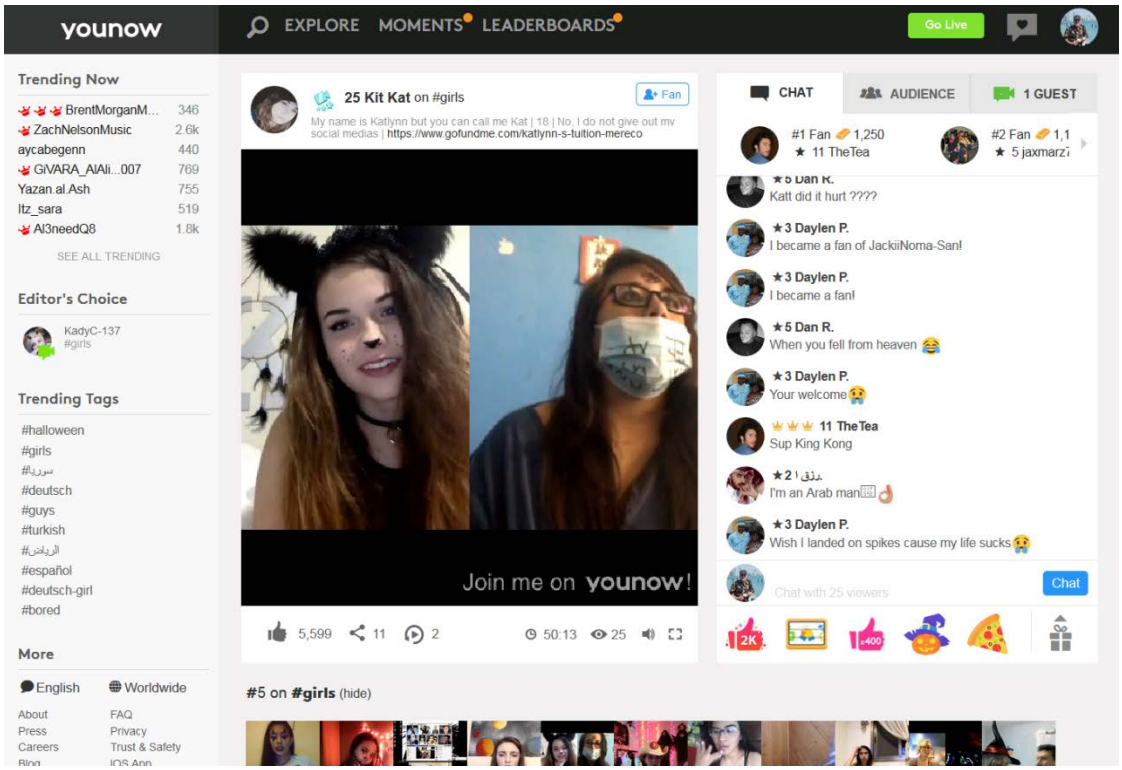

Figure 2.1: Live stream on YouNow (split screen of broadcaster and one participant)

What information behavior do prosumers exhibit on SLSSs? In line with Bates [7] and Wilson [8] we define "information behavior" as all human behavior with relation to information and knowledge (HII: Human Information Interaction) or to information and communication technologies (HCI: Human Computer Interaction). As information behavior on SLSSs is always computer-mediated, it is subject of HCI by definition. Fisher, Erdelez and McKechnie [9, p. xix] conceptualize information behavior "as including how people need, seek, manage, give, and use information in different contexts." Similarly, Robson and Robinson [10, p. 169] propose an information behavior model that "takes into account not just the information seeker but also

the communicator or information provider."

The aim of this article is to develop a heuristic model for the scientific description, analysis and explanation of prosumers' information behavior on social live streaming services in order to gain better understanding of the communication patterns in real-time social media. Why do some people broadcast live – even slices of their own lives similar to Truman Burbank (in the movie "The Truman Show" – please, have in mind that Truman was not fond of it in the end) [11]? Why do people watch such streams? And why do some people participate in communication by giving "hearts," comments or gifts? What are the users' motivations as producers, consumers and participants? Does gamification help to motivate prosumers to use an SLSS and to lock the users to the service?

In order prepare the ground to answer these questions empirically, we are going to develop a theoretical framework for understanding information behavior on SLSSs building on the classical Lasswell formula of communication, the Uses and Gratifications theory of media usage and the psychological theory of Self-Determination.

2.2 The Lasswell formula of communication

In a first rough differentiation, we distinguish between sender-centered and audience-centered communication models as in SLSSs both aspects, namely senders (i.e., broadcasters) and viewers (i.e., audience) are equally important. One of the classical sender-centered models is the theory of Harold D. Lasswell. Lasswell [12, p. 37] introduces the following questions:

- Who
- Says What
- In Which Channel
- To Whom
- With What Effect?

These five questions lead to five sub-disciplines of communication science, which however can definitely cooperate. "Scholars who study the 'who,' the communicator, look into the factors that initiate and guide the act of communication. We call this subdivision of the field of research *control analysis*. Specialists who focus upon the 'says what' engage in *content analysis*. Those who look primarily at the radio, press, film and other channels of communication are doing *media analysis*. When the principal concern is with the persons reached by the media, we speak of *audience analysis*. If the question is the impact upon audience, the problem is *effect analysis*"

[12, p. 37]. Braddock [13] adds two further questions:

- What circumstances?
- What purpose?

The extended Lasswell formula reads as follows: “WHO says WHAT to WHOM under WHAT CIRCUMSTANCES through WHAT MEDIUM for WHAT PURPOSE with WHAT EFFECT” [13, p. 88]. In terms of Braddock, the *Who* is the communicator (in SLSSs, the broadcaster); he/she acts as an individual or as a representative of a group. The *What* is the message with the two inseparable aspects of content and presentation (in SLSSs, the content and style of the broadcast). To *Whom* asks for the audience and its characteristics (in SLSSs, the viewers of the broadcast). *What Circumstances* concerning SLSSs analyzes the environment of the broadcasting act in terms of time and setting. One question Braddock asks is, “Was the communicator in a position in which he was forced or expected to say something? Was he acting as a spokesman for a group, being paid to say something, being influenced by superiors …?” [13, p. 91]. In SLSSs, for describing and analyzing influencers or micro-celebrities, for instance, it seems to be very important to realize the exact setting of the broadcast. *What medium* includes questions on the information channel. “Does it imply a mass or selected audience? … Can the audience see the communicator’s expression, gestures, dress, and so on? … Does the medium require oversimplification of the message?”, Braddock asks [13, p. 92]. *What Purpose* means the communicator’s motives to communicate. What does the communicator want the audience to do? Interestingly, Braddock only makes mention of the motives of the communicator, but not of the audience. Concerning SLSSs, we have to study the broadcasters’ motivations to produce and to perform a live stream. The last aspect *What Effect* analyzes the outcomes of the entire communication process for the audience. What are the reactions of the SLSSs’ audience when they consume a live video? The entire process is a linear sequence of building blocks of the communication [14, p. 14] (Figure 2.2). This representation of communication is quite similar to the signal transmission process as described by Shannon [15]; however, we have to add the component of knowledge as the content of information to Shannon’s more technologically oriented model [16, p. 36].

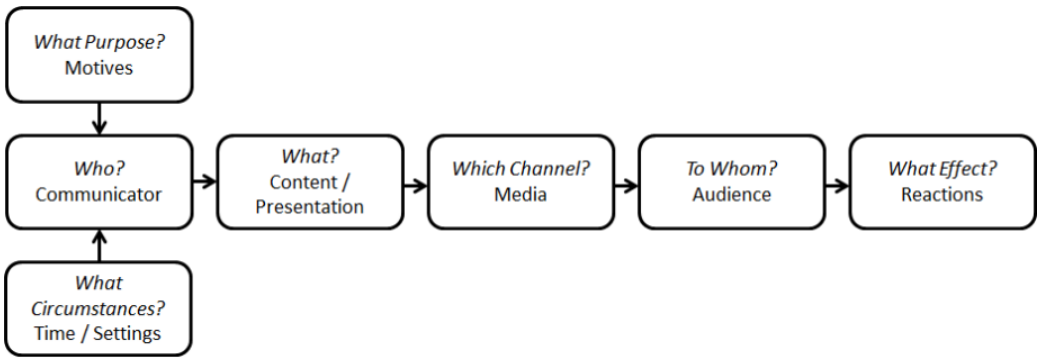

Figure 2.2: The communication process according to Lasswell and Braddock

Concerning Lasswell, circuits of communication are one-way or two-way, depending upon the degree of reciprocity between communicators and audience [12]. Given that there is an audience for a live stream, on SLSSs communication is always two-way and thus reciprocal. This means that the roles between communicator and audience can change; the original communicator will become audience when the viewer reacts to his/her message (or his/her appearance), and that the original audience may communicate with the original communicator and – what is very special to SLSSs – with the rest of the audience.

The Lasswell formula found application in the study of communication via social media and user-generated content. Wenxiu [17] transferred the model from "classical" mass media (as TV) to "new media" (as Internet and its services); Jan [18] developed an analytical framework for research on enterprise social media; and Auer [19] discussed political motivated content leading to influence the audience while using social media. However, scholars were able to identify problems in Lasswell's model of the five (with Braddock's additions, seven) W-questions if applied to understand communication on social media. "Lasswell's '5W' model lacks feedback, and the role of communicator and audience is rigid, the interactivity of new media provides the communication study lots of new inspiration," Wenxiu states [17, p. 249]. Similarly, Jan questions the linear relationship in the Lasswell formula. Instead, new media "are likely to reshuffle the dynamics of existing and future communication processes" [18, p. 11]. Therefore, we turn our attention to audience-centered communication models.

2.3 Uses and Gratifications

In sender-centered communication models, the starting point is the active communicator, and the audience remains more or less passive. By contrast, audience-centered models place special emphasis on the receivers. In the Uses and Gratifications approach by Elihu Katz and colleagues [20][21] "the 'needs' of the individual form the starting point" [14, p. 135]. "Audience activity is central to uses-and-gratifications research, and communication motives are key components of audience activity," Papacharissi and Rubin define [22, p. 175]. Klapper [23, p. 525] works out the

difference between the Lasswell formula and Uses and Gratifications theory clearly: “We are fond of saying that mass communication research used to be directed to the question of ‘What does mass communication do to people?’ but that uses-and-gratifications study ask, more sensibly, ‘What do people do with mass communication?’.” However, for Klapper (as for us as well), there is no contradiction between both views as they complement each other. “A valid view of audience behavior lies somewhere between these extremes [of the “passive” and the “active” audience],” Rubin adds [24, p. 98]. The uses and gratifications theory remains successful in the study of media effects till today [25][26][27].

For Katz, Blumler, and Gurevitch [20, p. 510], there are seven steps in the audience’s media usage:

- the social and psychological origins of
- needs, which generate
- expectations of
- the mass media or other sources, which lead to
- different patterns of media exposure, resulting in
- need gratifications and
- other consequences (including unintended ones).

Researchers may study the audience’s needs and then uncover how they are gratified by the media. Or vice versa, we observe gratifications and look for the needs that are gratified. Of course, researchers may analyze the social and psychological origins of audience expectation and gratifications as well [20, p. 510]. It is important to realize that the need gratification and the media choice are strongly dependent on the single concrete audience member – so we have to be very careful when generalizing audience data into hypothesis or theories. All media compete with other sources of gratification, e.g., with face-to-face contacts with other people or with playing with toys [20, p. 511]. We tried to visualize the media usage steps in Figure 2.3.

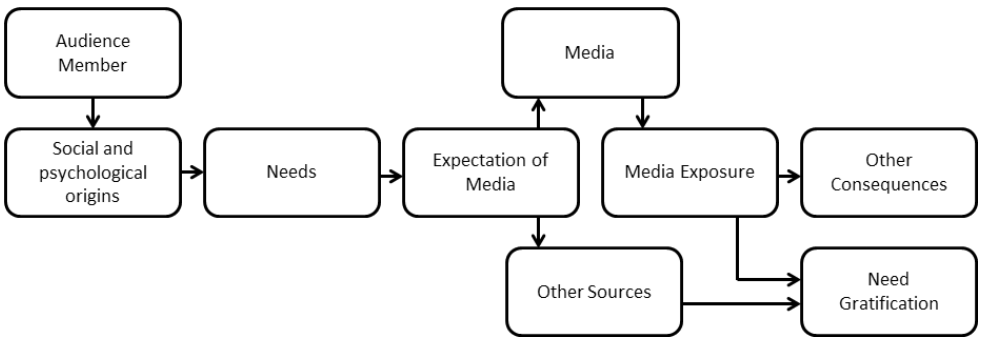

Figure 2.3: The communication process according to Katz, Blumler, and Gurevitch

We have to distinguish between two aspects of gratifications. When there are needs and expectations of media, audience members seek for gratification. After media exposure, they find gratifications. According to Palmgreen et al. [28] there is a feedback loop between the gratifications sought and the gratifications obtained (Figure 2.4). “Over time we would expect such feedback processes to result in a rather strong relationship between sought and obtained measures for a particular gratification as long as the seeking behavior is reinforced” [28, p. 164]. It is possible, for instance, to seek for information; however, after media exposure not obtaining the anticipated information but finding entertainment. For Palmgreen et al. [28, p. 164] it is an important research question, “are the *dimensions* of gratifications of gratification *sought* from a particular medium, content type, or program the same as the *dimensions* of gratifications perceived to be *obtained*?”

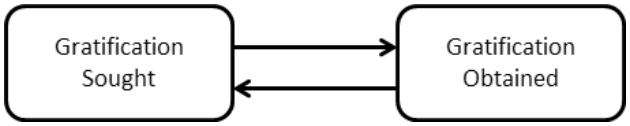

Figure 2.4: Gratification sought and obtained according to Palmgreen, Wenner, and Rayburn II

What types of gratification are identified in communication science? Blumler and Katz [29] and later MacQuail [30] found four basic dimensions of gratifications:

- information,
- personal identity,
- entertainment as well as
- integration and social interaction.

Information means the motive of finding knowledge; personal identity is related to our motive to define our identity; entertainment comprises escaping from problems, relaxing, filling time, or sexual arousal; social interaction is the motive to interact with other people.

However, mediated social interaction is different from “normal” social interaction. Basic elements of “normal” social interaction are bodily contact, proximity, orientation, gesture, facial expression, eye-movement as well as verbal and non-verbal aspects of speech [31]. An audience member, say of a TV show and its actors, does sometimes not only passively consume the show, but he or she builds up a kind of relationship to an actor, presenter or celebrity [32]. The “media figure” is not aware of a relationship, but only the spectator. Horton and Wohl [33] name such mediated social interactions “parasocial interactions.” The crucial difference between social interactions and parasocial interactions “lies in the lack of effective reciprocity,” establishing an “intimacy at a distance” [33, p. 215] as bodily contact is not given as well. In mediated contexts,

the fourth dimension of gratification is *parasocial interaction*.

There are other classifications of basic gratifications. It is possible to sort all motivations into the five categories of cognitive, affective, personal integrative and social integrative motivations as well as into the motive of tension release [20].

Use of social media is not the same as use of TV [34]. With Joinson [35] we can distinguish between content gratifications (gratifications based upon the content of the watched media), process gratifications, which are based on the actual experience of using the media, and – which is new on the Web – social gratifications (or gratifications in a "social environment" [36]), based upon communication and integration.

TV-oriented communication research predominantly studied the behavior of the audience. On social media, one can figure out three different roles of people [37, p. 15]:

- consumers (or lurkers),
- participators and,
- producers.

For Shao [37] *consumers* only receive content and do not contribute to the communication processes. *Participators* do not initiate content communication, but they "take advantage of user-generated sites to interact with the content and other human beings" [37, p. 18]. Lastly, *producers* "produce their own contents" [37, p. 18]. All three groups of people look for and obtain gratifications.

The dimension of personal identity has to be broadened in social media. Producers and participators as well can and will articulate their personal identity. They are actively acting and presenting themselves. So, we should better speak about "self-presentation" in this dimension.

Uses and Gratifications theory found and finds many diverse applications in social media research. There are numerous studies about uses and gratifications on, for instance, SNSs as Facebook [35][38], MySpace [39] or professional SNSs [40], microblogging services as Twitter [41] or Weibo [42] and sharing services as Instagram [43] or YouTube [44]. Additionally, there are lots of papers on Uses and Gratifications concerning other Web services, e.g., messengers such as WhatsApp [45] or WeChat [46].

2.4 Self-Determination: Needs, motivations and (maybe) Flow

In the Uses and Gratifications theory, there is an important building block of the model called "needs." Without human needs there will be no media production or media reception. To clarify

the function of needs, we turn towards Self-Determination theory, originated by Ryan and Deci [47][48][49]. Self-Determination theory – as a theory of human motivation [50] – seems to be an ideal psychological addition to communication science approaches as the Lasswell formula and the Uses and Gratifications theory [51].

For Ryan and Deci [47, p. 10], needs are defined as "nutrients that are essential for growth, integrity, and well-being." There are three basic needs; *autonomy* is the need to self-regulate own experiences and actions; *competence* is the need to act efficiently and to master all important life contexts; finally, *relatedness* concerns feeling socially connected, belonging to a community and feeling significant among others [47, pp. 10-11]. Needs lead to motivations. Motivations concerns "what 'moves' people to action" [47, p. 13], they "energize" and give directions to human behavior. Ryan and Deci distinguish between three regulatory styles of motivation, namely

- intrinsic motivation,
- extrinsic motivation (integration, identification, introjection, external regulation), and,
- amotivation [52].

Motivations are determined either by the acting persons themselves (self-determination) or by other circumstances (nonself-determination). Those circumstances include other people as loci of causality or nonpersonal loci. There are no clear boundaries between self-determination and nonself-determination, but a continuum of the degree of (non-)self-determination of motivations. Apart from intrinsic motivations (which are always caused by internal aspects, i.e., by the acting persons' selves), motivations are caused by a combination of internal and external aspects (Figure 2.5).

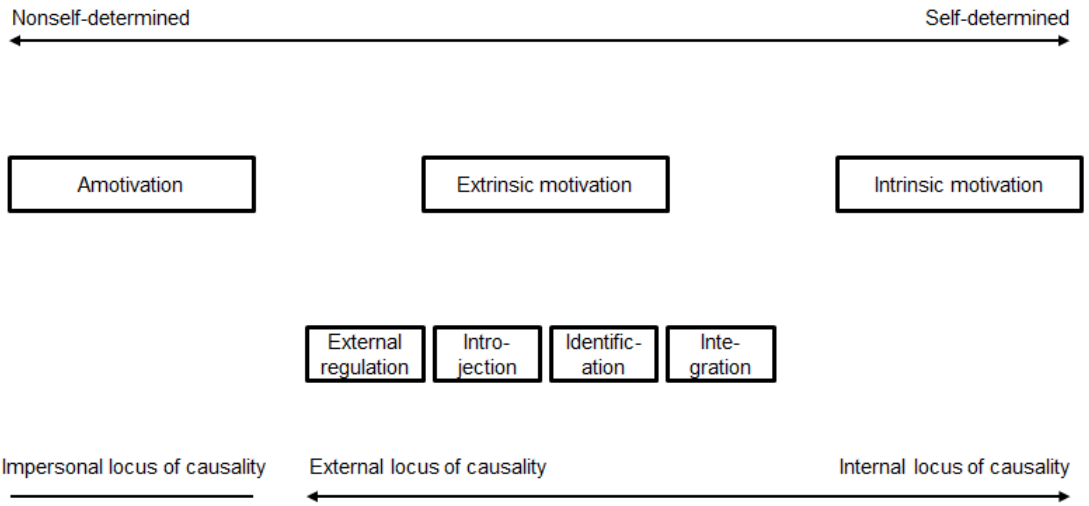

Figure 2.5: Human motivations in the self-determination continuum following Ryan and Deci

Intrinsic motivation “involves people freely engaging in activities that they find interesting, that provide novelty and optimal challenge” [49, p. 235]. Intrinsically motivated human behavior is performed out of the acting person’s interests, for which the primary rewards are the confirmation of one’s own competence or simply enjoyment. Following Vallerand [53], there are three types of intrinsic motivations, namely to cause an activity for pure joy, to understand something new, and to arrive at an accomplishment (for the process to create something new). While intrinsic motivations are autonomous by definition, extrinsic motivations vary “widely in the degree to which they are controlled versus autonomous” [47, p. 14]. Deci and Ryan distinguish four kinds of extrinsic motivations. *Integration* means the internalization of extrinsic causes. “When regulations are integrated people will have fully accepted them by bringing them into harmony or coherence with other aspects of their values and identity” [49, p. 236]. The external aspects of motivation are fully transformed into self-regulation resulting in self-determined extrinsic motivation. *Identification* is the adoption of external regulations for a special purpose. “For example, if people identified with the importance of exercising regularly for their own health and well-being, they would exercise more volitionally” [49, p. 236]. While integration and identification are more related to a person’s self-determination, introjection and external regulation are more caused by external and nonself-determined aspects. *Introjection* entails the actor’s taking in external regulations and the reaction on contingent consequences of those regulations. Prototypical examples of introjection are actions leading to the person’s pride or refraining actions which could end in the person’s feelings of shame or guilt. The “classic case” of extrinsic motivation is the *external regulation* “in which people’s behavior is controlled by specific external contingencies” [49, p. 236]. People behave to get rewards or to avoid negative consequences – independently of their own preferences or norms.

Intrinsic as well as all types of extrinsic motivations represent personally caused actions (internally caused by the actor or externally by others). Amotivation lacks such external personal aspects. Amotivation leads to non-activity, i.e., to refrain from an action. Deci and Ryan identified three forms of amotivation, namely a felt lack of competence, a lack of interest, relevance or value, and the defiance or resistance to influence (which can also be seen as motivated nonaction) [47, p. 16].

For Max Weber, “action is ‘social’ insofar as its subjective meaning takes account of the behavior of others and is thereby oriented in its course” [54, p. 4]. Information behavior on social media in general and also in SLSSs in particular is partly oriented on the behavior of others. So, it is social action. For social actions, there are no intrinsic motivations causing the information behavior on social media, because intrinsic motivations are autonomous and therefore not oriented towards the behavior of others as a matter of principle. Of course, all not explicitly

socially oriented actions on social media may be caused by intrinsic motivations.

If we combine the sought as well as the found gratifications adopted from Uses and Gratifications theory with the motivations identified from Self-Determination theory, we have to ask for each gratification (information, self-presentation, parasocial interaction, and entertainment), what type of intrinsic or extrinsic motivation (or amotivation) is realized in the concrete situation.

However, there is another form of motivation found on some information systems, namely motives driven by gamification [55]. The implementation of game mechanics and dynamics in non-game contexts is used to increase one's engagement, motivation and activity. Therefore, Web information systems and mobile applications already utilize them [56]. For Deterding [57], gamification means designing for motivation to adopt and to repeatedly use an information system. Typical gamification elements for producers and for participants on SLSSs are, for example, getting fans (becoming a fan), getting positive comments (giving comments), receiving gifts (making gifts), getting subscribers (becoming a subscriber) as well as getting shares and likes (giving shares and likes). For consumers (as well as for the other two groups) gamification elements as rankings, levels, coins or badges are possibly motivating.

Sometimes, media producers, participants or consumers may experience total absorption in an activity as well as the non-self-conscious enjoyment of it. Csíkszentmihályi [58] called such an optimal experience "flow." Flow can be reached if there is an optimal challenge. "Too much challenge relative to a person's skills leads to anxiety and disengagement, whereas too little leads to boredom and alienation" [49, p. 260]. Flow theory is compatible with Self-Determination theory, as Deci and Ryan state, "(w)hen people experience flow, their activity is said to be autotelic, which means that the purpose of the activity is the activity itself, and we often spoke of flow as the prototype of intrinsically motivated activity" [49, p. 260].

2.5 The model

Paraphrasing Klapper [23], on social media, with user-generated content, we study what people do with social media and what social media do with the people. In "classical" communication science as of Lasswell or Katz we spoke of the "audience" of media (especially of TV), with the advent of the internet and especially of the social media the term changed to "users" [34, p. 505]. Nowadays, on social media, audience members are users. However, in SLSSs, they are very special users. As SLSSs combine (live) TV with social media the people working with SLSSs are both, TV audience and social media users. In this way the different research lines of communication science (studying the audience) on the one side and of HCI research (studying

users) on the other side get together.

The special position of SLSSs in the field of all social media is mirrored by the kind of social interaction. While all parasocial interaction (on TV as well as on social media, but not on SLSSs) lacks proximity, and bodily contact, and (in many cases) reciprocity, SLSS-mediated interaction may be reciprocal, if the producer and the participant communicate live via the system. Of course, also on SLSSs there is no spatial proximity; however, there is a temporal proximity as everything happens in real-time (Table 2.1). So, SLSS-mediated interaction is closer to "normal" social interaction than to parasocial interaction.

Table 2.1: Forms of interactions

	Reciprocity	Spatial Proximity	Temporal Proximity	Bodily Contact
Social Interaction	Yes	Yes	Yes	Yes
Parasocial Interaction	Sometimes	No	No	No
SLSS-mediated Interaction	Yes	No	Yes	No

In Figure 2.6 (flowchart) and 2.7 (database model), users search for intrinsically or extrinsically motivated gratifications through entertainment, information, SLSS-mediated social interaction, and self-presentation or through gamification elements (insofar provided by the service). In our flowchart, user X is a producer and user Y a participant. If another user Y' stops at the building block "information reception," she or he is a consumer.

In Figure 2.6, you will find the building blocks of the Lasswell/Braddock model (from Figure 2.2) on the way from user X (Who?), his/her motives (What purpose?) and the circumstances of the communication act (What circumstances?) via the production of a publication, i.e., a live video, with its particular content (What?), distributed on an SLSS (Which Channel?) to the information receivers Y or Y' (To Whom?) and their reactions (What Effect?). The Uses and Gratifications approach (from Figure 2.3) starts with user Y resp. Y' (Audience member). The model stresses the importance of user characteristics as the circumstances, demographic data and the user's role/s in the entire communication process (Social and psychological origins) as well as the user's motivation (Needs).

Former experiences with SLSSs (and other social media) lead to certain Expectation of Media and the use of SLSSs (Media exposure) or alternatively the use of Other Sources, leading to the satisfaction of the motivation (Need gratification) and to other consequences (e.g., changing leisure behavior due to stark SLSS usage). Of course, our model also considers the relation between gratifications sought and gratifications obtained (from Figure 2.4).

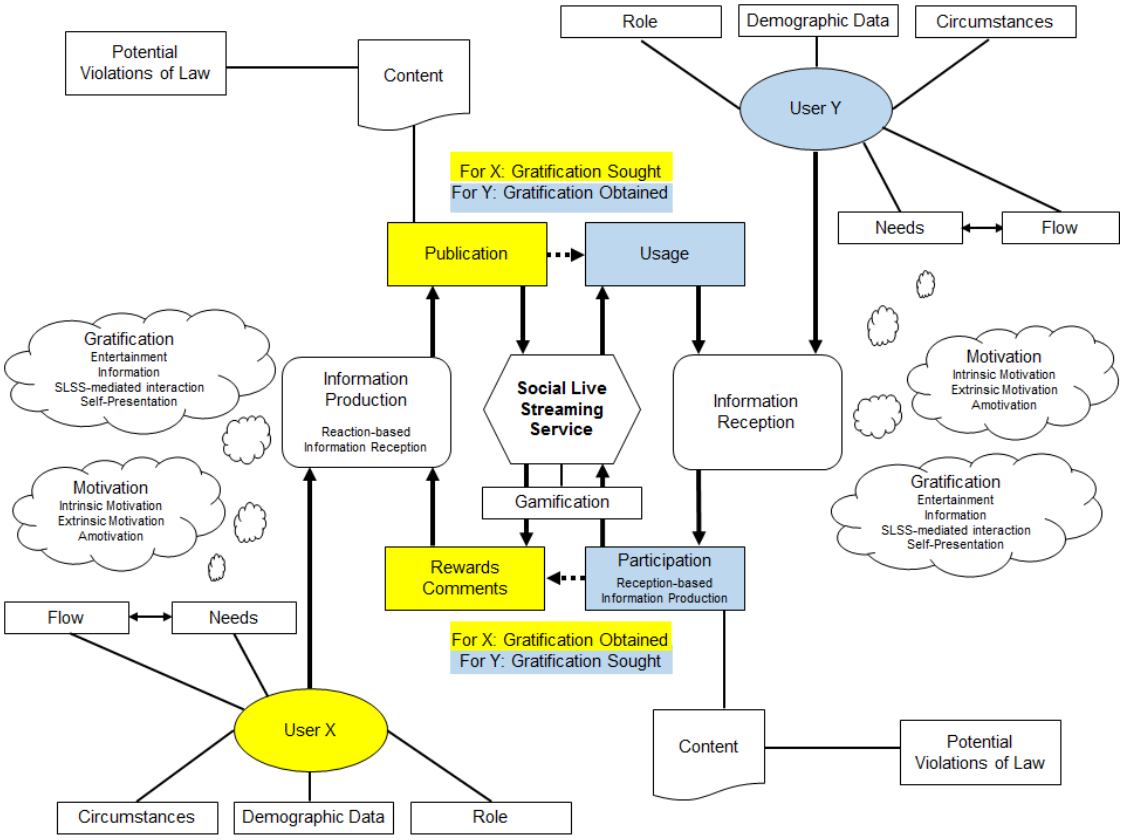

Figure 2.6: Building blocks of information behavior on SLSSs as a flowchart

SLSSs offer spectators the possibilities to (only passively) view a video (as user Y' does) or to (actively) participate as a guest in a live stream (as in Figure 2.1), to write chat messages and to reward the streamer (so does user Y). Producers (as our user X) interact with the viewers in real-time through their publications, i.e., their live streams. Additionally, they read the chat messages of the participants (now acting as consumers) and can instantly respond in their stream (now acting as participants). Gratification is sought by streaming (user X), by watching (user Y') as well as by commenting and donating (user Y); gratification is found by the satisfaction of one's motives. Therefore, user X will be satisfied when viewers react to the streams and reward him or her; user Y will be satisfied when the streamer or other viewers react to the comments resp. to the rewards; finally, user Y' will be satisfied when she or he receives the wanted live video.

Producers as well as participants distribute content. It is possible that this content is "contaminated" with juridical problems. If music is playing while broadcasting, this could be a copyright infringement. If the video shows other people without their written permission, say on a street, this is an object of personality rights violation.

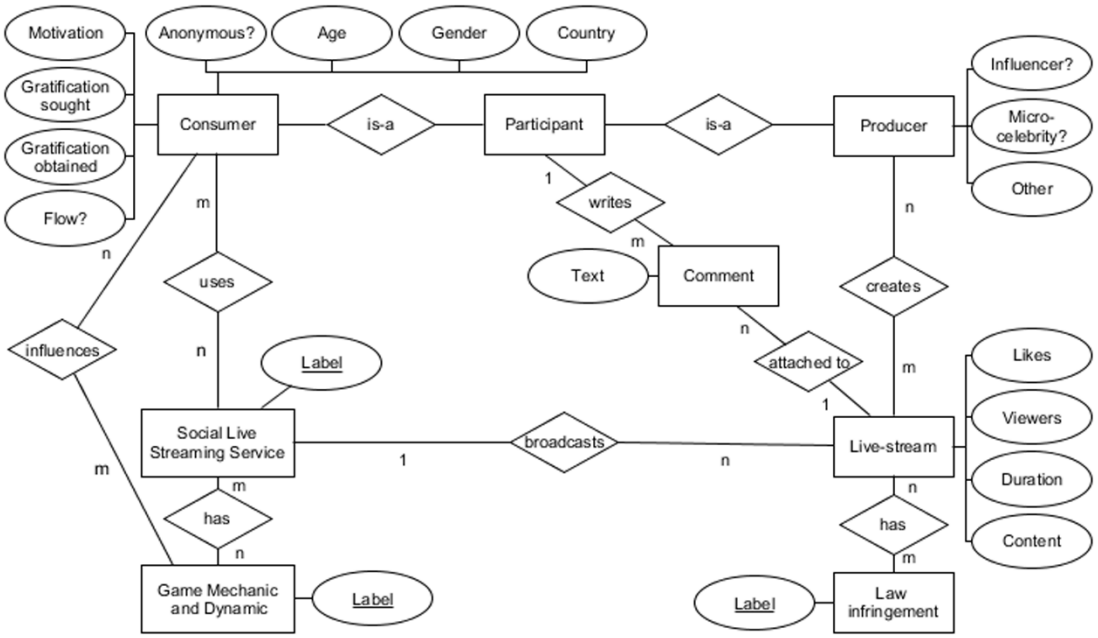

Figure 2.7: Information behavior on SLSSs as entity-relationship model

Finally, users have characteristics, most important their roles (as producers, participants, or consumers), their gender, their nationality, and their age resp. their generational cohort. Additionally, we have to consider specific circumstances, in which the users behave and which influences the users' information behavior, e.g., their position as opinion leaders [59], influencers [60], micro-celebrities [61] or as stakeholders of companies, political parties or religious associations. On SLSSs, only producers are identifiable, while consumers and participants may stay anonymous. Also on other social media, users can decide whether they want to act identifiable or to remain anonymous. However, on some specific social media, e.g., Jodel[17] or the closed down service Yik Yak, users are always anonymous. As anonymity has impact on the information behavior of the users, the model has to pay attention to this differentiation.

The aim of the entity-relationship model [62] corresponding to our flowchart, is to describe the inter-related information of our specific domain of knowledge, the information behavior of SLSSs' users (Figure 2.7). This way, we are able to generate a database which can hold lots of data for easy access and future analyses. The entity 'Consumer' is in relation to the entity 'Social Live Streaming Service,' since we want to analyze which user interacts with which kind of SLSSs. It would have been possible to attach the entity 'Social Live Streaming Service' to the 'Live-Stream' entity as an attribute, but we wish to gain insight into the gamification elements that influence the user and this relation would be lost, since a game mechanic is not attached to a stream per se, but to the SLSS. Analyzing the demographic data of a 'Consumer' (age, gender,

[17] https://jodel.com/de/

country), and if the user was anonymously online, for which we chose Boolean values, is also our goal. Since flow is a state which is experienced or not, we likewise chose Boolean values to answer if the user was immersed in the stream. We want to further inquire the motivational aspects and the different forms of gratifications a user searches for and in return receives, so we added the attributes 'Motivation,' 'Gratification sought' and 'Gratification obtained' which will later be filled with the applicable norm entries corresponding to the Self-determination and the Uses and Gratifications theory by the researchers.

Since the participant is a consumer who also writes comments, thus interacts with the stream, and a producer is a special form of participant who creates live-streams and can be an influencer, micro-celebrity or other kind of personality, we choose to implement 'is-a'-relationships to better distinguish between the three kinds of users of an SLSS. Further research could focus on the comments the participant writes during a live-stream, so we save the content of the comments and what kind of user writes them.

We are interested in different aspects of a live-stream; its duration, number of viewers, the number of likes, as well as the content, and therefore added attributes for them. Furthermore, since each live-stream can display several breaches of the law, we implemented them as an entity for easier analyses.

2.6 Measuring information behavior on SLSSs

All building blocks depicted in Figures 2.6 and 2.7 are measurable. However, how? How can we arrive at sound data on information behavior on SLSSs? As HCI and communication researchers, we are able to use four different sources for data gathering, namely (1st) log files of the information systems, (2nd) performing experiments with probands in controlled test situations, (3rd) asking the users (by quantitative surveys and qualitative interviews), and, finally, (4th) systematic observations of the streams.

As log files' data are not very meaningful (it is impossible to get data on users' motives and streams' content) we can only use this source for some basic data as, for instance, for describing few user characteristics (e.g., country of dial-up) and some technical interaction data (e.g., time spent on the SLSS) [63][64].

If we are able to identify certain dimensions of information behavior it is possible to analyze those variables in a test situation. Wilk, Wulffert, and Effelsberg [65], for instance, performed experiments on the behavior of SLSS viewers concerning the effects of gamification elements. With experiments, it is possible to arrive at precise data on single variables; however, as the data

were collected in a controlled situation, they are not necessarily the same outside the laboratory. To cover real-life information behavior, researchers have to go into the "wilderness," i.e., they have to study (real) users when they interact with (real) information services.

With Katz et al. [20, p. 511] we believe, that "people are sufficiently self-aware to be able to report their interests and motives in particular cases." Therefore, SLSS researcher may conduct online surveys with SLSS users as participants and perform qualitative interviews with prototypical users. Indeed, many empirical investigations on SLSSs made use of surveys, for instance, concerning Twitch [66][67][68][69] or general SLSSs as YouNow [6][11][70], the former services Qik [71] and Meerkat [72], the Chinese SLSSs Douyu TV and YY Live [73] as well as live streams via SNSs [74]. Additionally, there are surveys on the information behavior of special user groups as, e.g., teens [75].

As a further methodological approach, researchers will realize systematic observations of a sufficiently large number of streams and evaluate the videos' content as well as the streamers' motivations (insofar they are observable) via content analysis [76][77]. If there are open questions during the observations the researchers are able to ask both, the streamers as well as the viewers, during the live-sessions. We found some content analyses on SLSSs, e.g., analyzing user-generated content on YouNow [78] or comparing content on Periscope, Ustream and YouNow [79][80]. Additionally, one may statistically analyze the word distribution of the chats [81].

The main perspective of our theoretical models is the user of an SLSS and her or his *information behavior* concerning the services and their environment. If we turn the angle to an evaluation of the *information service*, we are able to identity additional theoretical models which help us to structure research tasks on SLSSs. Until today many different evaluation models (among others, TAM, TAM 2, TAM 3, UTAUT and MATH) have been developed to measure the quality and acceptance of these services. However, those models consider only subareas of the whole concept that represents an information service. As a holistic and comprehensive approach, the Information Service Evaluation (ISE) model [82] studies five dimensions that influence adoption, use, impact and diffusion of the information service: information service quality, information user (here is the contact area with the information behavior models), information acceptance, information environment and time. All these aspects have a great impact on the final grading and of the success (or failure) of the service. Concerning SLSSs, ISE found application in an evaluation of the general SLSS YouNow [11][70].

2.7 Conclusion

The aim of our article was the development of a heuristic theoretical model for the scientific description, analysis and explanation of users' information behavior on SLSSs in order to gain better understanding of the communication patterns in real-time social media. Our theoretical framework makes use of the classical Lasswell formula of communication, the Uses and Gratifications theory of media usage as well as the Self-Determination theory (including the theory of Flow). Additionally, we shortly mentioned the ISE model to consolidate studies on the information service. In the current literature on SLSSs, indeed all addressed theories and models could be identified (Table 2.2); however, in most cases only one of the theories.

Table 2.2: Theoretical foundations of SLSS studies

	Examples
Lasswell formula	[83]
Uses and gratifications theory	[66][67][68]
Self-determination theory	[69]
Theory of flow	[74]
Information service evaluation model	[11][70]

The combined model of information behavior on SLSSs (as shown in Figures 2.6 and 2.7), if necessary, connected with the Information Service Evaluation model, has two main advantages:

- it addresses all building blocks of the entire communication process on SLSSs (leading scientists simply not to forget important research aspects),
- it establishes a common basis for comparable results from different research teams.

Albeit we constructed the model for understanding user behavior on SLSSs it is (with small changes) suitable for all kinds of social media. As other social media are mostly asynchronous, there is no direct backchannel from the audience to the producers. However, the building blocks of the research model will be the same for most of the known social media services.

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3 Game mechanics on social live streaming service websites

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3.1 Introduction

A tactical and promising strategy that is used in education, companies, online applications, and many other aspects to engage and motivate people is called “gamification” [1]. The use of gamification asserted itself for increasing peoples’ activity and making users continue the usage of a system. It is not only used for motivational aspects, but also for psychological as well as behavioral results. However, even in many research disciplines, respectively system studies, it became a central point of interest [2].

One often applied definition for the term “gamification” is “the use of game design elements in non-game contexts” [3, p. 1] as, for instance, badges or levels. Through these mechanics, a user is continuously in contact with one’s own accomplishments and achievements. Likewise, users are able to compare their own performance with others (e.g., through leaderboards) [4]. Seaborn and Fels define “gamification” as follows: “the term is used to describe those features of an interactive system that aim to motivate and engage end-users through the use of game design elements and mechanics” [5, p. 14]. This definition refers to the engaging and motivating effect of gamification on users as well.

One kind of social networking service (SNS) that makes use of gamification are social live streaming services (SLSSs). SLSSs users feel rewarded as well as motivated through the interaction with game mechanics [6]. The popularity of these services is growing. Especially in China there are already over 200 different offers of live streaming services [7]. Even popular social media like Facebook and YouTube implemented the live streaming-function for their systems. Streaming live allows broadcasters to interact with their audience in real time. While the broadcaster is performing the live program, viewers are able to communicate with the broadcaster as well as with other viewers via chat [8].

There are three types of SLSSs – general live streaming services, with no specification at all, topic-specific live streaming services with one special interest group dominating the content of the streams, like art or e-sports, and embedded live streaming services, where the function of streaming live was added to an existing service (e.g., YouTube Live). Unlike asynchronous social

network services like Facebook or Twitter, social live streaming services are known for being a synchronous service, as everything happens in real time [9].

The users of SLSSs are mostly broadcasting live and chatting with other users or sharing information during their streams. The main motives for using such a service are boredom, socializing, communication, or entertainment [10–13]. In this context, the Uses and Gratifications Theory (UGT) by Blumler and Katz [14] should be mentioned. The use of media is goal-directed as well as guided by certain expectations [15]. Users aim to satisfy their needs and are searching for gratifications while using (online) media [16]. McQuail [17] summarizes at least four central motives for media use: entertainment, information, personal identity as well as social interaction. However, following a model about SLSS research, the concept of personal identity should be redefined by the term self-presentation in this context [18]. What's more, the idea of gamification was applied to the model showing the entertaining outcome of game elements on SLSSs users.

Another aspect that deals with the point of human needs and (user) motivation is the Self-Determination Theory (SDT) by Ryan and Deci [19]. Motivation is described as "what 'moves' people to action" [20] and is caused by internal and external aspects. Consequently, one may differentiate between internal as well as external motivation [21]. Intrinsic motivation "involves people freely engaging in activities that they find interesting, that provide novelty and optimal challenge" [22]. And extrinsic motivation "refers to doing something because it leads to separable outcome" [23, p. 54]. Hamari, Koivisto, and Sarsa mention that users of a service are intrinsically motivated through the game design elements [2]. Users will rather recommend an SNS to others if it is gamified, also, their intention to use the service increases [24]. On LinkedIn for example, we can find a "progress bar for measuring progress in entry of personal details" [25, p. 27], consequently, more users of the service are filling in all personal details. All in all, gamification is used to design for motivation and to repetitive information system usage [26]. Based on this aspect, the central research question of our investigation is:

RQ1: Which gamification elements are implemented on social live streaming service websites?

3.2 Related work

Some prior research about the usage of game design elements on live streaming systems was detected. Starting with Wilk, Wulffert, and Effelsberg [27] who developed three different versions (A, B, and C) of a live streaming application to test the effect of gamification elements on the broadcasting behavior of SLSSs users. A first version (A) was implemented as a base version that did not contain any game mechanics. Version B was constructed like the base

version, but additionally the function of leveling was implemented as a game mechanic. And finally, the last version (C) of the application had, additionally to version B, challenges and badges as features. Then, each version was evaluated by different users. The results for each version are an average time of 125.70 seconds for version A, 177.90 s for version B, and for version C it was 401.98 s. Consequently, the researchers found out that the average streaming time of a user was significantly higher when more game elements were added to the application.

Following, research about the impact of gamification elements in social live streaming services, having YouNow as a case study, should be mentioned [6]. This study shows to what amount different user groups (producers, participants, and consumers) are motivated as well as rewarded through different gamification elements of the service. However, the study's results show that producers, the streaming and content producing users, are the most rewarded as well as motivated by the gamification elements. Also, the outcomes clarify that every element is at least perceived as neutral but most of them are perceived as highly rewarding and motivating.

Another paper that has YouNow as a case study as well, displays the differences between giving and receiving gratifications in a gamified social live streaming service [28]. The results show that different game design elements are considered as fun, useful, rewarding, and motivating by SLSSs users. Also, the differentiation between getting different gratifications as well as giving different gratifications illustrates that users rate the action of receiving gratifications mostly better than the action of giving.

Likewise, Lu, Xia, Heo, and Wigdor mention the engaging role of the gifting function and fan groups in Chinese SLSSs [7]. Giving streamers a reward is considered as a method of interaction on SLSSs. The usage of gifts is described as similar to emojis. Gift-sending viewers are sometimes treated more special by streamers. Some gifts have to be paid with real money, but few users are not able or do not want to spend their money for gifts. Overall, they found out that (in China) gifts display a more meaningful and expressive way of communication than text.

There are some more studies discussing the motivating focus of gamification [29, 30] and the motivation of SLSSs users [31, 32]. All of the studies found that gamification elements are perceived as rewarding, they engage as well as motivate users, and are changing their behavior. However, no study examined different kinds of SLSSs and what game design elements are implemented.

3.3 Methods

The aim of this study is to get an overview about the implemented game mechanics and game

design elements on different SLSS websites. On SLSSs, some streamers add their own gamification elements to the layout of their stream via bots (e.g., a ranking that lists top gifting viewers). This kind of game mechanic was not considered for this study. This research only focuses on the game mechanics prepared and applied by the SLSS website itself.

Also, mobile live streaming applications as well as the mobile application of the evaluated platforms were not considered in this research, because only few website services have a mobile application and there are different features and game design elements used in each version. For instance, Instagram's mobile application supports the live function, but the website does not. Consequently, Instagram Live is not a research object of this study. Furthermore, not every implemented game mechanic of a system may be used by each user group (producer, participant, or consumer). The systems were examined from each user groups perspective, but because of only few differences we showed no differentiation in the results section. As investigative method, a total of 21 different SLSS websites have been examined and evaluated for a defined set of gamification elements. To this end, we conducted a content analysis with the conventional and deductive approach as literature review [33, 34]. The literature was selected in order to find appropriate SLSSs and game mechanics for our investigation. With the directed approach [33], we examined SLSSs for different game mechanics and categorized them.

3.3.1 Appropriate SLSSs

Primarily, the SLSS websites were selected through literature research [e.g., 7, 35-37] as well as online research. During the online research, we consulted the homepage of the Nanjing Marketing Group, a website specialized on Chinese markets, since China has a big user base for SLSS websites [38]. From this website we got a number of various SLSS websites which we investigated. Some websites were not accessible and the remaining amount was too big, so we decided to get their websites ranking position in China from Alexa and took the 11 highest websites. Also, we searched for the phrase "live stream" or hashtag "#livestream" on social media (e.g., Instagram, YouTube, Facebook, and Twitter) and identified the remaining Western SLSS websites.

After gathering the SLSSs, we checked their Alexa Ranking compared to other websites of the world as well as their position in the country with the most users (Table 3.1). The table displays all relevant SLSSs for our investigation which were examined for the implemented game mechanics.

Table 3.1: SLSSs websites and their global and country-specific rank

SLSS	Global Rank	Rank in Top Country
YouTube.com	2	USA: 2
Facebook.com	3	USA: 4
qq.live.com	8	China: 2
Twitch.tv	33	USA: 14
Nicovideo.jp	111	Japan: 9
Panda.tv	1,903	China: 133
Pscp.tv	2,916	USA: 1,620
yy.com	4,238	China: 456
Mixer.com	4,594	USA: 1,822
Longzhu.com	6,448	China: 662
Ustream.tv	6,830	USA: 601
Qiuxiu (x.pps.tv)	8,646	China: 1,137
Younow.com	9,037	USA: 7,037
Huya.com	9,980	China: 585
Kuaishou.com	10,261	China: 1,360
Picarto.tv	10,655	USA: 3,911
Bigo.tv	11,120	Thailand: 706
Chushou.tv	15,534	China: 1,960
Yizhibo.com	18,130	China: 1,864
Huajiao.com	19,154	China: 2,747
Laifeng.com	42.672	China: 6,856
Data source: Alexa (as of June 7, 2018)		

3.3.2 Game mechanics

The game mechanics were selected through different theoretical backgrounds. Especially previous literature reviews about gamification (e.g. [2]) and research about gathering different game mechanics (e.g. [44, 46-47]) have been considered. Afterwards, we had a list of over 20 assorted gamification elements. Following, the conventional approach via observing SLSSs was applied to get an impression about what game mechanics are implemented on SLSSs. The game elements we could not identify on SLSS websites were withdrawn from the prepared list and one game mechanic that was not mentioned as gamification in the considered literature yet was added (capturing moments). The remaining 14 game design elements and a short definition of each one is listed in table 3.2.

3.3.3 The examination

A pair of two researchers, following the four eyes principle [48], has examined each live streaming website. They discussed every game mechanic presented on the website and always reached a conclusion on which category was appropriate for the corresponding game mechanic that was observed. For example, if some form of money exchange could be recognized on the SLSS, it was classified as the ‘currency’ category.

Since the two researches did not have the appropriate language skills for the Chinese or Japanese SLSSs, a Chinese native speaker who acted as a translator was present for all

investigation sessions on the Chinese SLSSs, and a fluent speaker in Japanese for the investigation of the Japanese website.

All in all, we could identify fourteen different game mechanics that are applied by different SLSSs (Table 3.2).

Table 3.2: Common game mechanics on SLSSs

Game Mechanics	Description	Literature
Badges	Visual elements that are awarded for fulfilling tasks	e.g., [39]
Capturing Moments	Recording a short clip of a live stream	e.g., [6]
Collaboration and Team	Broadcast via split screen of two or more users	e.g., [6]
Collecting	Collection of different things, e.g., awards or gifts	e.g., [40]
Currency	Bought with real money or earned through tasks to buy gifts	e.g., [41]
Points	Earned through different tasks or site activities	e.g., [42]
Customization	Changing features of the channel, profile website, or chat	e.g., [43]
Following Others	Users stay up to date through a following, fanning, subscribing, or befriending function	e.g., [28]
Gifts	Viewers can show their appreciation with gifts	e.g., [7]
Challenges and Goals	Users can achieve goals and solve tasks that are predefined by each platform	e.g., [44]
Leaderboards	Statistics of the (daily, weekly, monthly) best streamers according to different criteria	e.g., [42]
Progress Bar	Overview of current status until reaching the next level	e.g., [45]
Likes	A kind of social feedback from viewers towards streamers	e.g., [46]
Levels	Display the users' experience in a system	e.g., [4, 39]

3.4 Results

What game mechanics are applied by which service? Differences can be observed when looking at the distribution of the total number of game mechanics among SLSS websites (Table 3.3). Especially China's SLSSs display a high number of game design elements. Eight of the eleven observed Chinese SLSS websites have ten or more implemented game elements. Also, the most game mechanics overall (twelve) can be found on SLSSs in China, namely Huya and Longzhu. Contrary, the number differs widely for the SLSSs that are the most popular in the U.S. The social media services which embedded the function of live streaming to the system (YouTube and Facebook) only have three implemented gamification elements, and, Ustream, the service for professional (business) streaming, even has none. The most game mechanics for U.S. systems have been found on the general SLSS YouNow, with 11 applied game mechanics. The gaming-focused SLSSs Twitch and Mixer implement a high number of game elements as well (nine and eight respectively).

Table 3.3: No. of game mechanics per SLSS (N=14)

SLSSs ordered by No. of Game Mechanics and Country's Ranking	No. of Game Mechanic Elements
China	
Huya.com (585)	12
Longzhu.com (662)	12
qq.live.com (2)	11
Panda.tv (133)	11
yy.com (456)	11
Laifeng.com (6,856)	11
Qiuxiu (x.pps.tv) (1,137)	10
Yizhibo.com (1,864)	10
Chushou.tv (1,960)	9
Huajiao.com (2,747)	8
Kuaishou.com (1,360)	5
Japan	
Nicovideo.jp (9)	6
Thailand	
Bigo.tv (706)	6
U.S.	
YouNow.com (7,037)	11
Twitch.tv (14)	9
Mixer.com (1,822)	8
Periscope.tv (1,620)	5
Picarto.tv (3,911)	3
YouTube.com (2)	3
Facebook.com (4)	3
Ustream.tv (601)	0

On the Japanese (Nicovideo) and Thai (Bigo) SLSS websites we identify six game design elements. Also, in Asia, we find the option to connect with others, use currency, buy gifts, and the displaying of the most successful streamers via leaderboards on every observed SLSSs (Table 3.4). All SLSSs implemented the option to connect with other users via following or befriending them, except for Ustream.

It is important to keep in mind that YouTube and Facebook are already established websites that do not have to compete with newer services as much, which could be a reason why they do not implement as many game mechanics, since they already have a big user base. It has to be mentioned that Ustream as well as Periscope value a more serious approach to live streaming, as Ustream wants to focus on education and business communication, and Periscope on reporting on live events for citizen journalism.

To conclude, Asia seems to focus on a high degree of gameful designs on their SLSS websites in contrast to the U.S.

Table 3.4: Overview of all applied game mechanics on SLSSs.

SLSSs	*Game Mechanics*													
	Currency	Points	Levels	Progress Bar	Leaderboards	Badgets	Gifts	Challenges & Goals	Customization	Collecting	Connecting with Others	Likes	Collaboration & Team	Capturing a Moment
Youtube												✓		
Facebook												✓		
QQ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Twitch	✓	✓			✓	✓	✓	✓	✓		✓			✓
Nicovideo		✓		✓	✓	✓			✓		✓			
Panda	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓
Periscope		✓			✓		✓				✓	✓		
YY	✓	✓	✓		✓	✓	✓	✓		✓	✓		✓	✓
Mixer	✓	✓	✓	✓			✓		✓		✓		✓	
Longzhu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Ustream					✓									
Qiuxiu	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	
YouNow	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Huya	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Kuaishou	✓				✓		✓				✓	✓		
Picarto						✓			✓		✓			
Bigo	✓	✓	✓		✓	✓					✓			
Chushou	✓	✓	✓	✓	✓	✓	✓		✓		✓			
Yizhibo	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		
Huajiao	✓		✓	✓	✓	✓	✓				✓	✓		
Laifeng	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	

In table 3.5, the number of SLSS websites having the respective gamification element are displayed. The most represented game design element on the examined SLSS websites is the function of following other users – respectively becoming a fan or subscriber. This function could be found on 20 of 21 SLSS websites. Furthermore, occurring on 16 SLSSs, leaderboards are the second most frequent feature. Coins, badges as well as gifts are implemented on 15 streaming websites each. Next, points are on 14, levels are on 13, and progress bars are on 12 out of 21 SLSS websites. On 10 different streaming systems, challenges or goals are found. The function of customization is implemented on 10 of the examined websites as well. Collaboration is used on 7 SLSS websites, and likes, or the possibility of social feedback, on 6 SLSSs. Collecting things was found on 5 systems. The least used element is the function of capturing a moment of a stream. It was only found on 4 out of 21 SLSS websites. Importantly, on some systems, users have the opportunity to re-watch a stream as a video, therefore it is not necessarily needed or that meaningful on each service.

Table 3.5: Number of SLSS websites having game elements (N=21)

Game Design Element Ordered by Frequency	No. of SLSSs having the Game Mechanic
Following Others	20
Leaderboards	16
Currency Badges Gifts	15
Points	14
Levels	13
Progress Bar	12
Challenges & Goals	10
Customization	10
Collaboration & Team	7
Likes	6
Collecting	5
Capturing a Moment	4

3.5 Discussion

To investigate what gamification elements are implemented, and on which social live streaming service, we applied a content analysis by using the conventional and directed approach. This way we determined 14 different game mechanics and 21 SLSSs around the world, eleven popular in China, eight in the U.S., and one each in Thailand and Japan. We even examined two of the SLSSs in the top three of the most visited websites in the world (YouTube and Facebook). We found nine services that apply ten or more game elements that we determined, eight of them are popular in China. The most used game mechanics can be found on Huya and Longzhu with 12 applied elements.

The game mechanic that was used the most often (20 times) is “following others”, which has a social aspect for the users. This facet was applied by all SLSSs in Asia and in the U.S., except Ustream. Eight of the eleven Chinese SLSSs have ten or more game design elements, for the U.S. SLSSs only one of the eight observed systems has ten or more game mechanics.

Our study found that gamification is a big deal on Chinese SLSSs. We are formulating a hypothesis because gamification is not studied explicitly in China and the U.S: If we look at the mean of the implemented game mechanics per most visited region, it is 5,375 (43/8) for U.S. systems and 10 (110/11) for Chinese systems. Following Hofstede [49], the culture in China is pragmatic (score of 87). Consequently, the preferable use of an easy and gamified system can be expected. “Gamification features are perceived to be more important by users whose goals are easy, outcome-focused and who are more inclined towards providing themselves to others” [30, p. 67]. U.S. citizens are not that pragmatic (score of 26). Also, Hofstede mentions that Chinese society is “driven by competition, achievement and success” [49], which are all indicators and characteristics of gamification.

Furthermore, gamification is considered as group orientated as there are, for instance, giving and taking gifts as well as spending virtual currencies. In contrast to the self-oriented culture in the U.S., in China group orientation and personal relationships dominate the cultural behavior (see [49]). Nowadays one can find a lot of gamification elements in Chinese everyday life. Schools successfully implemented gamification elements for teaching, and colleges are supposed to follow [50]. China will even apply a “social credit” which aims to score the trust level of citizens which is composed of, e.g., professional conduct and tax evasion [51].

To get an idea of the implemented gamification elements on SLSSs and what the goal is of each game mechanic, following, the examined elements are described in more detail and some examples of game mechanics on SLSS websites are given. Badges are visual elements which can be earned through fulfilling certain conditions [39]. Zichermann and Cunningham say that they are used “to encourage social promotion” and “mark the completion of goals” [4, p. 55]. On YouNow, for example, there are several badges for displaying different experience ranges of broadcasters.

The function of *capturing a moment* is not described in further literature because it is a special SLSSs’ function and SLSSs are rather new. It was considered as a gamification element because of the aspect of being the creator of a short clip. In SLSSs, viewers are able to capture the last few, mostly 15, seconds of a live stream. Afterwards, the clip is shown on the profile of the broadcaster as well as of the capturing user.

Collaboration and *teams* are helpful for the social aspect in games. In game play, teams are "working together and achieving a goal" [52, p. 32]. On SLSSs, broadcasters are streaming together for socializing and they may reach a wider audience together.

Collecting is an activity that most people enjoy. The aim of a collection is to complete sets. Some are comparing their own collections and are trading [40]. Respectively, on QQ Live, a user has their own backpack to collect different gifts.

Points are a unit that increase by accomplishing particular actions and certain site-activities [42]. They motivate users through a feedback function as well as trough collecting more points [40].

Virtual currencies are like points, but through them one is able to buy virtual goods [41] and, on SLSSs, gifts. In many SLSSs, especially in Chinese services, virtual currencies have to be paid with real money. The SLSS website yy.com has red diamonds as currency, QQ Live has eggs, and huya.com offers golden and silver beans as payment method.

Customization allows users to change features, respectively the design of their profile website. On Twitch, users are able to change the color of their name which is displayed in the chatting box.

Connecting with others via following the user is a basic human need, because people want to feel connected with others. But also, others want to lead people, since there cannot be leaders without followers [53]. With the usage of SLSSs, users on both ends can hold this special kind of connection.

Gifts are a virtual form of appreciation. They can vary in value, some are easy to buy, but some are more expensive, making them even more valuable to the receiver [54]. Gifts can have all kinds of forms, on Longzhu.com we can find kisses and candies (Figure 3.1), but on Yizhibo we find virtual flower petals or cars, for example.

Challenges and *Goals* are little tasks that users can complete on SLSSs [44]. This way the user gets motivated to interact on the SLSS, and challenge himself to complete goals and make him feel that he has earned his achievement. An example for a goal is, to reach a certain number of viewers on a stream.

Figure 3.1: Screenshot of one of the SLSS websites with the most gamification elements (Longzhu.com)

Leaderboards are lists of players, who are ranked based on different criteria of their success [39, 42]. This way, the user is motivated to accomplish a higher ranking on the SLSS, which also creates social impulses [4]. On Panda.tv, for example, we find rankings of the users with the most received comments, who received or gave the most money, who has had the most viewers and so on. On Twitch, one can find rankings of stream-specific donors.

The *progress bar* acts as feedback function for users [46, 40]. This way he can observe how many points he needs to progress to the next level, encouraging him to take the next step [40].

Likes are a form of approval that users signal to the streamer. This helps the user to feel appreciated by the viewers [46]. Likes are implemented on a lot of SNSs, like Facebook, for example, but can be found on SLSSs as well, like Periscope.

Levels represent the player's experience on the SLSSs [4, 39], which gives the player a feeling of mastery and accomplishment by achieving higher levels [52]. An example for levels can be found on YouNow, where one's level rises by fulfilling different activities, for instance, when the streamer is broadcasting live.

But what is striking, compared to other types of SNSs, SLSSs make use of a greater variety of game design elements. Only few game mechanics like avatars, story and narrative elements, or quests were not implemented on the observed SLSSs, probably because they will not fit the structure of such services. However, removing gamification from an SNS reduces the overall participation of users [55].

Coming back to the outcomes of the study, capturing moments, collecting of virtual items, and

likes were the least implemented among the SLSSs. In the U.S., we find YouNow with the most gamified elements (11), and the two game-focused SLSSs Twitch (9) and Mixer (8). Here, we also find the lowest numbers of game mechanics: Picarto has 3, YouTube Live and Facebook Live only have 3 each as well, and Ustream even has none.

Since Facebook and YouTube are already the most popular social media on the web, and which implemented the function of SLSSs, they probably do not feel the need to implement as many game mechanics to motivate the users to use their service, since they already have an established user base. Furthermore, Ustream and Periscope have a more serious focus in SLSSs, namely education and live news. It is interesting to discuss why some game elements might be more often implemented than others. Gamification elements have different psychological effects. Badges and leaderboards positively affect competence need satisfaction [45]. Our results show that those are the game mechanics that were implemented the most often, especially on all Chinese SLSSs. Additionally, the main game mechanics that were implemented the most are also supporting social interactions (following others) and the self-presentation of a user (leaderboards, badges).

Overall, we could observe that the SLSSs in Asia focus more on the number of gamified elements than those that are popular in the U.S.

3.6 Limitations and outlook

Some limitations of this study were recognized and need to be acknowledged. Since only in China are already over 200 different systems for streaming live [7], there is a large remaining number of SLSSs which were not considered in this paper. From the unidentified great amount of SLSSs, we observed only a limited number, to be more accurate, 21. Furthermore, live streaming systems from South America, the Middle East, Africa, or other countries were not detected. Although we followed the four-eyes principle there might be some other game mechanics which were not identified. Also, our study has no further statistical results, like correlations or significance test. Interviews with some developers of live streaming platforms will provide a better and more obvious insight into the background thoughts and goals of using game elements on each platform.

Further research should concentrate on a more detailed overview about the differences between Chinese as well as U.S. American SLSSs and, additionally, on the country-specific varieties of used game mechanics. Also, the observation of mobile social live streaming applications and the comparison of websites as well as mobile applications will be interesting. Finally, it is important to note that no other kind of social media implements such a wide array

of game elements in contrast to SLSSs. A comparison of all types of social networking services and their implemented gamification elements should be conducted.

This research presents a detailed overview on the gamification elements that are used on different SLSSs websites. It creates a reasonable basis for further studies about live streaming as well as designing systems with gamification.

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4 Gamification elements on social live streaming service mobile applications

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4.1 Introduction

Gamification is a promising and tactical strategy often used in education or online applications [5]. One definition of gamification was coined by Deterding, Nacke, and Dixon: "gamification [is] the use of game design elements in non-game contexts" [6, p. 1]. Generally speaking, gamification can be seen to be comprised of three main elements as proposed by Hamari, Koivisto, and Sarsa [14]: the elements or mechanics that are used within a system are aimed at making the user undergo a gameful experience. This in turn leads to psychological outcomes, which can be, for example, encountering a feeling of competence when solving a task or quest, but also enjoyment which is one of the main ambitions of gamification. Based on these positive experiences, it is estimated that the user will change their behavior. These behavioral outcomes can be seen in better results if learning and language apps are concerned, or health applications and physical fitness. Gamification is estimated to be implemented by many companies in the near future, proving it to be an important mechanic in business contexts [19].

The potentials of gamification are also seen for other areas, for example government services and public engagement, crowdsourcing, commerce, exercise [20], marketing and advertising, environmental behavior, and information systems [24].

Social networking services (SNSs), a special type of information system, are rather recommended by users if they are gamified, also, the intention to use the service increases [13]. Recently, SNSs such as Facebook and the video sharing platform YouTube implemented the live streaming feature, making them an embedded social live streaming service (SLSS), e.g., YouTube Live. There are two other types of SLSSs - general live streaming services where no specific focus or subject is prevalent (e.g., Periscope), and topic-specific live streaming services attracting one special interest group concerned with a certain kind of content, e.g., Twitch for eSports. This kind of SNS seems to be especially attractive in China, as there are already over 200 different SLSSs [27]. The implementation of gamification elements makes users of SLSSs feel rewarded and motivated through the interaction with the game mechanics [35].

SLSSs are mainly used out of boredom, for socializing, communication, and entertainment [3, 9,

10, 16]. In this context, the Uses and Gratifications Theory (UG&T) by Blumler and Katz [1] needs to be mentioned. If one applies media, it is usually goal-oriented and underlines a kind of expectation [22]. McQuail [30] states four main goals or motivations to use media: entertainment, information, personal identity and social interaction. In the context of SLSSs, the aspect of personal identity shall be redefined as self-presentation [45].

The Self-Determination Theory (SDT) proposed by Ryan and Deci [32] also concerns human needs and user motivation. They describe motivation as an action that drives people which is influenced by external and internal factors. Intrinsic motivation makes people engage in activities they find interesting but also challenging, making it an internal driving factor. Extrinsic motivation is an influence from outside, for example, monetary rewards or fame. Hamari et al. [14] state that users of an information system are intrinsically motivated by game design elements.

All in all, gamification is applied to motivate users and for repetitive information system use [4].

4.2 Related work

There are already studies on the impact of gamification in context with live streaming behavior. First of all, the game mechanics are seen as a motivating factor, making users want to keep using a service [12, 15, 23, 39].

A live streaming application was developed in three different versions to test the effect of gamification elements on the broadcasting behavior of SLSSs users [42]. The first version did not contain any game mechanics, the second version contained levels, and the third version added challenges and badges. The results indicate that the more gamification elements are implemented and used, the longer the streaming time.

The impact of gamification was investigated using YouNow as a case study [35]. Three different user groups (producers of streams or streamers, participants, and consumers) were analyzed, all seem to feel rewarded through different gamification elements. Most motivated by gamification mechanics are the producers of streams. Overall, all elements are at least perceived as being neutral but most often as highly rewarding and motivating.

YouNow was also the focus of a study showcasing if a difference between giving and receiving gratifications in a gamified SLSS could be observed. All game mechanics are perceived as being fun, useful, rewarding, and motivating. In general, the users seem to rather want to receive gratifications from others than taking action such as giving gratifications to the streamer [36].

Another service, Twitch, is an ideal platform to investigate as the activities of streaming and watching streams are highly gamified. For example, streams can be individualized through customization to keep the viewers entertained [38]. But the study also points out that not all features will suit all streamers and their streams. A streamer who garners a lot of viewers is not able to read all commands and chat comments, therefore some actions are getting lost in the chat history.

Twitch was the case study of another study concerned with a web-based leaderboard tool developed to amplify the gamification effect of word-of-mouth referrals, which is intended to help the streamer grow his audience [2]. Since word-of-mouth programs, which give the customers incentives to share with their friends and families, for example, a referral code, are successfully employed by many companies on social media, the impact could likely be as effective for streamers. As the study points out, the tool increased the number of new viewers and is also appreciated by the Twitch community.

Lu, Xia, Heo, and Wigdor [27] mention the engaging role of the gifting function and fan groups in Chinese SLSSs. As gift-sending viewers are sometimes treated more special by the streamer, gifting seems to be a popular option in streamer and viewer interactions. Gifting serves as a more meaningful and expressive way of communication than texts. China is the country with the most SLSSs as of now, applying various game mechanics and elements to keep the streamers and viewers engaged [37]. The mentioned study also investigated the amount of game mechanics found on the most popular SLSSs websites in the world. The features that were implemented predominantly are following others, leaderboards, and, ranking third together with currency, badges, and gifts.

In summary, gamification is motivating for streamers and viewers of SLSSs, keeping them engaged and wanting them to keep on using a service. But to our knowledge, a study on SLSS apps (Figure 4.1) and the most applied game design elements on them has not been conducted yet. Therefore, we are going to close this research gap. Based on these aspects, we arrive at the following research question:

RQ1. Which gamification elements are implemented on social live streaming service mobile apps?

4.3 Method

For this study, the aim is to get an overview of the implemented game mechanics and game elements on different SLSS mobile applications. It is possible to add gamification elements to the layout of the stream via bots (e.g., a ranking that lists top gifting viewers). This kind of game

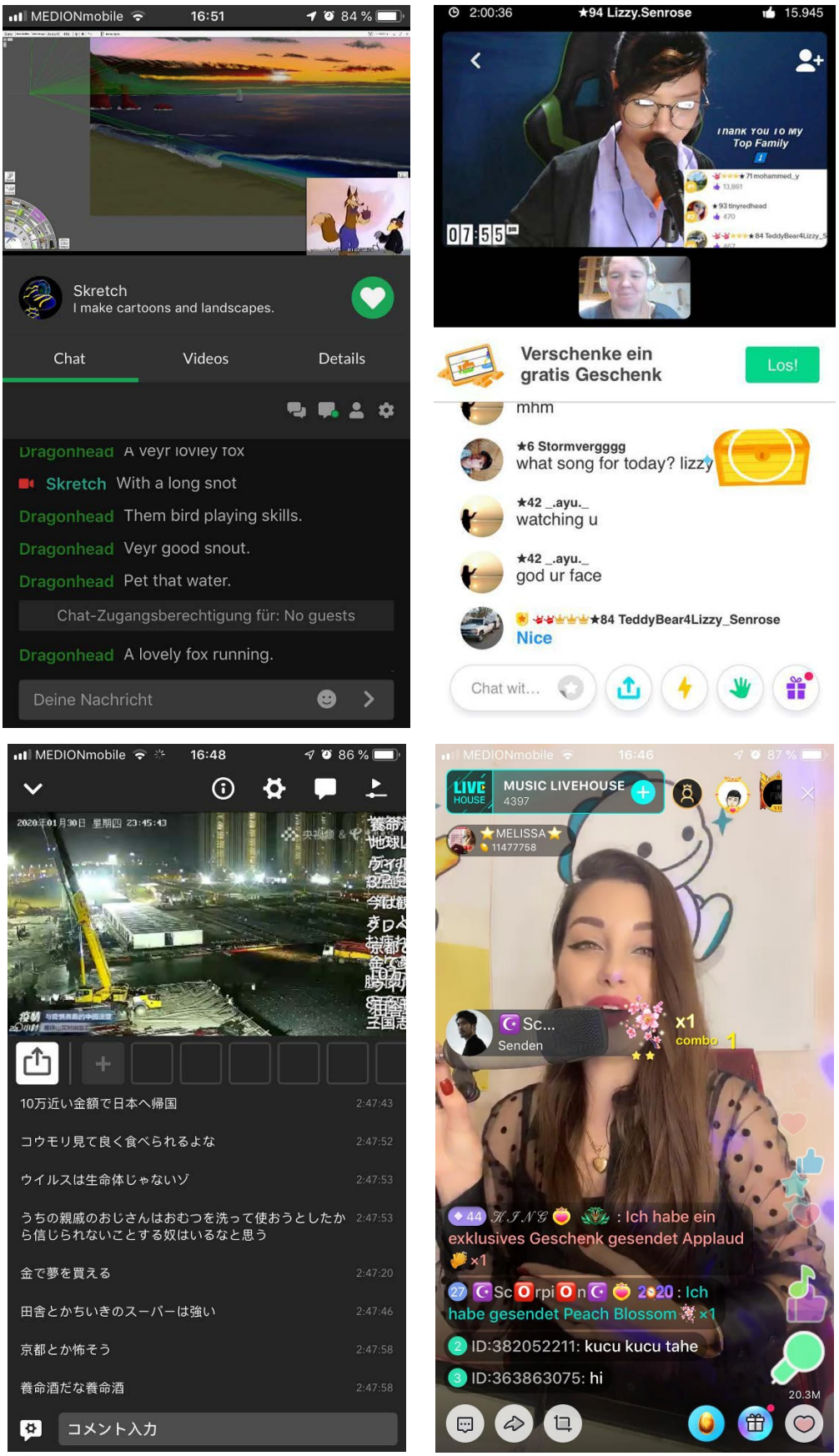

Figure 4.1: Screenshots of (left to right) Picarto, YouNow, niconico, Bigo Live

mechanic was not considered in this study. The focus lies on the game mechanics prepared and applied by the system and the apps itself.

Furthermore, SLSS websites of the applications were not included in this study, as research on the same subject was already conducted [37]. Also, not every implemented game mechanic of a system may be used by each user group (producer, participant, or consumer). The systems were examined from each user group's perspective, but because of only a few differences we showed no differentiation in the results section. As our investigative method, a total of 20 SLSS mobile applications were examined and evaluated for a defined set of gamification elements. For this study, a content analysis was conducted with the conventional and deductive approach applying literature review [8, 18]. Via the directed approach [8], we examined SLSSs for different game mechanics and categorized them.

4.3.1 Appropriate SLSSs

A first analysis of SLSS websites and the applied game elements was conducted [37]. Based on this, as a comparative measure, our study focuses on the game mechanics of the corresponding apps. Primarily, the SLSS websites were selected through literature research [e.g., 21, 27, 31, 46] as well as online research. We consulted the homepage of the Nanjing Marketing Group, a website specialized on Chinese markets, as China has a big user group of SLSS websites [28]. The 11 highest ranking websites in China were selected from Alexa.com and the corresponding apps investigated. Furthermore, the phrase "live stream" or "#livestream" were searched for on various social media sites (e.g., Instagram, YouTube, Facebook, and Twitter) to gather the Western SLSS websites. After gathering the SLSSs, we checked their Alexa rankings compared to other websites of the world as well as their positions in the country with the most users. From this, the websites were chosen. Table 4.1 displays all relevant SLSSs which were examined for the implemented game mechanics.

4.3.2 Game mechanics

The game mechanics were selected by applying different methods. Literature reviews on gamification (e.g., [14]) and research on different game mechanics (e.g., [29, 41, 43]) were especially considered. All in all, a list consisting of over 20 gamification elements was created. Following, the conventional approach via observing SLSS websites was applied to get an impression on what game mechanics are implemented on SLSSs. The game elements we could not identify on SLSSs websites were not included in the list. The 14 game design elements and a short definition of each one is listed in Table 4.2.

Table 4.1: SLSS apps and their global and country-specific ranking

SLSS	Global Rank	Rank in Country
YouTube.com	2	USA: 2
Facebook.com	5	USA: 4
live.qq.com	6	China: 3
Twitch.tv	40	USA: 18
yy.com	96	China: 29
Nicovideo.jp (niconico)	222	Japan: 19
Mixer.com	1,370	USA: 639
Huya.com	1,750	China: 244
Pscp.tv	10,710	USA: 6,933
Kuaishou.com	11,518	China: 1,116
Bigo.tv	12,610	China: 6,777
Younow.com	14,061	USA: 18,991
Longzhu.com	17,145	China: 1,359
Chushou.tv	21,036	China: 1,365
Ustream.tv	23,025	USA: 34,269
Picarto.tv	29,482	USA: 11,095
Huajiao.com	32,190	China: 2,119
Laifeng.com	37,746	China: 4,669
Qiuxiu (x.pps.tv)	59,691	China: 7,013
Yizhibo.com	88,764	China: 6,523
Data source: Alexa (as of December 29th, 2019)		

Table 4.2: Game mechanics found on SLSSs (modified from [37])

Game Mechanics	Description	Literature
Badges	Visual elements that are awarded for fulfilling tasks	e.g., [11]
Capturing moments	Recording a short clip of a live stream	e.g., [35]
Collaboration and team	Broadcast via split screen of two or more users	e.g., [35]
Collecting	Collection of different things, e.g., awards or gifts	e.g., [26]
Currency	Bought with real money or earned through tasks to buy gifts	e.g., [7]
Points	Earned through different tasks or site activities	e.g., [33]
Customization	Changing features of the channel, profile website, or chat	e.g., [40]
Following others	Users stay up to date through a following, fanning, subscribing, or befriending function	e.g., [36]
Gifts	Viewers can show their appreciation with gifts	e.g., [27]
Challenges and goals	Users can achieve goals and solve tasks that are predefined by each platform	e.g., [41]
Leaderboards	Statistics of the best streamers or viewers according to different criteria	e.g., [33]
Progress bar	Overview of current status until reaching a next step (e.g., level)	e.g., [34]
Likes	A kind of social feedback from viewers towards streamers	e.g., [29]
Levels	Display the users' experience in a system	e.g., [44, 46]

4.3.3 The examination

Each SLSS mobile app was examined by a pair of two researchers [25]. Each game mechanic presented in the app was discussed. The coders always arrived at the same conclusion on which category was appropriate for the game mechanic that was observed. For example, if some form of money exchange could be recognized on the SLSS, it was classified as the 'currency' category. Since the three researchers did not have the appropriate language skills for Japanese, a fluent speaker was present for the investigation of the Japanese app. All in all, we identified fourteen different game mechanics that are applied by different SLSSs (Table 4.2).

4.4 Results

Taking a look at Table 4.3, the number of game mechanics identified on each service are listed. Most Chinese live streaming applications have nearly all game mechanics implemented. At least eight or more gamification mechanics were observed on each Chinese SLSS app. Two of the services from China, Huajiao and Yizhibo, have all 14 game elements, four services have 13 game elements, one service has 12, and three services have 11 game elements each. From China, the least elements (eight) were found on Kuaishou.

Table 4.3: Number of game mechanics per SLSS mobile application (N = 14)

SLSS mobile application (*country of origin*)	Number of game mechanics
China	
Huajiao	14
Yizhibo	14
Bigo Live	13
Laifeng	13
Long Zhu	13
Qiuxiu	13
YY	12
Chushou	11
Huya	11
QQ Live	11
Kuaishou	8
USA	
YouNow	14
Mixer	11
Twitch	9
Periscope	7
Facebook Live	6
YouTube Live	5
Ustream	0
Japan	
niconico	11
Germany	
Picarto	3

For the US-American services, only YouNow's app has all game mechanics implemented. Facebook Live has a number of six, YouTube Live five and one service (Ustream) even has no game elements. For YouTube and Facebook, we have to take into consideration that the services are already established and important SNSs which embedded the function of streaming live broadcasts. The Japanese SLSS mobile application niconico has 11 and the German service Picarto has three game mechanics.

Following, some examples for the detected gamification elements will be mentioned, as the observation table only displays if a certain game mechanic was implemented or not, and no details are included (Table 4.4). Every checked platform, except for Ustream, has the function *following others* and *customization*, as Ustream has no game element.

On Bigo Live, streamers can add stickers to their stream as a kind of *customization*. *Collecting* is implemented on, for instance, Quixiu. Viewers can open chests when watching the stream to earn random awards. Streamers collect gifts and exchange them for income.

With *leaderboards*, users are able to compare their performance and accomplishment with other users - YouNow has leaderboards for top broadcasters, top fans, and top moment makers. On the SLSS mobile application of YY, Y coins and red diamonds are implemented as *currency* to be able to buy gifts. *Gifts* on SLSSs serve as a reward for the streamer. They are implemented on 18 of the 20 observed services, whereby they are built-in on Picarto and Ustream.

Chushou has *challenges and goals* that are called "missions," thereby users are able to get badges and to earn "active coins". The Facebook Live function in the mobile application offers the opportunity to invite friends to the stream. If the friend accepts the invitation, they are able to *collaborate* and stream via a split screen.

On Huajiao and Huya, experience *points* can be earned by, e.g., sending gifts or watching streams. Experience points are for leveling up. On most platforms, a *progress bar* displays the progress to a next level. Whereby Mixer has a progress bar for streamer-progression which tracks a streamers growth. Levels display the experience of users, we could identify them on 12 apps, e.g., QQ Live, NicoVideo, Laifeng, and Long Zhu. *Badges* on Twitch will be earned when fulfilling specific things, such as purchasing bits or giving gifts. Also, subscribers can get a so called "Subscriber Badge". Via *likes* users can show that they like a streamer's live show. Periscope provides the opportunity to send likes with colorful hearts which are shown in the live stream. The least often applied function was *capturing a moment*, we could identify it on Yizhibo, Huajiao, YouNow, and Twitch. Thereby, a user is able to record a certain time period of a stream.

Table 4.4: Overview of the implemented game mechanics per SLSS mobile application

	Game mechanics													
SLSS mobile applications	Currency	Points	Levels	Progress bar	Leaderboards	Badges	Gifts	Challenges & goals	Customization	Collecting	Following others	Likes	Collaboration & team	Capturing a moment
Huajiao	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Yizhibo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
YouNow	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bigo Live	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Laifeng	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Long Zhu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Quixiu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
YY	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Chushou	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Huya	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Mixer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
NicoVideo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
QQ Live	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Twitch	✓	✓			✓	✓	✓		✓	✓	✓			✓
Kuaishou	✓	✓					✓		✓	✓	✓	✓	✓	
Periscope	✓	✓					✓		✓	✓	✓	✓		
Facebook Live							✓		✓	✓	✓	✓	✓	
YouTube Live							✓		✓	✓	✓	✓		
Picarto									✓		✓		✓	
Ustream														

The most often detected game mechanics on the observed SLSS mobile applications were *customization* and *following others*; 19 of the 20 platforms had these functions implemented (Table 4.5). As customization allows users to be individual, it is a very popular function. With following others, users stay up-to-date about the users' activities. The functions *gifts* and *collecting*, with 18 each, as well as *currency* and *points*, with 16 each, were also often found on SLSS mobile apps.

A number of 13 of the 20 observed apps had *leaderboards*, *badges*, *challenges and goals*, *levels*, and a *progress bar*. *Likes* were observed on 12 SLSS mobile applications and *collaboration and team* on 11 apps. The least often implemented game mechanic is *capturing a moment*. It was only found on four observed systems. As some services (e.g., YouTube Live) offer the opportunity to watch the completely recorded former live streams again, it is not necessarily used on each system.

Table 4.5: Number of SLSS mobile application having game mechanics (N = 20)

Game mechanic	Number of SLSS mobile apps
Customization	19
Following others	19
Gifts	18
Collecting	18
Currency	16
Points	16
Leaderboards	13
Badges	13
Challenges & goals	13
Levels	13
Progress Bar	13
Likes	12
Collaboration & team	11
Capturing a moment	4

4.5 Discussion

In this study, a content analysis of 20 different SLSS mobile applications was conducted to discover which game mechanics are applied on each service. Thereby, the applications were checked for a number of 14 game elements. Eleven mobile apps were from China, six from the United States of America, one from Japan, and one from Germany. The results show that Chinese SLSS mobile applications apply on average the most game elements. Two of the Chinese services have all 14 and four services have 13 game elements implemented. From the United States of America, only one service (YouNow) has all game mechanics implemented and the following one with the second most has 11 game mechanics. The Japanese service has 11 as well and the German service has 3 gamification elements. The tendency shows that Chinese SLSSs have more

game mechanics implemented than the ones from the US. A comparison with German or Japanese services is not applicable as only one service of each country was considered.

Why is there such a tendency for gamification on Chinese SLSS? An explanation could be that there is a more intense competition between the various live streaming services (a number of 200) in China. Following Hamari and Koivisto [13], the intention to use a service increases if gamification is applied. Furthermore, Scheibe and Zimmer [37] explored similar results for SLSS websites. Here, the authors consulted findings from Hofstedes country comparison [17] where China is presented as a pragmatic culture. The explanation about China's society could be that they are "driven by competition, achievement and success" [17] which are attributes of gamification, providing a possible explanation for the gamification phenomenon on Chinese SLSSs.

In contrast to other social networking services, SLSSs offer a great variety of gamification elements to their users. Since the primary interaction among users on SLSSs follows the one-to-many communication model during a live stream, gamification elements offer an additional way of interaction on SLSSs.

This study shows that there is a great variety of game mechanics which can be used in many different ways (e.g., different kinds of currencies). The most often implemented game mechanics on SLSSs mobile apps are *customization* and *following others*, followed by *gifts* and *collecting* as well as *currency* and *points*. *Capturing a moment* of a stream was implemented the least often. On Ustream, no gamification elements are implemented, and we hypothesize that there are no gamification elements needed, as it is provided for professional and public live streaming.

Comparing our results to the study of Scheibe [35], she found that streamers are feeling rewarded and motivated when getting fans or subscribers. Also, gifts have a strong positive effect on the streamer's motivation, but also on the viewer's motivation when giving gifts to streamers. Earning coins is seen as a reward by all users.

When taking a look at the results from Scheibe and Zimmer [37] about the applied gamification elements on SLSS websites, a few differences can be observed while keeping in mind that one year has passed since the mentioned study was conducted. Additional gamification elements could have been added to the SLSS websites as well. For example, *customization* is more often implemented on SLSS mobile apps than on the SLSS websites. Further research should concentrate on the differentiation of applied game mechanics to a website and to a mobile app, as the user-experience and behavioral effect may vary depending on the distinct interface

structures and layouts.

The limitations of this study should be mentioned. First, we have observed only a small amount of SLSS mobile applications. There is an undefined number of services which remain undiscovered, since in China there are over 200 individual live streaming systems [27]. The number of services that were checked in this study is 20, whereof only eleven are Chinese.

Furthermore, live streaming platforms from other countries were not examined and should be considered in further studies, e.g., African, South American, and other Asian countries. Although our approach followed the four-eyes principle, there might be a bias by missing gamification elements while checking the services.

As an outlook, other types of social networking services should be checked and compared to SLSSs. As research points to the implication that SLSSs are mostly applied by generation Z, this could be an important aspect on why gamification works for live streaming; is generation Z more prone to apply gamification elements than, for example, the baby boomers or generation Y? Also, comparing the acceptance of SLSSs without gamification elements and with gamification elements, like e.g., Wilk, Wulffert, and Effelsberg [42] did, but with public SLSSs, would be an interesting investigation.

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5 Cyber social interactions: Information behavior in between social and parasocial interactions

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5.1 Offline and online human-human information interactions

Studying the behavior of people when interacting with information is one essential aspect of information science. Whenever people actively or passively deal with information, researchers speak of human information interaction and human information behavior (e.g., Wilson, 2000). Even while people interact with each other, a process of information interaction takes place. However, attention was not paid to the differences between the characteristics of particular online human-human information interactions, which should not be confused with human information interactions. In this article, we exclusively focus on offline and online relations between humans. Offline human-human information interaction mainly happens during face-to-face conversations. However, when people watch TV or listen to the radio, they also receive information from other people. Once digital and online media was accepted in our everyday life, the ways of interpersonal interaction changed. It no longer only takes place either physically and in-person (as in social interactions) or through otherwise one-sided information flow (as in parasocial interactions), but now it also happens virtually. Online human-human information interaction is very diverse and includes online web conferences, VoIP calls, watching a stream or online video and, furthermore, chatting or any other form of exchanging messages.

The concepts of “social interactions” and of “parasocial interactions” are widely known in the social sciences and also in information science. A typical example of “social interactions” are face-to-face conversations between two or more people. Fundamental characteristics of face-to-face communication and, therefore, of social interactions are bodily contact, proximity, facial expressions, eye movement, gestures, and orientation, as well as verbal and non-verbal aspects of communication (Argyle, 1969). Considering mediated contexts, audience members may establish some kind of relationship towards the “media figure” during consumption of, for instance, movies, TV shows, or social media content. However, the media figure (e.g., streamer, TV show moderator, or another celebrity) is not (or not always) aware of this relationship. Horton and Wohl (1956) describe such mediated interactions as “parasocial interactions.” Some studies apply the term parasocial interaction in the context of live streaming services or real-time online events (like webinars or online meetings) to describe the information behavior of

their participants. Is this classification actually, correct? Our studies indicate a clear “no” (see, e.g., Fietkiewicz, 2019, 2020; Fietkiewicz & Scheibe, 2017; Fietkiewicz & Stock, 2019; Fietkiewicz & Zimmer, 2020; Fietkiewicz et al., 2018, 2021; Friedländer, 2017a, 2017b; Gros et al., 2017, 2018; Honka et al., 2015; Scheibe, 2018; Scheibe & Zimmer, 2019a, 2019b; Scheibe et al., 2016, 2022; Zimmer, 2018; Zimmer et al., 2017, 2018, 2020, 2022; Zimmer & Scheibe, 2019). Describing such online interaction as “parasocial” signals a misunderstanding of the concept of parasociality (Giles, 2010). Kowert and Daniel (2021) speak of a “one-and-a-half sided parasocial relationship,” but to our understanding it is no parasocial relation at all, as it does not match the characteristics of parasocial relations. The crucial difference between social interactions and parasocial interactions is the lack of reciprocity, of bodily contact, and of temporal proximity, leading to the establishing of “intimacy at a distance” (Horton & Wohl, 1956, p. 215).

Interpersonal interactions on live streaming services or during online meetings or online schooling are neither social interactions (as there is no spatial proximity and no bodily contact) nor parasocial interactions (as there is reciprocity and temporal proximity). There indeed exists a different form of human-human interaction, which we like to name “cyber social interaction.” Cyber social interactions as real-time interactions in the technological world (Lanzara, 2015) or in cyber-spaces (Çakir, 2015) occupy an intermediate position between social and parasocial interactions. With the increasing importance and prevalence of this type of interaction, real-time digital environments occupy an exceptional position in the entire landscape of social media and other web-based tools (Scheibe et al., 2022; Zimmer et al., 2018) (see Figure 5.1). In this brief article, we introduce and discuss the novel approaches of cyber social interactions and cyber social relations in the context of information science, especially in information behavior research.

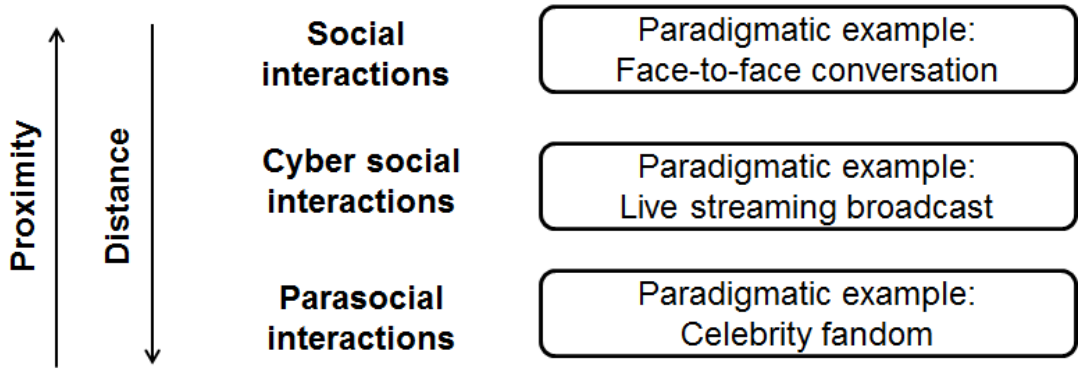

Figure 5.1: Interpersonal interactions

5.2 Cyber social interactions and cyber social relations

Cyber social interactions need to be distinguished from cyber social relations; however, both fall under cyber social behavior (McLaughlin & Wohn, 2021). Interactions are concrete interpersonal contacts in (cyber-) space and time, e.g., chatting with a live streamer or with other viewers on a live streaming platform such as, for instance, Twitch, or answering participants' questions during a webinar. Relations are constant over a certain period of time, e.g., subscribing to a streamer and viewing his or her broadcasts because of a positive experience with presented content or interaction in the past. We find social relations (and interactions) between teachers and their students, or between colleagues in a company, but when it comes to remote schooling and online business meetings, they become cyber social interactions, which can be very diverse: Some participants turn off their cameras and others do not, some are distracted by other activities, some are concerned about privacy, and while some finally feel confident to speak out, others use this as an opportunity to stay on the sidelines and refrain from active participation.

The boundaries between the three concepts of social, cyber social, and parasocial interactions are not exact but rather open and blurred. We find increasing (temporal and spatial) proximity on the way from parasocial to social interactions, and on the opposite side the distance increases when changing from social to parasocial interactions. For instance, people with pre-existing social relations who now interact online are participating in cyber social interactions, but their behavior is also near to social interaction (Mesch & Talmud, 2006). It is possible that people who have known each other, and others who did not meet online, form new virtual communities (Chen et al., 2014; Cheung et al., 2015) as a result of their cyber social interactions. However, when we communicate with new colleagues during an online meeting (as is not seldom in the time of COVID-19), it is at the very center of cyber social interactions. We found similarly clear cyber social interactions on social live streaming services when it comes to communication with, probably unknown, users from the audience (Chen & Lin, 2018). But if we observe the cyber social interactions of viewers with prominent streamers, these interactions are close to parasocial interaction. Finally, if one observes and reads the posts of a celebrity on, for instance, Instagram, and he or she is a fan of the celebrity, it is a clear one-sided parasocial interaction. If our fan comments on a post of the celebrity and the celebrity actually answers, we cross the boundary from parasocial to cyber social interactions, as reciprocity is now present in cyber-space.

Scales for measuring the extent of parasocial interactions already exist (Dibble et al., 2016; Rubin et al., 1985). It is necessary to establish similar scales for cyber social interactions as well. Further, we should empirically study this kind of behavior, more specifically people's online

information behavior during real-time events. What are the differences between social and purely cyber social relations, and what differentiates parasocial and cyber social interactions?

5.3 Cyber social interactions on live streaming services

Live streaming platforms are a paradigmatic example for cyber social relationships (Figure 5.1), as they are enabler for social actions and cyber social interactions, on which the two actor groups of streamers and viewers meet (Figure 5.2). Live streaming services are social media with the following characteristics (Scheibe et al., 2016):

- they are synchronous,
- users are able to broadcast real-time content,
- mobile devices (e.g., smartphones, tablets) or computers with webcams are used for broadcasting,
- audience members are able to interact with the broadcaster and with other members of the audience via chat messages, and
- audience members can reward performers with, e.g., virtual gifts or by tipping money.

We differentiate between four kinds of live streaming services:

- general social live streaming services (without any thematic limitation; everyone may broadcast), e.g., YouNow or IBM Watson Media (formerly Ustream),
- live streaming services for selected broadcasting users, e.g., V LIVE for Korean artists (Askeridis & Ilhan, 2019),
- embedded services (as parts of other social media platforms), e.g., YouTube Live, Instagram Live, or Facebook Live, and
- topic-specific live streaming services, e.g., Twitch (mainly e-sports and digital games), Chaturbate (nudity and sexual activity), or Taobao Live (e-commerce in relation to Alibaba).

In the following paragraph, we report on findings of a systematic review on live streaming (for details and literature references see Scheibe et al., 2022).

Broadcasters' information behavior and social actions depend on the service. Streamers behave differently on, for example, Twitch, YouNow, Chaturbate, or Taobao Live. Therefore, streamers on different platforms perform different social actions and have different influences on their audience members. On Twitch, streamers report about, for instance, e-sports events (e.g.,

European Sports League), comment on (their own) video game playing, or simply chat with the audience. Most streamers present themselves with the help of a camera and speak to their audience with a microphone, while their screen is shown as an overlay while streaming the played game or commented event on an additional screen. Various notifications are displayed across the presentation of a stream, such as chat messages, mentions of top donors, additional donation and subscriber notifications, and sometimes banners of sponsors. Broadcasters of general live streaming services, like YouNow, stream a broad variety of content. Some, for instance, chat and share information with their audience and others make music or dance. Sometimes streamers fulfil the communicated desire of their audience and adapt their streamed content to the audiences' wishes. Chaturbate is a topic-specific platform for sexual and nudity related content. Streamers provide sexual performances for their audiences. In the categories of women, men, couples, and trans they act as webcam models and flirt with audience members, do a striptease, or have sex in front of the camera. Some models use a professional studio for their broadcasting. Interaction between viewers and streamers may happen through chat messages and also remote-controlled vibrators. On shopping-related e-commerce live streaming platforms, e.g., Alibaba's Taobao Live, streamers get paid by audience members, by companies, or they receive a share of the profits by streaming product-related content. Streamers, for example, answer viewers' questions about the products and demonstrate the products' functions to encourage the purchase intentions of potential customers.

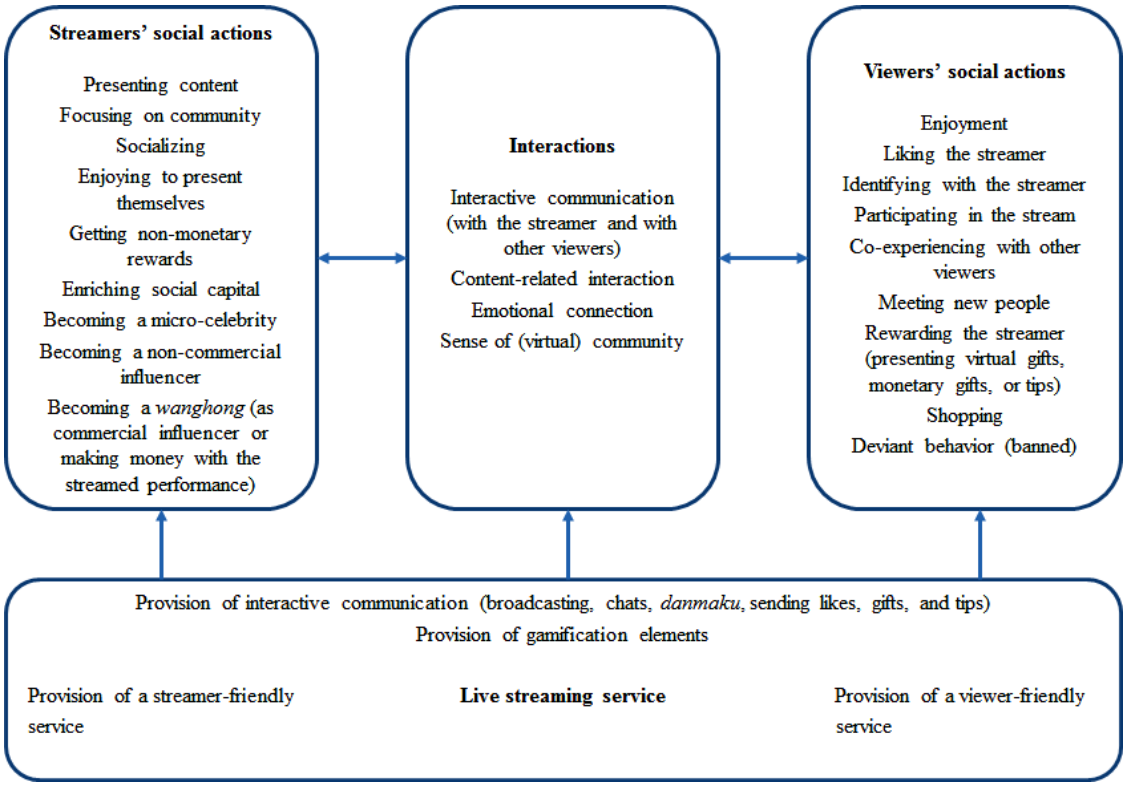

Figure 5.2: Streamers' and viewers' cyber social interactions on live streaming services (Source: Scheibe et al., 2022)

Streamers are community-focused as well as content-focused and they are motivated by and interested in non-monetary and monetary outcomes. Acting community-focused and communicating actively with their audience supports higher non-monetary outcomes, like audience engagement, and results in lower monetary outcomes, like donations, on Twitch. The majority of streamers on general live streaming services (e.g., YouNow) are motivated to broadcast live for fun and to overcome boredom as well as to get in contact with other people. About 10% of streamers even stream because they hope to become an influencer and micro-celebrity. In order to receive the audience's attention, for streamers on Chaturbate it is about creating authenticity, i.e., the authentic interaction of content (e.g., striptease) and the model's personality. Broadcasters on e-commerce live streaming platforms (like Taobao Live) are mainly interested in earning money as digital entrepreneurs or wanghongs (wǎng luò hóng rén; 网络红人 网络红人; Chinese for "people who have gone viral on the Internet"). For them, the main motive is to create social attraction and live streaming mediated interaction.

For many streamers, broadcasting starts as a hobby. They begin as amateurs and some gain social capital and develop a fan base, leading to a hybrid form of work and play. A certain level of social recognition and social capital is necessary for streamers to be able to monetize their actions and streamed content. Especially for video game streamers who started early with the release of Twitch, the situation was very promising to become a micro-celebrity. Some professional streamers make their money through donations and tips (many broadcasters on Twitch and nearly all on Chaturbate) and some act as influencers – they cooperate with companies and other institutions. One may distinguish between unpaid influencers, who influence their audience, for example, in terms of environmental protection, and paid influencers who work with a company to draw viewers' attention to a particular product. Many of them can be found as *wanghongs* on live streaming platforms which are linked to e-commerce services such as Taobao Live. However, all cyber social actions performed by streamers, regardless of their specific motives, are targeted at the interactions with their audience.

How do viewers perceive the cyber social relations on live streaming services? What are their main motives for watching and spending time on such services? What information behavior do viewers of social live streaming services have? What social actions do audience members perform? Watching live streams makes users happy and relieves stress. Moreover, viewers of live streams are attracted to the streamer's charisma and sometimes develop an emotional attachment to micro-celebrities. Liking the streamer, combined with interactivity as well as viewers' identification with the streamer, predicts the use of game related live streaming services. Viewers' social actions on live streaming platforms are mainly driven and motivated by their enjoyment. Watching and interacting in live streams can even help viewers to cope with

difficult periods in their lives such as, e.g., mental health issues or conflicts at work and in school. In addition to social interaction, the sense of community and meeting new people motivate users to engage with other users during live streams. For some users even the lack of external support in real life is a motivation to watch live streams and to "escape reality." Sometimes deviant behavior by viewers and streamers, such as abusive behavior or solicitation of unwanted sexual acts, also results in deviant relationships, normally leading to the banning of these users.

Some audience members like to participate actively in a stream and show engagement. Possibilities for viewers to participate are very diverse on live streaming services. One can chat with other audience members and with the streamer, viewers can become a guest in a streamer's broadcast and stream with the streamer via a split screen, and one can donate a subscription to other viewers and reward the streamer with virtual gifts. Receiving rewards, for example, through likes, donations, or (money-based) gifts, is essential for streamers on live streaming platforms. However, what are the incentives and motives of viewers to donate rewards which require being paid with money? Gifting rewards is an important aspect to support the streamer as well as to acknowledge the streamer's performance. Users can support a streamer by giving (non-monetary) gifts (e.g., likes, hearts), gifting money (donations or subscriptions), or paying ("tipping") streamers for desired actions (e.g., taking off a bra on Chaturbate). Supporting a streamer therefore satisfies the needs of social integrative motivated viewers.

Almost all viewers on general social live streaming services have a desire to reward streamers with special emoticons, which are virtual gifts. Especially on Twitch, viewers who are motivated by social interaction and are spending money use the service to be part of the community, to communicate with other users, and furthermore, to support the streamer. Virtual crowd and community experience, viewer-streamer interaction, and cognitive absorption (being deeply involved in using the service), influence audience members' purchase intention and are the main motives to purchase virtual gifts. Similar effects like cognitive absorption occur by experiencing flow. There seems to be a relation between sending gifts and *danmaku*, which is a kind of comment that runs across the screen (if implemented in the system). Additionally, broadcasters' reciprocal actions have motivating effects on the viewers. Viewers send (sometimes expensive) gifts, by spending a huge amount of money, to attract the attention of the streamer and sometimes the audience, or to promote preferred stream content. So, gift giving depends on the sense of community and therefore both the viewer's relationship with the streamer and with other audience members. The more engaged viewers are with the broad-cast or platform, the more likely they are to donate gifts. It should also be remembered that the viewer's sense of happiness influences the crowd's intention to donate; viewers are paying for entertainment.

The continuous viewing intentions of users lead to “stickiness” towards a specific service, show, or an individual performer. What drives the stickiness of viewers? The loyalty of users to streamers presupposes the loyalty of broadcasters to the service. Gratifications as sociability and entertainment are necessary for loyalty of viewers. In this regard, immediate feedback of users is important for the perception of media richness. Furthermore, platform attachment as well as emotional attachment towards streamers foster user stickiness. Identifying oneself with the broadcaster and the streamed content as well as emotional engagement indirectly have effects on behavioral loyalty; however, this is moderated through the intensity of interpersonal relations.

Many live streaming services provide gamification elements to support streamers’ as well as viewers’ motivation to continuously stream and watch content, respectively. Among other mechanics, one can find different kinds of points, levels, badges, leaderboards, and also gifts. On most live streaming services, users can spend money to buy the service’s virtual currency and furthermore virtual gifts for streamers. Particularly, Chinese live streaming platforms provide a great variety of game mechanics (e.g., Longzhu.com).

5.4 Micro-celebrities and wanghongs: Information behavior of influencers and streamers

We now turn to the economic perspective and the opportunity of monetizing parasocial and cyber social relations (Stock, 2020). If successful, information producers with distinct relations are (1) influencers (monetizing their parasocial relationships), (2) live-streamers (monetizing their cyber social relationships), or (3) both. For Khamis et al. (2017), such persons are “micro-celebrities.” If a person has many followers on social media services and great follower interaction, the person may cooperate with companies and make advertised posts. Successful persons may become influencers or affiliate partners and monetize their online outreach and parasocial relations (Freberg et al., 2011). Influencers can be found in many parts of the Internet; they predominantly apply, for instance, YouTube, TikTok, Instagram, and Twitter.

On live streaming platforms, there is a further monetization possibility apart from the affiliate marketing. If a person has many subscribers or casual viewers during their live streaming performances (for instance, on Twitch, Chaturbate, or YouNow) they can make money with paid subscriptions and tips (Törhönen et al., 2019, 2021).

Besides influencers and live-streamers, there is also a third category of micro-celebrities, who can profit from both monetization opportunities. Those micro-celebrities act as influencers on live streaming platforms and combine their parasocial and cyber social relations (Ma, 2021). Especially in China and South-East Asia, shopping via live streaming services is popular. At first

sight, it is similar to TV shopping channels; however, it is much more interactive. There are two groups of motivations for customers to view live streaming services for shopping, namely product-related and streamer-related motives. There seems to be evidence that the mediating role of the broadcasters as micro-celebrities is essential for viewers' purchase intentions, thus forming a web celebrity economy. A prominent example is Alibaba's live streaming service Taobao Live, where streamers present products to be sold in e-commerce. This way the streamer ends up with two sources of income—the affiliate commission (payments from the advertising companies or brands) and tips from the satisfied audience. Influencers and streamers (and combinations of both) as well as their parasocial and cyber social relations constitute the latest form of Internet-based economy, worth billions of dollars, called wanghong (Craig et al., 2021), particularly in China (Han, 2021).

5.5 Conclusion

The concept of "cyber social interactions" is becoming increasingly important these days. Especially with live streaming and video meetings and conversations, the terms "social interaction" and "parasocial interaction" fail to describe the novel behavioral traits. The time has come for information science, especially for the "important area" of information behavior research (Willson et al., 2022), to give the concept of "cyber social interactions" the attention it deserves. Information behavior is much more than information seeking behavior and includes all human activities of information production, information seeking, and information reception (Fisher et al., 2005, p. xix), be it as human-computer interaction or as human-human interaction in cyber-space. Now we have the possibility to explore human information behavior in a novel context and witness its development, for better or for worse. Our conceptual paper is a plea to engage more in human-human online relations and interactions not only in sociology, economics and business administration, and communication science, but also in information science.

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Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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Part II: Asylum seekers' information horizons

6 ICT and media practices for integration – A literature review

Published in K. Scheibe & F. Zimmer, Asylees' ICT and Digital Media Usage. New Life – New Information? (pp. 85–126). De Gruyter Saur. (Knowledge and Information. Studies in Information Science)

Our investigation starts with a literature review and the results of other studies will be presented. The focus of this literature review is the ICT and (online) media usage of asylum seekers in a new home country. Demonstrated are the existing body of knowledge, the observed gaps and how this study aims at being a first step in analyzing the issues at hand (Creswell et al., 2003). The approach for the literature review was based on Fink (2019) and Moher et al. (2009). The databases used to retrieve the documents for this study are Web of Science and Scopus, as they are commonly applied for literature review and indicate a certain qualitative standard. These retrieval systems are multidisciplinary databases, meaning they cover wide areas of research. Both can be used to search for, e.g., topics, titles, abstracts, keywords, and authors. As the databases differ in the number of journals and proceedings, it is recommended to use more than one database to enhance the overall recall (Fink, 2019). For details on the methods, see Chapter 7 (pp. 69 ff.).[18] Based on this, the following research question (RQ1) will be explored:

RQ1: How do asylum seekers use ICT, online and traditional media as well as social media for integration according to the literature?

To add the literature to the potential investigation corpora, a few requirements needed to be met. All in all, 44 documents were investigated for the content analysis of the literature review. The search, conducted on June 29, 2020, consisted of the following search queries:

Web of Science
TS = ((“refugee*” OR “asylum seeker*” OR “asylee*” OR “forced migration”) AND (“uses and gratifications” OR “media” OR “Internet Use” OR “ICT” OR “digital” OR “communication*” OR “information behavior” OR “social media”))

Scopus
TITLE-ABS-KEY ((“refugee*” OR “asylum seeker*” OR “asylee*” OR “forced migration”) AND (“uses and gratifications” OR “media” OR “Internet Use” OR “ICT” OR “digital” OR “communication*” OR “information behavior” OR “social media”))

6.1 Overview of data

Following, the findings are summarized to give an overview of the identified themes. In the next sections, the thematic areas are discussed in detail.

[18] What is meant is Chapter 7 in the book “Asylees' ICT and Digital Media Usage: New Life – New Information?”

When it comes to the different types of information that are needed by asylum seekers as well as for their information seeking behavior, the length of stay seems to determine those aspects (Tirosh & Schejter, 2017). Information is seen as one of the most crucial needs: “The only thing which I need is information, ... information is like your daily bread you know, it is important” (Tirosh & Schejter, 2017, p. 10). The information types can be differentiated into “personal/survival”–information about family members in their home country and information about how to make a living; “institutional”–information about the status and rights as asylum seekers as well as other governmental or municipal service needs; “spatial/orientational”–is concerned with language, information about spatial orientation and local customs as well as information related to news from around the world. For example, regarding the institutional information needs, the regulatory changes often cause confusion among asylum seekers. “We are in a very, uhm, like undetermined situation, so we want to hear something from the government every minute, every time,” as one participant states (Tirosh & Schejter, 2017, p. 11). A different example could be, as stated by another study participant, that they have been in the new country for nine months and did not know how to obtain a driver’s license. Regarding the spatial challenges, even though asylum seekers acquire the country’s language over time, the conversational language level is not always sufficient. For example, the bus system, in this case of Tel Aviv, was completely changed and the information was only available in Hebrew, making it impossible to understand without sufficient language skills (Tirosh & Schejter, 2017). In addition to the three identified information needs (personal/survival, institutional, and spatial/orientational) proposed by Tirosh and Schejter (2017), a study identified several other important informational areas:

> Finding appropriate work to get money to secure housing, psychological burdens suffered concerning the image of being refugees, emotional distress, lack of accessing some basic services such as education and transportation, lack of financial resources, lack of time, lack of motivation and cultural and social barriers, were significant to Syrian refugees when seeking information. (Mansour, 2018, p. 161)

Here, the information behavior is related to establishing a life in a new country as well as emotional well-being.

Based on the observed literature and studied ICT usage (see Table 6.1), different thematic areas were identified. Merz et al. (2018) observed five practices related to smartphone use by asylum seekers: 1) seeking information online, 2) communicating with family and friends abroad, 3) meeting locals, 4) meeting peers, and 5) counteracting boredom. By seeking information online, asylum seekers learn about the new country. Further, it helps with self-dependence, e.g., when acquiring information on asylum law. To communicate with family and friends abroad, smartphone applications with Internet audio and video calling capabilities and social networking

Table 6.1: Identified ICT in the literature

ICT	Literature
Computer	(Alam & Imran, 2015; Almohamed & Vyas, 2019; Bacishoga et al., 2016; Bletscher, 2020; Díaz Andrade & Doolin, 2019; Mansour, 2018; Oduntan & Ruthven, 2017; Sabie & Ahmed, 2019; Scheibe et al., 2019; Simko et al., 2018; Tirosh & Schejter, 2017)
Internet	(AbuJarour et al., 2018; Ahmad, 2020; Bletscher, 2020; Dhoest, 2020; Köster et al., 2018; Leurs, 2017; Merisalo & Jauhiainen, 2020; Oduntan & Ruthven, 2017; Simko et al., 2018; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017)
Landline	(Mikal & Woodfield, 2015; Scheibe et al., 2019; Shrestha-Ranjit et al., 2020; Tudsri & Hebbani, 2015; Yun et al., 2016)
Laptop	(Alam & Imran, 2015; Kaufmann, 2018; Leurs, 2017; Scheibe et al., 2019; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017; Witteborn, 2019)
Mobile phone, smartphone	(AbuJarour & Krasnova, 2017; Bacishoga et al., 2016; Kaufmann, 2018; Kneer et al., 2019; Koh et al., 2018; Mansour, 2018; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015; Witteborn, 2019)
Others: Internet café, flash drive	(Tirosh & Schejter, 2017)
Radio	(Mansour, 2018; Scheibe et al., 2019; Tudsri & Hebbani, 2015)
Smartphone	(AbuJarour & Krasnova, 2017; AbuJarour & Krasnova, 2018; Ahmad, 2020; Alam & Imran, 2015; Alencar & Tsagkroni, 2019; Almohamed & Vyas, 2019; Bletscher, 2020; Dhoest, 2020; Graf, 2018; Kaufmann, 2018; Kneer et al., 2019; Kutscher & Kreß, 2018; Leurs, 2017; Marlowe, 2019; McCaffrey & Taha, 2019; Merisalo & Jauhiainen, 2020; Merz et al., 2018; Mikal & Woodfield, 2015; Sabie & Ahmed, 2019; Scheibe et al., 2019; Simko et al., 2018; Witteborn, 2019)
Tablet	(Graf, 2018; Kaufmann, 2018; McCaffrey & Taha, 2019; Sabie & Ahmed, 2019; Scheibe et al., 2019)
Television	(Díaz Andrade & Doolin, 2019; Kaufmann, 2018; Mansour, 2018; Mokhtar & Rashid, 2018; Scheibe et al., 2019; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015)

sites are used. To contact and meet locals, ICT is applied often, either to initialize or maintain contacts. Further, it seems to be easier to establish new contacts online rather than offline. Additionally, meeting peers from the same home country is described as a less difficult endeavor. For entertainment, smartphones are used to watch movies and counteract boredom.

In context with digital practices, Leurs (2017) analyzed different themes. These are the 1) right to self-determination, 2) right of freedom and expression, 3) right to information, 4) right to family, and 5) right to cultural identity. Asylum seekers have the need to feel some kind of agency in a life which they cannot always control. Further, the experiences with censorship strengthens the desire for expressing oneself freely. For example, on social media, photos and videos of atrocities in Syria were removed from Facebook, Instagram, or other platforms. But social media also helps them to connect with family across a distance. By creating public profiles on Twitter

or Instagram, the diasporic attachment can be expressed, for example, by using hashtags such as “#I_love_Syria” or by sharing memories.

To overcome information challenges, the first contact point seems to be human rather than technological (Alencar & Tsagkroni, 2019; Bletscher, 2020; Nekesa Akullo & Odong, 2017; Tirosh & Schejter, 2017). Here, information is exchanged between two parties, either face to face or through online media. Furthermore, access to technology determines if someone is seen as being an opinion leader and therefore trusted more.

Next, the media mentioned in the literature as well as relevant themes were identified (Tables 6.2 and 6.3). Social media also plays an important part in giving and receiving information among asylum seekers. Mentioned social media are, e.g., Facebook, WhatsApp, and YouTube (Scheibe et al., 2019). Overall, Mokhtar and Rashid (2018) identified several needs in accordance with media usage: Media is used to fulfil the needs for entertainment, information news/updates, wealth of information, positive attitude to media, linkage, convenience, affordability, and religion. Bülbül and Haj Ismail (2019) analyzed information posted on Twitter by Syrian refugees living in Turkey. Issues that are found were related to obstacles while living in Turkey, such as work, dreaming of returning to the home country, and even beauty.

However, even though the Internet is used and applied by asylum seekers, some issues were observed. According to Coles-Kemp et al. (2018) as well as Mikal and Woodfield (2015), asylum seekers perceive the Internet as being dangerous. The concerns are related to frauds or being exposed to unsavory content. Therefore, the Internet is used carefully and only if needed. Further, parents often felt restricted in their ability to help and protect their children in context with mobile and digital media usage (Coles-Kemp et al., 2018). However, this can be attributed to technical literacy, as many people are not familiar with net safety tools. This in turn provides opportunities for education, offering independence and security in the application of ICT and media. To sum up, the mentioned aspects serve as a starting point to build categories for this literature review. At some points, contradicting insights were made among the literature. However, this can be attributed to the geographical differences where the studies were conducted (see Table 6.4) or the different studied nationalities. Overall, 44 studies were consulted and examined for the categories, which are:

6.2. ICT and media usage in a new home country

6.3. Problems related to ICT and media usage

6.4 Results in accordance with the Uses and Gratifications Theory

6.5 Information exchange

Table 6.2: Identified media in the literature

Traditional and online media	Literature
Books, magazine	(Dhoest, 2020; Mansour, 2018; Scheibe et al., 2019)
Dating app (e.g., Badoo, hi5, Meetone, Twoo, Grindr)	(AbuJarour & Krasnova, 2018; Dhoest, 2020; Merz et al., 2018; Witteborn, 2019)
Education (e.g., video tutorials, moodle platform, app)	(AbuJarour & Krasnova, 2018; Merz et al., 2018)
E-mail	(Alam & Imran, 2015; Alencar & Tsagkroni, 2019; Bacishoga et al., 2016; Díaz Andrade & Doolin, 2019; Mikal & Woodfield, 2015; Mokhtar & Rashid, 2018; Sabie & Ahmed, 2019; Scheibe et al., 2019; Simko et al., 2018; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017; Udwan et al., 2020)
E-payment app	(AbuJarour et al., 2019; Coles-Kemp et al., 2018; Sabie & Ahmed, 2019)
Gaming	(Ahmad, 2020; Merz et al., 2018; Mikal & Woodfield, 2015; Scheibe et al., 2019)
GPS, navigation app (e.g., DB navigator app, location finding app, Google maps)	(AbuJarour et al., 2019; Ahmad, 2020; Alencar & Tsagkroni, 2019; Coles-Kemp et al., 2018; Díaz Andrade & Doolin, 2019; Duarte et al., 2018; Kaufmann, 2018; Kutscher & Kreß, 2018; McCaffrey & Taha, 2019; Merz et al., 2018; Sabie & Ahmed, 2019; Scheibe et al., 2019)
Internet radio	(Díaz Andrade & Doolin, 2019; Merz et al., 2018; Tirosh & Schejter, 2017)
Mobile instant messenger (e.g., Yahoo! Messenger, WickR)	(Bacishoga et al., 2016; Leurs, 2017; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015)
News website, (online) news channel	(Díaz Andrade & Doolin, 2019; Mokhtar & Rashid, 2018; Scheibe et al., 2019; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015)
Newspaper	(Mansour, 2018; Marlowe, 2019; Scheibe et al., 2019; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015)
Official websites (German government website, UNHCR)	(Köster et al., 2018; Mokhtar & Rashid, 2018)
Other: Ethnic media, online webpage, various apps (e.g., life counseling app, prayer times app, design software, ebay), Wikipedia, SMS	(AbuJarour et al., 2019; AbuJarour & Krasnova, 2017; Coles-Kemp et al., 2018; Graf, 2018; Mokhtar & Rashid, 2018; Sabie & Ahmed, 2019; Scheibe et al., 2019)
Search engine (e.g., Google search engine)	(Alencar, 2018; Díaz Andrade & Doolin, 2019; Köster et al., 2018; Scheibe et al., 2019; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017)
Translation services (e.g., app, website, Google translate, Microsoft translator)	(AbuJarour et al., 2018; AbuJarour et al., 2019; AbuJarour & Krasnova, 2017; AbuJarour & Krasnova, 2018; Alencar & Tsagkroni, 2019; Almohamed & Vyas, 2019; Coles-Kemp et al., 2018; Duarte et al., 2018; Köster et al., 2018; McCaffrey & Taha, 2019; Merz et al., 2018; Scheibe et al., 2019; Tirosh & Schejter, 2017)

Table 6.3: Identified social media in the literature

Social media	Literature
Facebook	(AbuJarour et al., 2019; AbuJarour & Krasnova, 2017; AbuJarour & Krasnova, 2018; Ahmad, 2020; Alencar, 2018; Alencar & Tsagkroni, 2019; Almohamed & Vyas, 2019; Bletscher, 2020; Dhoest, 2020; Graf, 2018; Kaufmann, 2018; Kneer et al., 2019; Köster et al., 2018; Kutscher & Kreß, 2018; Leurs, 2017; Mansour, 2018; Marlowe, 2019; Marlowe, 2020; McCaffrey & Taha, 2019; Merz et al., 2018; Mikal & Woodfield, 2015; Mokhtar & Rashid, 2018; Scheibe et al., 2019; Simko et al., 2018; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015; Udwan et al., 2020; Witteborn, 2019)
Instagram	(AbuJarour et al., 2019; Ahmad, 2020; Alencar, 2018; Kneer et al., 2019; Leurs, 2017; Marlowe, 2019; McCaffrey & Taha, 2019; Mokhtar & Rashid, 2018; Scheibe et al., 2019)
Professional (e.g., LinkedIn, Xing)	(Alencar, 2018; Alencar & Tsagkroni, 2019; Stiller & Trkulja, 2018)
Other: live streaming services, reddit, TikTok, 9GAG	(Scheibe et al., 2019)
Skype	(Ahmad, 2020; Dhoest, 2020; Díaz Andrade & Doolin, 2019; Kaufmann, 2018; Kutscher & Kreß, 2018; Merz et al., 2018)
Snapchat	(AbuJarour et al., 2019; Ahmad, 2020; Kneer et al., 2019; Leurs, 2017; Scheibe et al., 2019; Udwan et al., 2020)
Twitter	(Ahmad, 2020; Alencar, 2018; Bülbül & Haj Ismail, 2019; Marlowe, 2019; Scheibe et al., 2019; Stiller & Trkulja, 2018)
Viber	(Ahmad, 2020; Alencar, 2018; Almohamed & Vyas, 2019; Bletscher, 2020; Kaufmann, 2018; Kutscher & Kreß, 2018; Marlowe, 2019; Merz et al., 2018; Simko et al., 2018; Witteborn, 2019)
WhatsApp	(AbuJarour et al., 2019; AbuJarour & Krasnova, 2017; AbuJarour & Krasnova, 2018; Ahmad, 2020; Alencar, 2018; Alencar & Tsagkroni, 2019; Almohamed & Vyas, 2019; Bletscher, 2020; Coles-Kemp et al., 2018; Kaufmann, 2018; Kneer et al., 2019; Kutscher & Kreß, 2018; Leurs, 2017; Marlowe, 2020; McCaffrey & Taha, 2019; Merz et al., 2018; Mokhtar & Rashid, 2018; Sabie & Ahmed, 2019; Scheibe et al., 2019; Simko et al., 2018; Witteborn, 2019)
Other messengers (e.g., Facebook Messenger, Tango, IMO, Telegram, Line, WeChat)	(AbuJarour et al., 2019; Ahmad, 2020; Alencar, 2018; Kaufmann, 2018; Marlowe, 2019; McCaffrey & Taha, 2019; Merz et al., 2018; Mokhtar & Rashid, 2018; Scheibe et al., 2019; Witteborn, 2019)
YouTube	(AbuJarour et al., 2019; AbuJarour & Krasnova, 2018; Ahmad, 2020; Merz et al., 2018; Mokhtar & Rashid, 2018; Simko et al., 2018; Udwan et al., 2020)

Table 6.4: Countries of included studies

Country of study	Literature
Australia	(Alam & Imran, 2015; Almohamed & Vyas, 2019; Koh et al., 2018; Tudsri & Hebbani, 2015; Walker et al., 2015)
Austria	(Kaufmann, 2018; Merz et al., 2018)
Belgium	(Dhoest, 2020)
Egypt	(Mansour, 2018)
Germany	(AbuJarour et al., 2018; AbuJarour et al., 2019; AbuJarour & Krasnova, 2017; AbuJarour & Krasnova, 2018; Duarte et al., 2018; Graf, 2018; Köster et al., 2018; Kutscher & Kreß, 2018; Scheibe et al., 2019)
Greece	(Merisalo & Jauhiainen, 2020)
Hong Kong	(Witteborn, 2019)
Iran	(Merisalo & Jauhiainen, 2020)
Israel	(Tirosh & Schejter, 2017)
Italy	(Merisalo & Jauhiainen, 2020)
Jordan	(Merisalo & Jauhiainen, 2020)
Canada	(Sabie & Ahmed, 2019)
Lebanon	(Ahmad, 2020)
Malaysia	(Mokhtar & Rashid, 2018)
Netherlands	(Alencar & Tsagkroni, 2019; Kneer et al., 2019; Leurs, 2017; Udwan et al., 2020)
New Zealand	(Shrestha-Ranjit et al., 2020)
South Africa	(Bacishoga et al., 2016)
Sweden	(Coles-Kemp et al., 2018; Graf, 2018)
Turkey	(Bülbül & Haj Ismail, 2019; Merisalo & Jauhiainen, 2020)
U.S.	(Bletscher, 2020; Mikal & Woodfield, 2015; Simko et al., 2018; Yun et al., 2016)
Uganda	(Nekesa Akullo & Odong, 2017)
United Kingdom	(Oduntan & Ruthven, 2017)

6.2 ICT and media usage in a new home country

When establishing oneself in a new country, finding employment is challenging, therefore, buying different technology appliances, including Internet access devices, becomes difficult (Alam & Imran, 2015). As a result, accessing important information can be problematic (Nekesa Akullo & Odong, 2017). Tirosh and Schejter (2017) state how asylum seekers sometimes sit in restaurants with channels from their home country being broadcasted on TVs. Certain stores sell phone cards, music discs, and DVDs from the asylum seekers' home country, the owner helping many of the customers who do not know how to access the Internet. Interviewees also stated that they do not own a computer and therefore relied on Internet cafés. Others even use 3G mobile services to access the Internet on their laptops. If

no cable modems or routers are accessible, Wi-Fi hotspots serve as alternatives (Tirosh & Schejter, 2017). A study exploring challenges of asylum seekers accessing the heavily technological infrastructure in Canada arrived at interesting results (Sabie & Ahmed, 2019). All asylum seekers owned a smartphone and data plan, except for one participant. Even the children, one being only eight years old, owned a smart device. Mobile phones are used on a regular basis and, surprisingly, other digital devices are seldom utilized. But all interviewees stated that they had access to Wi-Fi and at least one computer and or tablet at home, whereas only four of the interview participants used a computer. Similarly, the library and community centers offer free Wi-Fi and computer access. Being able to connect to the Internet is simultaneously seen as being connected to the world (Coles-Kemp et al., 2018). The mobile phone is present in all areas of life and often the first thing the participants look at in the morning (Coles-Kemp et al., 2018).

A closer look will be taken at different age groups and gender-dependent differences and similarities regarding ICT application when establishing oneself in a new home country. Regarding age differences, a study conducted by Merisalo and Jauhiainen (2020) concerning Internet use and smartphone ownership of different age groups concludes that the older asylum seekers are, the less likely they are to use the Internet. Another study confirms this distribution, the younger generation has more ICT related skills:

> For us it's a lot easier, but for our parent's, that's a barrier … if I explain to my mum that I'm going on the Internet and I'm trying to find this information, she like gets out the Yellow Pages and calls the doctor. I'm like no I can go and type it in and look for a doctor and look for their schedule, and she finds that hard to comprehend. So it's just … getting on the Internet and finding certain things is a problem (Alam & Imran, 2015, p. 356)

Further, children at school age, teenagers and early-twenties to young adults, have a higher access rate to technology than even their older siblings and consequently parents and grandparents (Bletscher, 2020). When focusing on younger participants and their usage of social networking sites and messaging services, WhatsApp to communicate with others and Facebook to seek and share information are used the most often. Twitter, Instagram, and Snapchat, however, are rarely used. YouTube, on the other hand, is applied a lot for entertainment and leisure purposes.

Also, there seems to be no gender-based digital divide in regards to Internet users (Merisalo & Jauhiainen, 2020). In contrast, Ahmad (2020) reports that, according to their study of asylum seekers' social media and device usage, of the 40% who do not own a device, the majority of those are young unmarried females between 15 and 18 years. Alas, the Internet was not the

focus, but smartphone ownership. This group uses smartphones owned by their parents or siblings. It came to light that, often, the male person of the household is responsible for purchasing phones for the children and wife. Furthermore, once a sibling or parent upgrades to a newer model, the older phone is given to the younger family member. This notion is supported by a study of smartphone use of asylum seekers in New Jersey (McCaffrey & Taha, 2019): Men tend to have the newest models of phones. Whereas they and older school-aged children also own data plans, many younger children do have their own device, but no data plan. Some women had two phones, a smartphone without a data plan and a welfare phone, which is a flip phone provided by charity programs. When the husband left for work or similar duties, he took the data plan device with him.

The app distribution among refugees in the new country shows interesting insights. According to AbuJarour et al. (2019), a study about the most common apps on the mobile phone home screens reveals that the most often user-installed app is WhatsApp. Other popular apps are Facebook Messenger, YouTube, Facebook, and Instagram. This was compared to a German user group and the results indicate that asylum seekers install Facebook and YouTube significantly more often than the German participants. Moreover, the most helpful apps seem to be social media apps, e-payment apps, location finding apps, translation apps, and apps for supporting the completion of school work (Coles-Kemp et al., 2018).

6.3 Problems related to ICT and media usage

A few problems in relation to ICT and media usage were mentioned in the literature. According to Sabie and Ahmed (2019), all of their participants were not familiar with most applications they had to use on a regular basis in their new home country. Examples were e-mails or banking. For some, they did not know about these applications or did not use them before. This is also reflected in their information behavior: doing things online or digitally and looking for information on the Internet is not familiar to them. Often, there is no awareness on how or where to look for information. This is echoed by observations made by Mikal and Woodfield (2015) as well as Tirosh and Schejter (2017). They found that the language skills and digital literacy which are necessary to locate relevant information is not something that everyone has — it cannot be taken for granted. When asked about if one participant could find, for example, the business hours of a certain institution online, they would not be able to do so (Mikal & Woodfield, 2015). When it comes to accessing and finding information, even if formal networks such as local municipalities or NGOs offer digital initiatives regarding information, in this case, the labor market, asylum seekers did not know about these offerings (Alencar & Tsagkroni, 2019), showcasing how knowing where to access certain information is crucial.

This problem ties in with the accessibility of ICTs. Even though ICTs offer a multitude of advantages for successful integration, it is argued that these are not widely available for asylum seekers (Bletscher, 2020). Further, fluency of a foreign language, most often English, impacts the use of information technologies. Surprisingly, this also has another side. Because asylum seekers are able to apply ICT and connect to other similar ethnic groups, this has discouraging effects on developing English fluency. However, following Díaz Andrade and Doolin (2019), participants were highly aware about their ICT skills, and were therefore more employable and business savvy. “It is very important as all the assignments are through the Internet and without the Internet you can’t get your work done. For instance, we can do all our transactions on the Internet such as paying bills, banking and shopping. It saves a lot of time” (Alam & Imran, 2015, p. 354). Further, the Internet provides asylum seekers with a sense of independence. Through applying those media and ICTs, they become more confident and have more freedom (Bletscher, 2020). Merz et al. (2018) state how translation apps and online dictionaries are supportive in being self-dependent. For example, when encountering situations in which one needs to speak the new country’s language, these services can be used to communicate efficiently. Additionally, it was mentioned how a few asylum seekers do not trust others when it comes to information and therefore use ICTs (Bletscher, 2020). When it comes to who to trust about information, there is conflicting literature. Merz et al. (2018) state that refugees use online sources to verify the information obtained by word-of-mouth. However, concerning the aspect of independence, some participants admit that they rely too much on resettlement agencies to use ICTs for them, limiting self-sufficiency in technology use (Bletscher, 2020). This results in co-dependency and reliance on these agencies. It is known that those asylum seekers who have access to other information sources because of their language skills and a broader social network in their new home country, rely less on social media to find information, for example, regarding legal or organizational information (Köster et al., 2018). Even though this phenomenon could be observed, the use of social media still contributes to social inclusion by providing information and therefore helping with integration (Köster et al., 2018).

The adoption of media and technology leads to some problems (Simko et al., 2018). Since using a certain new technology to accomplish a goal, like writing an e-mail or learning a new language, using it securely and privately is sometimes not a top priority. This is made even more difficult by the fact that many asylum seekers do not have a computer at home (Simko et al., 2018). Further, Mikal and Woodfield (2015) as well as Coles-Kemp et al. (2018) observed how their respondents perceived the Internet as being dangerous, halting them from using it. However, with the right digital literacy tools these perceived dangers can be overcome (Mikal & Woodfield, 2015).

6.4 Results in accordance with the uses and gratifications theory

Upon reviewing the literature, the studies were categorized according to the Uses and Gratifications Theory (U&GT) after Katz et al. (1973), McQuail (1983) as well as Shao (2009). As the nature of this book is the analysis of the motives to use ICT as well as media and social media, this study aims at finding the motives of asylum seekers to apply such ICT and media. As the U&GT is widely established, it is fitting to serve such a purpose. Furthermore, it was distilled what information these vulnerable groups are most interested in when trying to establish a new life. The applied information behavior, such as, what kind of ICT or media was utilized to serve those needs, was analyzed as well.

Information

In the following, the literature concerning themes in relation to information will be presented. These themes were further divided in subcategories for a better overview. The identified themes are: language learning; education and employment; health; law; news; housing; everyday information and tasks.

Language learning. A few papers could be identified dealing with language learning in relation to media and ICT (AbuJarour & Krasnova, 2017, 2018; Alencar, 2018; Almohamed & Vyas, 2019; Díaz Andrade & Doolin, 2019; Koh et al., 2018; McCaffrey & Taha, 2019; Merz et al., 2018; Mikal & Woodfield, 2015; Nekesa Akullo & Odong, 2017; Sabie & Ahmed, 2019; Tudsri & Hebbani, 2015; Witteborn, 2019). According to AbuJarour and Krasnova (2018), Alencar (2018) as well as Merz et al. (2018), learning the new country's foreign language is the most important concern for asylum seekers. Learning a new language correlates with the desire to understand a new culture (Alencar, 2018; Merz et al., 2018). According to Alencar (2018), participants reported on how they applied technologies for language and cultural learning even before they received their residence permit. This can also be due to the unfortunate fact that, depending on the new country, asylum seekers are not allowed to participate in education programs, including language courses, until the asylum process is completed (AbuJarour & Krasnova, 2017). Therefore, it is not surprising that asylum seekers turn to ICTs to acquire different educational goals. Of course, where applicable, visiting language schools are important for language learning (AbuJarour & Krasnova, 2018; Mikal & Woodfield, 2015). But additional means are needed, ranging from several media to online offers. When it comes to traditional media, Almohamed and Vyas (2019) describe how participants use media such as dictionaries to learn the definition of a word and even a whiteboard to write down new words to remember them better. Asylum seekers seem to rely heavily on ICT to learn the new country's language (AbuJarour & Krasnova, 2017; Almohamed & Vyas, 2019). For example, Díaz Andrade and Doolin (2019) describe how

the computer at home is used for daily language lessons. Furthermore, it is possible to contact teachers via e-mail this way. Even a phone and laptop can be utilized for language acquisition as described by Witteborn (2019). Another favored method to acquire a new language is the application of several online media (AbuJarour & Krasnova, 2018; Almohamed & Vyas, 2019; Merz et al., 2018; Mikal & Woodfield, 2015). Merz et al. (2018) describe how refugees search for online materials in order to help with learning German by self-study. For example, educational websites that were provided by the instructors of language courses were acknowledged (Mikal & Woodfield, 2015). Furthermore, dedicated websites concerned with language learning were mentioned by Merz et al. (2018), as well as specialized apps (AbuJarour & Krasnova, 2017, 2018), and online dictionaries:

> I used my computer to improve my English through using different types of dictionaries. In the past, I used hard copy dictionaries, which are not easy to find the meaning of words, but nowadays I have different types of digital dictionaries, so I can use three to four different types of dictionary on the computer. Sometimes I use the Internet to find specific meanings for the words or for sentences; and to translate the text you may need more than one dictionary. (Almohamed & Vyas, 2019, p. 41)

AbuJarour and Krasnova (2017) also mention some apps which help asylum seekers to connect with volunteers of a new country to learn the native language, underlining the importance of local contacts. Furthermore, refugees seem to access several e-learning channels to learn a new language (AbuJarour & Krasnova, 2018). Here, YouTube was mentioned several times (AbuJarour & Krasnova, 2017, 2018; Alencar, 2018). “Social media is helping a lot to learn the Dutch, because you can search for You-Tube, and follow so many videos, and you can start your first step of learning the Dutch language (Alencar, 2018, p. 1598). AbuJarour and Krasnova (2017) describe how most of their interviewees mentioned a YouTube channel hosted by an Arabic teacher who posts lessons in Arabic to teach German. Other social media seem to be a favored method for language acquisition (Alencar, 2018). AbuJarour and Krasnova (2018) acknowledge applications such as Facebook and WhatsApp for this; Merz et al. (2018) also mention video tutorials on Facebook. When asked about social media, one participant stated: “I do not know if it helps us for adaptation, but we can learn the language of the new country” (Alencar, 2018, p. 1597). Further, it was mentioned how the creation of Facebook pages and groups that include information on culture, language and traditions of every culture could be helpful to asylum seekers (Alencar, 2018). Of course, native media of the new country play an important part as well. For example, Merz et al. (2018) state how refugees listen to Austrian radio broadcasts to not even learn the country’s native language, German, but also familiarize themselves with the Austrian dialect. Tudsri and Hebbani (2015) observed that those who have limited language proficiency resorted to watching, in this case, English language media. Those who have no

interest in improving their skills resort to media in their own native language. When it comes to children and their language acquisition, a study observed how the younger ones learn words for colors with the help of an iPad game (McCaffrey & Taha, 2019).

Education and employment. Coming to education and employment, a few observations were made (AbuJarour & Krasnova, 2018; Ahmad, 2020; Bacishoga et al., 2016; Díaz Andrade & Doolin, 2019; Koh et al., 2018; Mansour, 2018; Merisalo & Jauhiainen, 2020; Mikal & Woodfield, 2015; Nekesa Akullo & Odong, 2017; Sabie & Ahmed, 2019; Stiller & Trkulja, 2018; Tirosh & Schejter, 2017). According to Nekesa Akullo and Odong (2017), 35% of their study participants need information on education and jobs to improve their well-being. In this context, when seeking information, finding appropriate work to earn money and housing are significant to Syrian asylum seekers (Mansour, 2018). According to AbuJarour and Krasnova (2018), one participant states: "[T]he most important thing is deciding to join a Master's program at Berlin University of Technology using my smartphone. I visited their website and I found a special program for refugees where they can join lectures as guests" (p. 7). Again, this highlights the importance of ICT in a new environment. In context with education acquisition, some countries make it difficult to get previous earned credentials approved in the home country, requiring asylum seekers to gain the degree again in the new country (Sabie & Ahmed, 2019). An Internet connection can help in acquiring education, as was explained by a Sudanese asylum seeker (Tirosh & Schejter, 2017). The Internet was also mentioned when it comes to finding both volunteer and paid employment in the United States (Mikal & Woodfield, 2015). Furthermore, the Internet is very helpful in monitoring the job market and which skills and documents are required to apply for a particular type of job as was explained by Díaz Andrade and Doolin (2019) on a study of asylum seekers living in New Zealand. Additionally, the mobile phone was mentioned in context with employment. According to a study by Bacishoga et al. (2016), the mobile phone is stressed as being important in order to be contactable for employment purposes. This is especially true for asylum seekers who are self-employed. The mobile phone is used to recruit customers and welcome them to be future customers. Even a study on gender- and age-dependent aspects concerned with job opportunities was observed. According to Merisalo and Jauhiainen (2020), male respondents are 1.5 times more likely than female respondents to seek information online about work opportunities. This statement is true for younger asylum seekers (19 to 29 years old) as well – they are more likely to search for work opportunities online than middle aged or older asylum seekers. All in all, refugees are aware of how ICT skills help them to make oneself more employable or are even useful to set up a business (Díaz Andrade & Doolin, 2019). However, a self-reported skill assessment on web browser, Internet search engine, and social network usage showcased that the participants

rated their skills to be above average (Stiller & Trkulja, 2018). But, after completing some tasks related to digital literacy skills during an observatory study, the researchers found that the perceived skills were overestimated as the participants demonstrated lower skills in practice. Observed issues were related to information seeking processes such as formulating advanced search queries which were often not known, or orienting oneself on a website.

Health. Literature on health information behavior was identified (Almohamed & Vyas, 2019; Graf, 2018; Mikal & Woodfield, 2015; Nekesa Akullo & Odong, 2017; Scheibe et al., 2019; Tirosh & Schejter, 2017; Udwan et al., 2020). Concerning health information, according to Nekesa Akullo and Odong (2017), 95% of their study participants reported that they need information on health services. For example, mothers wanted to know how they can get access to health services for their children and themselves. Scheibe et al. (2019) arrive at similar findings. Here, the topic health dominates all other information categories in its importance. When it comes to ICT and media, Google Translate was mentioned as helpful when visiting doctor appointments (Almohamed & Vyas, 2019). Furthermore, the Internet is helpful in accessing information on health in general (Tirosh & Schejter, 2017) or even certain medications (Mikal & Woodfield, 2015). According to a study on social media for social support, health, and identity, Udwan et al. (2020) state how the first step in seeking health information is to look up doctors' contact details and nearby hospitals or clinics via Internet-based platforms. "We can contact the GP via email, or we can make an appointment online without any difficulty and would save time and make life easy" (Udwan et al., 2020, p. 7). One feature that seems to be particularly convenient is the geolocalization option which is added to most social media platforms and mobile applications. They are helpful to find and evaluate the closest medical clinic (Udwan et al., 2020). In this context, social media platforms were mentioned as well. Here, asylum seekers have the opportunity to share their experiences regarding health procedures and give assistance in the new country. A great example would be the Facebook community group "الطبيةفيهولندا medical in Nederland" which is focused on the needs of the Syrian community in the Netherlands with 16,000 followers. "I ask questions on the Facebook page 'medical in Nederland' about health issues, when I get sick, I can ask about medicines, different diseases, comparing health insurance, death insurance, healthy food, useful information about pregnancy, for children, etc." (Udwan et al., 2020, p. 7). If credibility is concerned, the information is preferably discussed via social platforms with trusted social networks or family members with medical backgrounds. In this context, content on social media is not only consumed by asylum seekers, but also produced. For example, one asylum seeker, working as a pharmacist, created a page on Facebook and sees it as his duty to help his people. The same person also produces YouTube videos about those topics. Albeit not mentioned often in the literature, mental health was

brought up by Graf (2018). Here, one participant shared that he uses a life counselling app to manage his mental health. For him, he could depend on the app to give him valuable advice and support.

Law. Another type of information which is important to asylum seekers concerns the legal system of a new home country (Alencar & Tsagkroni, 2019; Duarte et al., 2018; Köster et al., 2018), especially the asylum status (AbuJarour & Krasnova, 2017; Mansour, 2018; Merz et al., 2018; Mokhtar & Rashid, 2018; Witteborn, 2019). Here, ICTs and media are used to retrieve information related to these topics. However, finding and understanding the content of those laws can be troublesome. According to Köster et al. (2018), their interviewees state how difficult it can be to assess this kind of information. Accordingly, German government sites, for example, are not always provided in the asylum seekers' native language and therefore require advanced language skills: "At first, I try to visit the German government websites, and if it is difficult I try to ask a German person and if I can't find the answer I'm looking for, I try to ask in Facebook groups; they can sometimes help" (Köster et al., 2018, p. 5). Therefore, following the statements of the study's participants, asking other natives, e.g., Germans, for help, is considered to be beneficial in this situation. However, as is also evident, asking native speakers is not always possible. Here, social media serves as an alternative information source. In this case, asylum seekers would refer to Facebook pages particularly specialized for Syrians and their information needs. Another mentioned Facebook page is WDRforyou, a member of the consortium of German public-broadcasting institutions. Similar findings regarding social media were made by Alencar and Tsagkroni (2019). Here, the connections that were made on social media are helpful in sharing information with asylum seekers to avoid breaking specific rules and laws in the Netherlands. Asylum seekers rely on their smartphones to access and translate official government websites (AbuJarour & Krasnova, 2017). Accordingly, asylum regulations change frequently and are published only in the local language. Asylum seekers need to follow a lot of administrative steps involving different governmental offices to finalize the asylum process, e.g., getting a residence permit or health insurance. When obtaining information on the current refugee status, some asylum seekers access the official UN website. "For information about refugee status, we check the website of UNHCR regularly or email them, but they are very slow to reply" (Mokhtar & Rashid, 2018, p. 81). Here, in contrast to findings by Alencar and Tsagkroni (2019) as well as Köster et al. (2018) on general information about the law of a new country, this information cannot be obtained from social media. However, an asylum seeker living in Malaysia proposed the idea of a social media page where this information can be shared: "I think Facebook. Like we have applied for asylum for several years now, there should be a place where we can get an update of our case there. Maybe some website, we can have a link to it.

Information could be posted on it, or e-mailed" (Mokhtar & Rashid, 2018, p. 77). This statement also highlights that it is not always obvious where to find the needed information, in this case, updates on the asylum status.

News. Literature on news was also identified (AbuJarour & Krasnova, 2017; Alencar & Tsagkroni, 2019; Dhoest, 2020; Díaz Andrade & Doolin, 2019; Graf, 2018; Kaufmann, 2018; Mansour, 2018; Marlowe, 2019; Merisalo & Jauhiainen, 2020; Mikal & Woodfield, 2015; Mokhtar & Rashid, 2018; Scheibe et al., 2019; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015). When asked about what kind of news the participants searched for, it was mainly related to news and other information from their home country (Mansour, 2018; Merisalo & Jauhiainen, 2020; Mikal & Woodfield, 2015; Scheibe et al., 2019). According to Scheibe et al. (2019), many of the study participants mentioned an interest in information concerning their home country (13 out of 17), but even more in information concerning the new country (15 out of 17). Scheibe et al. (2019) observed that news was read in the study participants' native language (13 from 17 participants) but also in the new home country's native language (9 from 17 participants). Only one participant was interested in English news. This limitation on the English language was observed by Díaz Andrade and Doolin (2019) as well. Graf (2018) arrived at quite different results. In their case, news programs in the native language of the new country, here, Swedish or German news channels, are not used because of language barriers. Whereas back in the home country, the radio, newspapers, and television were available in the asylum seekers' native language, accessing those kinds of media in a new country poses a challenge. Therefore, ICT mediated news consumption, for example via the Internet, presents an alternative to overcome language barriers (Dhoest, 2020; Díaz Andrade & Doolin, 2019; Mokhtar & Rashid, 2018; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015). Mobile phones or phone calls (AbuJarour & Krasnova, 2017; Díaz Andrade & Doolin, 2019; Tudsri & Hebbani, 2015) and the computer (Díaz Andrade & Doolin, 2019) are additionally used for news consumption in conjunction with the Internet. "As a refugee, I use my smartphone to learn, to stay in touch with my family, to navigate from one place to another, and to catch up with recent changes and news" (Abu- Jarour & Krasnova, 2017, p. 1796). As one participant states: "We can know the news from around the world . . . I watch news every morning on the computer" (Díaz Andrade & Doolin, 2019, p. 155). Other further mentioned applications to access news are the TV (Alencar & Tsagkroni, 2019; Díaz Andrade & Doolin, 2019; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015), online or offline radio (Díaz Andrade & Doolin, 2019; Mansour, 2018; Tirosh & Schejter, 2017), and news websites (Díaz Andrade & Doolin, 2019; Tirosh & Schejter, 2017). In the case of Mansour (2018), one-third of the Syrian study participants use both TV and radio programs to receive information, especially on the current status of the Syrian crisis. Preferred were programs from a political and social

perspective. Concerning traditional print media, a few papers were mentioned (Mansour, 2018; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015). Here, magazines and books (Mansour, 2018), and newspapers (Mansour, 2018; Tirosh & Schejter, 2017) were utilized. However, according to Tudsri and Hebbani (2015), even though newspapers and the radio are used to obtain information, they are not popular media choices. Only two of their 29 study participants reported on using the radio to listen to news. Focusing on specific news channels and programs, a few studies were identified: Asylum seekers consume local media and watch local television news programs, for example, a study participant who had gained a working knowledge of Hebrew reported watching Channel 2 news in Israel (Tirosh & Schejter, 2017). In this study's case, the asylum seekers also purchased and read the local news post, The Jerusalem Post. Local news origins, either being online or offline media, were reported as being sources of information (Díaz Andrade & Doolin, 2019; Tudsri & Hebbani, 2015). For example, Tudsri and Hebbani (2015) state how a few study participants like to watch Australian news programs to learn more about their new home country Australia. According to Díaz Andrade and Doolin (2019, p. 155), one study participant, now living in Nepal, states: "[L]isten to . . . a Nepalese radio every Saturday. It is a radio of what is happening in the world". Other mentioned news sources are South Sudanese newspapers on the Internet and private Sudanese satellite channel TV shows (Tirosh & Schejter, 2017). This also applies to news sources in English. According to Tirosh and Schejter (2017), news sources include local newspaper websites in English. Further, a Nigerian asylum seeker reported watching the following array of English-language programs and channels: The IBA English news program, Middle East Television, CNN, and Fox News. In one particular case, even though the study participant is able to understand English speaking news, he additionally relies on ICT to access supplementary online information to enhance his understanding of the news items seen on TV (Díaz Andrade & Doolin, 2019). "If [the topic] is interesting, we can type [it] on the Internet . . . For example, in Al-Jazeera News, they say 'If you need more information, go to the website'" (Díaz Andrade & Doolin, 2019, p. 155). But also, as mentioned earlier, where possible, participants like to access news sources in their native language (Díaz Andrade & Doolin, 2019; Tirosh & Schejter, 2017; Tudsri & Hebbani, 2015). Examples mentioned are BBC online (in Dari, Persian, and Urdu), SBS World news, Tolo news (an online Afghan news site), and Geo News (Pakistani online news website) in Urdu and English (Tirosh & Schejter, 2017). According to Díaz Andrade and Doolin (2019), BBC News is also mentioned, this time in Burmese. Other mentioned news sources are Radio Assenna from Eritrea (Tirosh & Schejter, 2017). However, some participants state they are aware of the circulation of fake news distributed by media outlets overseen by the government (Mokhtar & Rashid, 2018). "We can't believe these media, but I still check them to know what bogus news they are broadcasting there. I keep myself alerted to what kind of fake news they are spreading" (Mokhtar & Rashid, 2018, p. 83). To overcome this

challenge, some like to use social media and messengers like Facebook and WhatsApp to compare received information with friends and family.

Even though these news sources, such as BBC, Al Jazeera, CNN, and Fox News, are trusted, many study participants state that the news reached them quicker through their social media pages (Marlowe, 2019). The social media application Facebook seems to be especially popular for this (AbuJarour & Krasnova, 2017; Graf, 2018; Kaufmann, 2018; Marlowe, 2019; Mokhtar & Rashid, 2018), as well as Twitter (Marlowe, 2019). Facebook offers profiles of news outlets, helping asylum seekers to keep track of what is going on in their home country and the world. Further, Facebook pages of local institutions, shops, universities, or even asylum-specific organizations gather information on local events and happenings in an easy way (Kaufmann, 2018). One participant states: "I follow many Arabic sites, including informative and news sites. Facebook is my only way to catch up with the latest news and updates as I don't have a TV or radio. I follow these pages, and I find all the news from all over the world" (AbuJarour & Krasnova, 2017, p. 1802). This sentiment was shared by a study participant: "First in Facebook, then I will go on newspapers. I don't have TV in my current place. I'd rather do Facebook news. I'm on Twitter every day" (Marlowe, 2019, p. 179). Even though some countries try to help asylum seekers to access news, examples are German and Swedish public broadcasters who produce programs for migrants in a simpler language, these initiatives are not widely known (Graf, 2018). Another such initiative was mentioned by Tirosh and Schejter (2017): Amharic Israeli radio service (which is part of Reka, Israel Broadcast Authority (IBA) radio service for immigrants and listeners abroad) was established to help asylum seekers in Israel. However, it was also observed that quite a few participants distance themselves from news consumption (Dhoest, 2020; Kaufmann, 2018; Scheibe et al., 2019). As observed by Kaufmann (2018), some asylum seekers simply do not search for news and information. They limit their news to updates shared by family and friends, resulting in incidental news consumption. Scheibe et al. (2019) made similar observations. An interviewee explained "because there is always bad news" (p. 268) when it comes to their home country, it is preferred to abstain from news consumption.

Everyday information and tasks. As a lot of, if not all, asylum seekers' information needs are linked to their daily tasks (Alam & Imran, 2015; Coles-Kemp et al., 2018; Mansour, 2018), few different kinds of categories were observed. This ties in with the fact that we live in an information society, making it necessary to use ICT to perform everyday information activities (Díaz Andrade & Doolin, 2019). Identified information themes are related to paying utility bills (Díaz Andrade & Doolin, 2019; Witteborn, 2019), filing tax returns, preparing for the driving test, finding addresses and directions (Díaz Andrade & Doolin, 2019), banking information (Alam & Imran, 2015; Mikal & Woodfield, 2015), accessing children's school records (Mikal & Woodfield,

2015), and online shopping (Alam & Imran, 2015). Here, various kinds of apps are used to satisfy those needs, e-payment apps, location finding apps, translation apps, or apps for supporting the completion of school work (Coles-Kemp et al., 2018). Furthermore, asylum seekers perceive it as important to obtain information of the daily lives of locals living in the new country. Some asylum seekers want to obtain information about the new country, to integrate and make life liveable (Díaz Andrade & Doolin, 2019). In the case of Díaz Andrade and Doolin (2019), one study participant explained how he uses Google to find information to learn more about the new country, New Zealand, to find out how New Zealand children are taught by their parents. These information practices, finding online information, help to reduce the state of disorientation.

Mobile phones are used heavily for such tasks related to daily activities and all aspects of daily life, and also, translation of information. Not being able to translate is synonymous with not being able to exist in the new country (Coles-Kemp et al., 2018). A study by AbuJarour et al. (2019) observed that around half of the top ten used apps consist of locally used apps, including translation apps such as the Arabic-English-German dictionary arabdict. Furthermore, the prevalence of translation apps is higher among asylum seekers than immigrants. These translation apps and online dictionaries support asylum seekers in being self-dependent, for example, when they need to communicate with native speakers of the new country. A participant shared: “I use the Internet all day long. For instance, when I go to a supermarket, I write what I want to say in Arabic into the translator app, and the app translates the text to German so that the supermarket’s staff know what I want to tell them” (AbuJarour & Krasnova, 2018, p. 6). The reliance on the translation of information is especially relevant in the first months after arrival (Duarte et al., 2018). “It is hard for [some of us the ones that] do not speak English because it is not Arabic copy for it” (Duarte et al., 2018, p. 8). As many asylum seekers do not speak English or, in the case of this study, German, it makes it difficult to accomplish daily tasks, for example, making a doctor’s appointment (AbuJarour & Krasnova, 2017). “Here, ICTs are widely used to mitigate discomfort in communication, and help refugees achieve their goals, which enhance their sense of agency and well-being. For example, one of our respondents described how she used Google Translate to enable her to visit her physician” (AbuJarour & Krasnova, 2017, p. 1800). McCaffrey and Taha (2019) observed similar applications for translation apps, making it possible to exchange information in medical and welfare offices or even during parent-teacher conferences. Translator apps such as Google Translate or Microsoft Translator also helped to satisfy “momentary curiosities” (McCaffrey & Taha, 2019, p. 31). “Mohammad said that when his family first arrived speaking only Arabic, they wanted to know everything. ‘How do you say ‘sugar’?’ he remembered asking his wife and kids one day in the grocery store” (McCaffrey & Taha, 2019, p. 31). Navigation apps also make up half of the top ten

apps (AbuJarour et al., 2019). Named were locally used apps such as the German train navigation app DB navigator. Using such smartphone apps to navigate and to look up public transport schedules leads to a feeling of empowerment and self-dependence. It enables one to orient oneself in a new place and culture (Merz et al., 2018). As with navigation apps, it was observed how these apps were not necessary in the home country of asylum seekers (Duarte et al., 2018; Kaufmann, 2018). As Duarte et al. (2018) interviewed several asylum seekers, one interviewee explained "Google Earth [referring to Google Maps] I did not use it before. I did not need it before. In my land [country], I know everything. It is a small land; you do not get lost easily. Here you get lost easily" (Duarte et al., 2018, p. 12). One participant explained how he did not know about the existence of navigation apps; he only found out through a fellow asylum seeker. Another participant also disclosed:

> It was like a Sunday and I needed medicine for my father. And I didn't know, that pharmacies are closed and then I went to the pharmacy, that I know, and it was closed and then I called a friend and asked her, what [do] I have to do, and she said: 'Google which pharmacies are open in your district!', and then I googled it and found out. … Yeah, it comes with time, to know what you can do and then it's getting more important with time. (Kaufmann, 2018, p. 889)

This highlights the importance of sharing this kind of information with others, either through personal contacts or through social media (Alencar, 2018). GPS functions were also seen as helpful when exploring new neighborhoods and areas as well as for driving (McCaffrey & Taha, 2019). As a special kind of everyday information, the topic of political engagement was observed (Leurs, 2017; Marlowe, 2019). As this is not practiced by the majority of asylum seekers, fewer studies were identified. Many refrain from voicing political opinions in fear of repercussions (Leurs, 2017). Marlowe (2019) notes:

> For these 'non-political' participants, however, it did appear that political lives did creep in over the 12 months of working with them. Whether this was in relation to a local election, concerns of what was happening in their country of origin or some other development, it became clear that adopting a political life was one of strategy and at times, necessity. What becomes evident in these comments is that political lives are at times incredibly intertwined with everyday lives. (p. 178)

Those who want to participate in political discussions in a wider context have a few strategies: "I use Facebook differently from Dutch society. I had two accounts. One political one. And another one" (Leurs, 2017, p. 688). Information is shared using virtual private network (VPN) services and using encrypted messaging services like WhatsApp, Telegram, and WickR (Leurs, 2017; Marlowe, 2019). Of course, social media is an important source for political discussion

(Marlowe, 2019), for example Facebook and Instagram. Overall, according to Marlowe (2019), those who do participate in such information behavior "were unequivocal about its role in helping them and other refugees to integrate by giving them a sense of ongoing purpose" (p. 178).

Socialization

It was possible to distinguish research on how refugees maintain social ties to family and friends in their former home country and how new relationships in the new country are established. Generally speaking, different ICTs are applied as a means for communication and socialization. For example, Tirosh and Schejter (2017) observed that the most important aspect of using a computer was related to communication. Here, Yahoo! Messenger was mentioned when using a computer as was observed in a study on the role of media and telecommunications in the life of asylum seekers in Israel. Similar observations were made regarding mobile phones (Ahmad, 2020); they are mostly used for communication and to maintain strong ties and to call family members. The Internet in general as well as social media in particular, help refugees to establish and maintain social relations (Dhoest, 2020; Köster et al., 2018). Favored social media applications for communication and socialization are WhatsApp and additionally Facebook (Mokhtar & Rashid, 2018; Scheibe et al., 2019). This need for connection is important in daily lives and WhatsApp as well as Facebook help to overcome distances (Mokhtar & Rashid, 2018).

Keeping old contacts. When it comes to keeping in contact and socializing with relatives and friends still living in the home country or family members who had to take refuge in another country, a few studies were identified. According to AbuJarour et al. (2018) as well as Merz et al. (2018), this kind of communication is achieved mainly through ICT, which includes smartphone applications with Internet audio and video calling capabilities as well as social networking sites and various messaging applications. It was stated that the most important and first bought ICT is the telephone (mobile or smartphone) to call home (AbuJarour et al., 2018; Tudsri & Hebbani, 2015). Mobile phones are an important part in maintaining close relationships with family in the home country or who had to flee to other countries (Walker et al., 2015). This can be attributed to the fact that ICT provides cost-efficient communication. In this sample, 97.8% of the participants use the smartphone to connect to the Internet. Thus, through the means of ICT-enabled communication, the feeling of emotional support among asylum seekers can be strengthened by staying in contact with family and friends (AbuJarour et al., 2018; Bacishoga et al., 2016). For instance, one participant states how his phone was stolen and he borrowed a tablet from his friend to stay in contact with his family (Graf, 2018). This seems especially relevant for young people, as the mobile phone is used for communication and

contacting family and friends—a top priority for them (Kutscher & Kreß, 2018). This helps them in insecure situations which are often characterized by different migration-problems, for example uncertain legal situations. Here, Facebook, WhatsApp, Viber, and Skype were also mentioned as important social media and messaging apps.

Similar aspects can be highlighted about social media in general as it is seen as being a digital resilience resource—it makes one feel closer to each other: "Because now my family has Wi-Fi, we became able to talk with them and see them, so I feel as they live with us" (Udwan et al., 2020, p. 5). It was observed how important the social media service Facebook and messenger WhatsApp are for refugees to connect with family and friends wherever they are in the world (Alencar, 2018; Kutscher & Kreß, 2018; Mokhtar & Rashid, 2018) and how special Facebook and WhatsApp groups are used to distribute updates among family members (AbuJarour & Krasnova, 2017). Furthermore, these groups even serve as the primary source of information about family—people can share pictures and videos with family back home. Marlowe (2020) even observed how social media is mainly or even exclusively used to maintain contact with overseas family and friends. "I mean in Pakistan we may not use it that much, but because you are far from your family, and wherever the family is in the world you are in contact with them through WhatsApp, through Facebook" (Mokhtar & Rashid, 2018, p. 80). Another popular mentioned application was Skype to contact family and friends from the home country (Dhoest, 2020). Others use Skype, for example, to compare the current living circumstances and situations with relatives who were relocated in another country (Witteborn, 2019). A study on asylum seekers living in Canada shows that they use text messages as well as video and voice calls the most (Sabie & Ahmed, 2019). Another social media service that was mentioned to a smaller extent is Snapchat. A study by Leurs (2017) explained how Snapchat was used to show a new baby sister to grandparents and best friends still living in the former home country. Even YouTube is used to maintain relationships (Tudsri & Hebbani, 2015). Here, Pakistani refugees upload videos on YouTube and Facebook to stay in contact with friends and family back home. Further, to maintain old networks also relies on regular communication technologies such as SMS and e-mail as well (Bacishoga et al., 2016). Here, factors such as cost, connectivity and perceived usefulness come into play. When fleeing to South Africa, in this example, SMS provided the advantage of being reasonably priced compared to voice calls. Furthermore, it is possible to send one SMS to a number of different persons. Even though mobile instant messaging (MIM) would have been a priority for the participants, it was not possible to use them since most of the people they wanted to communicate with did not have phones with MIM.

New contacts. When establishing new contacts, a few studies could be identified. Through the application of ICT and social media, a strong link between digital inclusion and social inclusion

could be observed (AbuJarour & Krasnova, 2017; Alam & Imran, 2015; Alencar, 2018; Köster et al., 2018). "'Social media as a basic need for everyday life' and Participant 2, also male, said that 'if we do not have connection to each other then we will definitely get depressed . . . mental issues, psychological issues. Because we grow when we are in connection and support each other'" (Marlowe, 2020, p. 8). Using ICTs helps to feel socially included and get to know a new culture faster: "Using my smartphone and Social Media adds a lot of positivism to my life here, because I got to know the German society even better and this could help my integration process" (AbuJarour & Krasnova, 2017, p. 1800). This also works the other way—through social media, locals can get to know asylum seekers better. Social media is often applied to socialize with natives of the new home country to reduce isolation (Alencar & Tsagkroni, 2019). Not being able to access the Internet was seen as disadvantageous when trying to become socially included (Alam & Imran, 2015). The younger participants stated how they felt connected to the new country by using the Internet to learn more about the new culture: "So with the help of the Internet I feel that I have been part of the Australian society. I feel integrated into the system by the Internet" (Alam & Imran, 2015, p. 356). Even though not further specified how, the smartphone is used to find other peers (AbuJarour & Krasnova, 2017). Furthermore, social media helps in finding other people of the same ethnic or religious community (Marlowe, 2020). The mobile phone is also used to communicate with people with whom no strong ties exist, e.g., work colleagues or people that were met during travel or at entertainment events (Bacishoga et al., 2016). A study by Merz et al. (2018) illustrates a point often observed in other studies (Kutscher & Kreß, 2018; Marlowe, 2020): A first personal contact with natives of a new home country, in this example Austrians, could be successfully established online, especially through social media, rather than offline. Mentioned apps are Facebook, YouTube, LinkedIn, Twitter, Instagram, WhatsApp, Viber, and Google (Alencar, 2018). One participant states: "It's easy on Facebook to expand the circle of my friends… Trust comes with time. There are people with whom I exchanged on Facebook long time before these people decide or agree that we meet in real life" (Merz et al., 2018, p. 313). A similar observation was made by Dhoest (2020). Here, one participant states: "I use it for everything: for friends, for groups, to make contact" (Dhoest, 2020, p. 21). "I could feel more confident while sharing things through social media than meeting people and talking live. I think interacting through social media could give me practice doing things [related to resettlement] with more confidence" (Marlowe, 2020, pp. 7–8). "When I came to New Zealand, I had no friends at all but now I have some friends, I found them on Facebook" (Marlowe, 2020, p. 11). Different observations were made concerning dating apps (Dhoest, 2020; Merz et al., 2018; Witteborn, 2019). In a more traditional sense, many interviewees of Dhoest (2020) use chat, dating sites, and apps to connect to other suitable partners. According to Merz et al. (2018), even dating apps, like Badoo, were used to establish contacts, not even

necessarily for dating. A similar observation was made by Witteborn (2019). Here, people who fled to Hong Kong were able to meet others through dating apps. The newcomers met up with domestic workers in parks of Hong Kong on Sundays, often the only day off. Social media is also used to coordinate meetings and to see others face-to-face, such as church gatherings or activities organized by community organizations and informal gatherings. It was found that not only social media, but telephone calls, in this context intracommunity calls, were indicative of bonding social capital (Koh et al., 2018). Different groups could be contacted to socialize. Other mentioned communication means were e-mails (Díaz Andrade & Doolin, 2019). This method offers a structured and asynchronous nature of communication which helps new arriving people with language difficulties to converse in a less stressful way. Other examples were observed by Duarte et al. (2018). Social bonds can be strengthened through online platforms or groups in social media. In Münster, Germany, an App named *Welcome Münster* was developed to welcome refugees in the city. Here, one participant states: "The Welcome Münster service a lot since people helps you there… Germans organize parties, we see it, and we go there" (Duarte et al., 2018, p. 13). A similar initiative in the Netherlands, the "Buddy" program, was started to establish contact between newcomers and Dutch natives (Kneer et al., 2019). Here, social media served as a starting point and later to keep the connections alive. Even though the participants could not always meet face-to-face, just hanging out online is seen as a way to develop friendships. Mentioned applications were WhatsApp, Instagram, and Snapchat, whereby Snapchat was especially mentioned as a way to influence emotional and affectionate support. When offering free phones to asylum seeker families, it was observed that these were mainly used for peer support, with a secondary use for linkage with the new country's society services. Through this, the free-call phones helped to enable deepening relationships first with the peer group members and later with larger social circles (Walker et al., 2015). Bacishoga et al. (2016) looked at mobile phones from another perspective. In this study, people who arrived in South Africa met new contacts easily through similar interests at work, school, sport facilities, churches, or clinics. And through the help of mobile phones these contacts could be maintained and strengthened. Through communication with networks, of course, refugees become socially connected within the new society which correlates with aspects like agency, employment, education and language, culture, health, and many more.

Problems related to ICT and social media usage with socialization. Albeit the numerous positive effects of online media and applications, several problems and issues regarding ICT and social media in context with socialization and making contacts were described. First, Almohamed and Vyas (2019) observed how participants use social media like Facebook, Viber, or WhatsApp to contact relatives and the positive impact it has on them, but also, how they have trouble

reaching those who are older. One participant explains: “But not with my mother because my mother is old, and she isn’t interested to use Facebook. In my country, a small number of women has[have] an account on Facebook. Many Iraqi people believe that isn’t ok for women to use Facebook” (Almohamed & Vyas, 2019, p. 41). Even though the evidence suggests how the Internet is used to access social support, with the main purpose being support of socio-emotional and informational exchange, some studies suggest that the Internet is not used to create new relationships in the new country (Marlowe, 2020; Mikal & Woodfield, 2015). This includes either host nationals or other refugees living in the United States (Mikal & Woodfield, 2015). This is attributed to the fact that asylum seekers are reluctant to engage in online exploration or form other online communities. Some speculated reasons are cultural differences or barriers to the Internet, e.g., safety concerns, technological literacy, and access to a home Internet connection (Mikal & Woodfield, 2015). The participants seemed to meet new people face-to-face rather than online. Another interesting aspect was observed by Marlowe (2020). Here, nearly all participants (N=15) stated how social media could potentially hinder integration. As one participant put it:

> They [social media] probably hinder it because if your social media and your interactions are with people outside New Zealand, you can get a false sense that everything is OK. You don’t really have to make new friends in a new land. Thus, social locations (gender, education, age) and face-to-face interactions influence people’s social media encounters. (Marlowe, 2020, p. 8)

Another participant states: “I really don’t like Facebook and I think it is wasting time. I prefer to have contact with my friends by visiting them” (Almohamed & Vyas, 2019, p. 41).

Entertainment

Concerning entertainment needs in the new country, a few studies were observed. Contradicting results were found regarding the need for entertainment and usage frequency (Ahmad, 2020; Mansour, 2018). According to Mansour (2018), only a small number of asylum seekers seemed interested in seeking entertainment. The studies by Ahmad (2020) and Merz et al. (2018) about smartphone usage for acculturation by asylum seekers determines how important the smartphone is being perceived as in keeping oneself occupied. This is also prevalent concerning entertainment, for which study participants watch movies or play apps on their devices to counteract boredom. Mentioned games that are played were Sudoku, Angry Birds, and Farmville, or listening to music, and watching videos on YouTube (Tirosh & Schejter, 2017). By exchanging funny links or jokes, entertainment needs can be satisfied with messaging services such as WhatsApp: “We sometimes exchange information on politics back home but this can lead to debates. So I have learnt to avoid those and only engage in joking or reading

links related to news or entertainment" (Witteborn, 2019, p. 7). However, even being able to access entertainment programs seems to be rather surprising for some: "Coming here, you have a lot of free will to access anything, especially the internet, books, films. I had access to read books, I had access to see movies, I go to gay sites, I can watch movies online, I can watch documentaries online" (Dhoest, 2020, p. 20). The Internet is also seen as important when it comes to accessing entertainment programs in a native language (Díaz Andrade & Doolin, 2019). Examples mentioned were Nepalese or Nigerian movies, Burmese comedy, sports, music television channels, or singing karaoke. A study by Scheibe et al. (2019) cites the importance of YouTube and Facebook for entertainment purposes. Similar results were observed by Mokhtar and Rashid (2018), who applied a uses and gratifications perspective on media use by refugees. They conclude that online digital media is seen as being the most popular source to satisfy the need for entertainment. Popular sources to watch and download movies, dramas, and news videos are Facebook and YouTube. Another form of entertainment is the consumption of religious content as the preferred video and music genre (Mokhtar & Rashid, 2018; Tudsri & Hebbani, 2015). Surprisingly, only one participant cited television as a means to counteract boredom. Different insights were made by Kaufmann (2018), Mansour (2018) as well as Tudsri and Hebbani (2015). They found that indeed, many study participants spend many hours every day watching various programs on television. Programs such as sports, especially soccer, were mentioned. TV, laptops, and tablets are predominantly used at home for entertainment by the family (Kaufmann, 2018). When looking at the entertainment needs for younger asylum seekers, it is one of the most sought gratifications (Ahmad, 2020). The younger participants seem to have a greater need for this than older participants. With the highest percentage, the 15- to 17-year-olds like to use their smartphone for gaming compared to the other user groups. Further, YouTube is watched a lot for entertainment and leisure purposes.

Self-presentation

Arriving at the data about the desire to present oneself online, a few studies discuss this area of interest. Self-presentation is defined as the desire to post texts, pictures, or videos of oneself or areas of interest, which include hobbies, things one created, e.g., baked goods, written messages or photography, or pictures of one's own family (Shao, 2009). According to Scheibe et al. (2019), 15 out of 19 interviewees use social media as a means to present themselves. For this, the most popular site is Facebook. Also, to a minor extent, Instagram and also WhatsApp (posting a status update) are used to share pictures or information of oneself. Similar popularity was attributed to Facebook by Kutscher and Kreß (2018). Profile arrangements, postings, pictures, and quotes are all used by young asylum seekers for identity representation. By posting pictures of the home town with corresponding hashtags such as "#I_love_Syria" or creating nicknames like "free

Kurdistan" on public Twitter or Instagram accounts the users can also emphasize their diasporic attachments and love for their home country, city, town, or region of origin (Leurs, 2017). This focus on cultural heritage was also observed by Dhoest (2020). Graf (2018) observed the relationship between regained self-confidence, self-presentation, and being part of an ethnic community on social media. Others, however, are careful when sharing things about oneself. One participant stated how he purposely hides some aspects of himself, for example, his sexual orientation (Dhoest, 2020). A study by Witteborn (2019) took a closer look at the displayed content on social media. It was found that often, the pictures have an upbeat tone. Observed were selfies in shopping malls, in front of global brand stores, in the streets, or in front of local attractions. Hidden are the aspects of the lives asylum seekers face such as being poor, the forced inactivity, and painful journeys. This way, the self-presentation helps to show what is meaningful to the people and not being reduced to labels like "refugee" or "asylum seeker." However, Coles-Kemp et al. (2018) made a different observation. Here, it was described that the participants did not want to convey an image of having a good time in the new country, especially to family members still living in the former home country. Therefore, a certain image of oneself is created.

6.5 Information exchange

Another focus of this literature review was the aspect of information exchange—how information is exchanged between two parties, either by face-to-face interaction or through online media (Wilson, 1981). Information is accessed through local authorities or colleagues and friends (Alencar & Tsagkroni, 2019; Bletscher, 2020; Nekesa Akullo & Odong, 2017; Tirosh & Schejter, 2017). According to Tirosh and Schejter (2017), the first source to access information seems to be "human rather than technological" (p. 9). These are for example members of immediate groups of the study participants—either because they have an idea what information is needed or they can refer them to the people that have the desired information. One theme that emerged when analyzing the literature was how friends or family bridge information gaps and act as information brokers (Mansour, 2018; Mikal & Woodfield, 2015; Tirosh & Schejter, 2017). A high percentage of participants described how spoken communication with families and friends was the most important source of sought information (Mansour, 2018). To do so, a variety of technologies for communication purposes, especially mobile phones, are used.

One mentioned information area is concerned with news (Bacishoga et al., 2016; Graf, 2018; Kutscher & Kreß, 2018; Marlowe, 2020; Mokhtar & Rashid, 2018). It was observed how news is, of course, consumed through the media. However, Graf (2018) made some interesting discoveries: "It was striking in my interviews that news about the new country was primarily

retrieved through the filter of the subject's own community and not directly from Swedish or German news media" (p. 155). Therefore, it can be assumed that this information exchange is focused on personal relationships and communities. It can be distinguished between worldwide news (Graf, 2018; Kutscher & Kreß, 2018) and news from the former home country, or local news (Bacishoga et al., 2016; Marlowe, 2020; Mokhtar & Rashid, 2018). When talking about local news, two thirds of the respondents participating in the study conducted by Bacishoga et al. (2016) use mobile phones to keep up with general news of their home countries and to contact friends back home to get clarity on local news. This also ties in with the importance of social media for exchanging news from the home country (Kutscher & Kreß, 2018; Marlowe, 2020; Mokhtar & Rashid, 2018).

Participants shared how they like to compare the news received from family members in the home country with news found on Facebook. "I also compare the news given by my family members from the ground to the posts shared in the Facebook. I always found that the news posted in Facebook is matched with the info received from the ground" (Mokhtar & Rashid, 2018, p. 78). If further information or more details are needed, WhatsApp is also popular: "On TV, there can be only general news, if I need some specific information for myself, like if I want some personal information, I would contact someone personally on WhatsApp, that person wants some information, they will contact me on WhatsApp" (Mokhtar & Rashid, 2018, p. 77). One participant states:

> Social media decrease the distance between New Zealand and my home country. Although it is around 24 hours by plane, I feel like nowadays we are in one home. Immediately, I can see what is happening there and I get information and their news, and they get my news. Thus, we can say that the media are very important for us nowadays. (Marlowe, 2020, p. 9)

This emphasizes the importance of social media for information exchange and news, making people feel more connected with their home country. This eradication of space and time through social media such as WhatsApp, Viber, Facebook, or the instant messaging service Skype, and its importance for exchanging news was observed by Kutscher and Kreß (2018) as well.

When it comes to jobs and education, a few interesting insights could be made (Alencar & Tsagkroni, 2019; Koh et al., 2018; Mansour, 2018; Stiller & Trkulja, 2018). This reliance on others in the same community is also described as helpful when searching for a job (Almohamed & Vyas, 2019): "Actually, I am relying on the Iraqi community and the Arab community to get a job because it is easy to communicate with them without English and with the cultural barriers" (p. 41). According to Koh et al. (2018), the community ties and network strength is characterized by

the members looking out for each other and exchanging information. For example, one woman was able to further her education through these bonds: “There is an aged care course… and I didn’t know about it. So one of the group give me a phone[call] . . . So this course now I will be finishing next week” (Shrestha-Ranjit et al., 2020, p. 5). This also extends to using social media for work opportunities (Alencar & Tsagkroni, 2019; Mansour, 2018). Asylum seekers are aware how important the creation of social bonds in a new home country is to generate employment opportunities (Alencar & Tsagkroni, 2019; Stiller & Trkulja, 2018).

Other information areas are concerned with health (Alencar & Tsagkroni, 2019; Shrestha-Ranjit et al., 2020), law and documents (Coles-Kemp et al., 2018), and social support (Walker et al., 2015). Health was an important aspect in the context of information exchange. This was especially relevant for interpretations done by friends or family members in context with health information. “Many participants commonly used one of their family members, usually a child, as an interpreter as they did not have another option available to them” (Shrestha-Ranjit et al., 2020, p. 5). Further, social media is applied to find and share practical health information. For example, one participant translated materials in different languages to help fellow asylum seekers (Alencar & Tsagkroni, 2019). The reliance on friends to organize certain appointments or make phone calls because of language or information deficits was described by Walker et al. (2015) and Yun et al. (2016). In context with health appointments and communication with medical staff, the participants spoke of different scenarios. One participant here states: “’My daughter- in-law calls [the doctor] – she manages everything, so I really don’t know how she does that all . . . My daughter-in-law takes me [to the doctor]. I cannot make it there, so my daughter-in-law takes me’” (Yun et al., 2016, p. 532). Similarly: “Whenever we had any appointment, at the end we were always given an appointment, the follow-up appointment. So we’re never required to make our own appointment through phone” (Yun et al., 2016, p. 532). Further, the office also offered a translation service to manage appointments. However:

> I am still scared of doing it [asking for an interpreter on the telephone] and I still feel that they might not do it for me, but I speak when somebody speaks Nepali.... [Health Focal Point name] used to tell me that I cannot make calls for you all the time, so you have to learn to make calls by yourself. And I’ll dial the phone and then you have to speak and ask for the interpreter. (Yun et al., 2016, p. 532)

Walker et al. (2015) describe a similar situation: “I don’t ask my friends to come and help me at home. But sometimes if I need to make appointment, or I need to go to hospital, I call… to help me out with that. Because she can speak English” (p. 331). Therefore, the language barrier can be overcome by peer support groups.

If legal regulations are concerned, an interesting story was shared: “He urgently needed a copy of her ‘right to remain’ in Sweden document before he would be allowed to enter Lebanon on a 24-hour visa. She quickly took a picture of the document before sending him the document; all within the space of two minutes and all done with her mobile phone” (Coles-Kemp et al., 2018, p. 5). Only through this quick exchange of information he was able to enter Lebanon. Similar observations were made about official documents and letters (Alencar, 2018; Kaufmann, 2018). Even when asylum seekers used their smartphones as translation tools, they were not able to understand official letters. Here, they relied on their new local networks and friends to translate these letters. Combining language deficits and bad digital literacy skills could especially be problematic for those who are not integrated into society. This was mirrored by Alencar (2018) as well. Here, one participant said: “As I said if I want to look for information, I will ask a friend who will help me to find the right information . . . because the content is in Dutch. So, I always go to ask a help of friends” (Alencar, 2018, p. 1596). For social support, the phone is essential to discuss problems:

> I have 5 children and my husband is sick ... so I am really facing a financial problem ... I get depressed ... I contact my friend and seek advice. And so if they have good advice and a good suggestion, I will follow. Otherwise I won’t. So this is a big difference in my life, that I am using the phone, and getting suggestions from my friends. (Walker et al., 2015, p. 330)

This highlights the importance of ICT for emotional wellbeing. Relevant information can be accessed to solve different problems. This also extends to different cultural aspects. For example:

> In my culture, being an elder you have a lot of duties that you have to do in the community, especially when it comes to marriage and stuff ... With all these young women there are a lot of issues that the mother or someone in my age range would have been dealing with ... if it was back home ... And so, because of the telephone ... these are the kinds of things that I talk sometimes with the young women. (Walker et al., 2015, p. 330)

This reliance was also observed in relation to children of the participants. Especially mothers seem to adopt this notion. Their children are relied on for “culture and language brokering” (Mikal & Woodfield, 2015, p. 1327). Areas in which children could help their parents were related to technology. For example, as children are often technologically more adapted and use the Internet for homework or online games, they could help their parents with the user interfaces of online job applications. This can also be extended to translation of, for example, English texts or for phone calls (McCaffrey & Taha, 2019). On the other hand, others prefer to

rely on technology instead of other people. “I rely on mobile technology. And on avoiding having to ask some person, any person on the spot” (Graf, 2018, p. 153). Accordingly, the participant spoke about how he tries to avoid talking to natives of the new country in situations of risk or uncertainty and prefers to replace this interaction with the usage of an electronic device.

6.6 Conclusion

After extracting and organizing the literature, certain issues became prevalent. It was stated how insufficient access to ICT and media is seen as problematic for integration. Overall, the needed information as well as the information behavior depends on the length of stay in a new home country (Tirosh & Schejter, 2017). Several information needs identified by different studies could be determined: 1) personal: information about family members in their home country and information about how to make a living, 2) institutional: information about the status and rights as asylum seekers as well as other needs for government or municipal services, 3) spatial/orientational: concerning language, information about spatial orientation and local customs as well as information related to news from around the world (Tirosh & Schejter, 2017).

Mansour (2018) identified information needs related to work, housing, psychology, education, transportation, financial resources. Concerning ICT related practices and needs, Merz et al. (2018) mention five aspects: 1) seeking information online, 2) communicating with family and friends abroad, 3) meeting locals, 4) meeting peers, 5) counteracting boredom. Additionally, Leurs (2017) formulated five themes related to digital practices of asylum seekers: 1) right to self-determination, 2) right of freedom and expression, 3) right to information, 4) right to family, 5) right to cultural identity.

Different challenges emerge when trying to access information. When arriving in a new country, the financial means are lacking to afford technological appliances (Alam & Imran, 2015), making it difficult to gather information (Nekesa Akullo & Odong, 2017). However, smartphones are still owned by many asylum seekers, proving it to be an essential asset (Coles-Kemp et al., 2018; Sabie & Ahmed, 2019). Age differences in relation to ICT and smartphone ownership could be observed. The older the asylum seekers are, the less likely they are to use the Internet (Merisalo & Jauhiainen, 2020). Furthermore, the younger ones have more skills regarding ICT usage (Alam & Imran, 2015). This is also related to the higher access rate for the school aged children, teenagers, and young adults in contrast to the older siblings, parents, and grandparents (Bletscher, 2020). Regarding gender differences, Internet usage seems not to differ here (Merisalo & Jauhiainen, 2020). However, the ownership of smartphones seems to differ, as 40% of those who do not own a device are unmarried females between 15 to 18 years (Ahmad, 2020). Conversely, McCaffrey and Taha (2019) observed that all participants owned a phone, however,

women and younger children sometimes did not have a data plan.

Possessing language skills and broader social networks in the new home country leads to less reliance on media and social media to find information (Köster et al., 2018). Further, asylum seekers seem to prefer contacting friends, family, or other people rather than using technology (Alencar & Tsagkroni, 2019; Bletscher, 2020; Nekesa Akullo & Odong, 2017; Tirosh & Schejter, 2017). However, those who have access to technology are seen as opinion leaders and therefore trusted more. Also, social media is seen as helpful with integration by developing social ties (Köster et al., 2018). Media also plays an important part in giving and receiving information, especially social media. Media is used to fulfil different needs related to entertainment, for information news/updates, for the wealth of information, and because of a positive attitude to media (Mokhtar & Rashid, 2018). In relation to this, the popular media theory — The Uses and Gratifications Theory (Katz et al., 1973) — is applicable. Media is mainly used to satisfy four needs, namely entertainment, information, socialization, and, adapted for social media, self-presentation (Shao, 2009). Concerning the aspect of information, different areas could be identified. Information related to language learning; education and job; health; law, especially asylum status; news; housing; everyday information was observed. Learning a new language in a new country is the most important concern for asylum seekers as it correlates with the desire to understand a new culture (Alencar, 2018; Merz et al., 2018). Other means are social media such as videos on Facebook, but also media of the home country such as radio broadcasts or television programs. Those who did not want to learn a new language resort to the media of their home country.

Finding education and employment is also a priority (Díaz Andrade & Doolin, 2019; Mansour, 2018). Here, ICT can be used to attend educational programs online, or find volunteer and paid employment. Further, the job market can be monitored. Additionally, for self-employed asylum seekers, customers can be recruited and retained by owning a mobile phone. Male respondents are more likely to search for information online on work opportunities than female respondents. The same applies to younger asylum seekers – they are more likely to do so than middle aged ones (Merisalo & Jauhiainen, 2019).

Regarding health information, this is one of the most important topics (Nekesa Akullo & Odong, 2017; Scheibe et al., 2019). Mothers want to know how they can access health services for their children. The Internet is used to access information on health and medications. Further, Google Translate is seen as helpful for communication when going to doctor’s appointments (Almohamed & Vyas, 2019). Geolocalisation is applied to find the closest clinics. Social media is used to share experiences and give feedback regarding health procedures, e.g., on Facebook.

Overall, family members with medical backgrounds are trusted the most regarding health information, even on social platforms.

Another type of information which is highly valued by asylum seekers concerns the legal system of the new home country (Alencar & Tsagkroni, 2019; Duarte et al., 2018), especially the asylum status (AbuJarour & Krasnova, 2017; Mansour, 2018). The law and documents related to this are often difficult to understand, especially if they are only available in the language of the new country. Therefore, to counteract this problem, native speakers are asked for help or information looked up on social media, especially Facebook (Köster et al., 2018). ICT is also used to translate official government websites. Furthermore, the asylum status can be looked up by accessing the official UN website.

News on different topics is also of interest, especially news about the home country (Mansour, 2018; Merisalo & Jauhiainen, 2020), but also international news. Sometimes, news channels of the new country are not accessed because of language barriers. Accessing print media in the native language of asylum seekers is often not possible, so ICT is used as an alternative to access those kinds of media. TV, online or offline radio, and news websites are accessed as well. News is consumed in English, the new countries' local language, or the native language of asylum seekers. When reading news on social media, e.g., Facebook, one has to be aware of fake news. To overcome this, information and news are compared with those received from friends and family members. Some countries do offer news channels in the native language of asylum seekers, for example. Germany and Sweden, however, these programs are not widely known about. Also, some deliberately distance themselves from news, since news is often seen as too stressful.

Concerning everyday information and tasks, paying bills, filing tax returns, preparing for the driving test, finding addresses and directions, banking information, accessing children records, or online shopping are mentioned. Here, various kinds of apps are used to satisfy those needs – e-payment apps, location finding apps, translation apps, apps for supporting the completion of school work (Coles-Kemp et al., 2018). Translation apps are heavily used for daily life, it makes it possible to be self-dependent and communicate with native speakers of the new country. Going to the supermarket or a doctor's appointment or even parent teacher conferences are made easier with translation apps. These apps are also the most often installed ones on mobile phones of asylum seekers, followed by navigation apps.

The other aspect of the Uses and Gratifications Theory, socialization, was also mentioned in the literature. Differences and similarities can be observed in the way people maintain old contacts and establish new ones. Mobile phones are used to communicate and stay in contact with family

members (Ahmad, 2020). Social media such as WhatsApp and Facebook are applied for communication and socialization with family back home (Mokhtar & Rashid, 2018). By staying in contact with family members and friends, a feeling of emotional support can be established. Also, SMS and e-mail are used to maintain contact as these are cheaper in contrast to phone calls. When it comes to establishing new contacts, using ICTs helps to feel socially included and get to know a new culture. Social media helps to socialize with natives of the new home country. This is also emphasized by finding other people of the same ethnic or religious community. Sometimes, it is not easy to establish contact with natives of the new home country, so social media offers a good alternative as a first contact point. Mentioned services are Facebook, Instagram, Twitter, and WhatsApp. Surprisingly, sometimes even dating apps are used to establish friendships and, of course, romantic relationships.

Some problems in relation to social media and socialization were observed. Often, it is difficult to reach the older generations. Further, there exists a reluctance overall to form new social ties via the Internet because of safety concerns, bad technological literacy, or missing access to Internet connection. Here, meeting people face-to-face is preferred. Further, relying on online contacts can hinder establishing real contacts outside of the Internet since it creates an illusion of social inclusion.

Concerning the entertainment aspect, smartphones are important in keeping oneself occupied and entertained (Ahmad, 2020; Merz et al., 2018). Watching movies and playing apps are some preferred leisure activities. Further, exchanging funny links or jokes via WhatsApp helps satisfy entertainment needs. Additionally, entertainment programs in the native language of asylum seekers can be accessed via the Internet such as movies, music channels, comedy, or sports. The younger generation seems to have the greatest need for entertainment programs (Ahmad, 2020).

Finally, the self-presentation dimension was mentioned. Facebook is used as well as Instagram and WhatsApp to post pictures or status updates of oneself. This can also be achieved by posting special hashtags or creating nicknames related to cultural origins (e.g., “#I_love_Syria,” “free Kurdistan”) (Leurs, 2017). Being able to represent oneself on social media is correlated with self-confidence and being part of an ethnic community. It was also observed how social media is used to create a certain image of oneself that has an upbeat tone: selfies in shopping malls, in front of global brand stores and so on. However, it was described how some purposefully do not want to convey an image of having a good time in the new country because of family members still living in the former home country.

Another important aspect related to information behavior is information exchange– how people

exchange information with each other, either through face-to-face interaction or online communication. Information is accessed through local authorities or colleagues and friends (Alencar & Tsagkroni, 2019; Bletscher, 2020). The first access point seems to be human rather than technology. One area of interest is news and exchanging information about the new country – people prefer to talk about the news instead of receiving it through the new country's news channels. Further, social media and mobile phones are used to exchange information. It is possible to compare news received from family members with news found on Facebook about the home country. Through exchanging information among communities, new education and employment opportunities emerge. For example, an educational opportunity was discovered by sharing information about this. It is known how important social bonds are for employment. Other relevant information concerned with health, law and documents as well as social support were mentioned when exchanging information. Friends and family are able to translate certain documents. Further, through the application of ICT, people can feel connected and reach out for social support by calling friends and family. Another interesting aspect concerned with information exchange is the way friends and family can act as informants. Here, social ties help to bridge information gaps and even act as information brokers. Children are often more skilled when it comes to ICT. They use technology for homework or online games and therefore are able to help parents with navigating user interfaces of online job applications. Further, they pick up the language quicker and can help with translation. In contrast, others choose to rely on technology rather than asking other people. In uncertain or risky situations, using an electronic device is preferred than asking someone on the spot.

Some problems in relation to ICT and (online) media were observed. In a new home country, it seems that some asylum seekers are introduced to new applications with which they are not familiar with (Sabie & Ahmed, 2019). This is reflected in their information behavior as well, doing things online or digitally and looking for information on the Internet is not familiar territory (Mikal & Woodfield, 2015; Tirosh & Schejter, 2017). Further, fluency of a foreign language, especially English, can impact the use of information technologies. Conversely, since one is able to use ICT, this sometimes prevents one from developing English fluency. Additionally, ICT skills are seen as important on the job market (Díaz Andrade & Doolin, 2019). These skills provide confidence and freedom (Bletscher, 2020; Merz et al., 2018). ICT is also a two-sided sword – on the one hand, it provides independence because one can look up information to verify it (Merz et al., 2018). On the other hand, some seem to rely on resettlement agencies to use ICTs for them and therefore limit self-sufficiency (Bletscher, 2020). Even though the Internet is used and applied by asylum seekers, some issues were observed. Asylum seekers perceive the Internet as being dangerous. The concerns are related to frauds or being exposed to unsavory content (Coles-Kemp et al., 2018; Mikal & Woodfield, 2015; Simko et al., 2018).

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7 Age- and gender-dependent differences of asylum seekers' information behavior and online media usage

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7.1 Introduction

In 2015, a rising number of people fleeing their home country arriving in the European Union (EU) led to the European migrant crisis, or refugee crisis. 1.2 million first-time asylum applications were made in 2015 in the EU, which is more than double the amount of 2014. Germany, Hungary, Sweden, and Austria received two-thirds of all applications in 2015. In 2018, there were still about 600,000 first time applications [11]. The immigrants that arrive in Europe include asylum seekers and economic migrants. The term "economic migrant" describes a person who leaves their home country because of economic reasons, for example to flee from poverty or to find better job opportunities. Asylum seekers are individuals seeking international protection; a refugee is someone who fled their home country and cannot return, fearing persecution because of race, religion, or nationality. Therefore, every refugee is an asylum seeker but not every asylum seeker will be recognized as a refugee [4].

Statistically, most of the migrants came from regions south and east of Europe, additionally Africa and the Greater Middle East [27]. The Middle East is constituted of several countries centered in West Asia, and includes Turkey and Egypt, with some definitions including the South Caucasus. The largest ethnic groups are Arabs, Turks, Persians, Kurds, and Azeris. Since 2013, the highest number of all refugees fleeing to the EU originates from Syria (29% in 2015; 13.9% in 2018). In 2018, the second largest group were Afghan refugees (7.1%); Iraqis (6.8%), Pakistanis and Iranians (4.3% and 4.0% respectively) make up the next largest groups [16].

The asylum seekers fled from their homeland, arriving in a new country, where they develop their own information horizon and social environment. Their situation, living conditions, and circumstances changed. Some are separated from their family members, have to establish new social contacts and try to stay in touch with their acquaintances and relatives. They have to learn a new language for job opportunities. Since the asylum seekers need to build their new life, they have to adapt to new situations: What needs do they have [37]? What is their information behavior? Are they included in the new culture of the European host countries?

7.1.1 Asylum seekers, ICT, and (social) media

A conjoint experiment in 15 European countries asked 18,000 voters what kind of asylum seekers they are willing to accept, with the results indicating that asylum seekers with a higher employability, therefore judging them by their possible economic contributions, receive more support from the population [6]. A study [34] assessed the digital skills of refugees during job orientation in Germany. The authors concluded that targeted courses for those skills will be beneficial for refugees to make labor market integration easier. Information and communications technologies (ICT) play an important role in this, as those products and services (e.g., personal computers, smartphones, search engines, social media, messaging services) enable their users to search for, find, understand, and apply information. ICT skills to use digital technologies efficiently are a growing requirement for various occupations in the majority of countries [30]. Furthermore, refugees "use their mobile phones for interactions regarding social and financial issues; for business or work purposes; for education, divertissement, church, safety and advocacy purposes" [9:2166], as a study about urban refugees in South Africa highlights. Personal needs of refugees make it difficult to separate themselves from their smartphones. Especially young migrants use their smartphones as a medium to participate with other youths locally and globally and to have a sense of refuge [29].

Another study focused on information practices of refugees and communication strategies in the integration process, however not in relation to ICT [25]. It was found that asylum seekers do receive necessary task-related information when arriving in a new country, in this case Sweden. Certainly, those asylum seekers in Sweden, are later left alone, since officers in the state agencies cannot provide personal guidance because of strict rules, impeding the acquisition of general orienting information and guidance. Different approaches are taken to help asylum seekers settle in their new countries with the use of technology [5,7,39] and applying HCI research in line with workshops to help researchers learn how to interact with asylum seekers [1]. Other research focused on an approach to use computer clubs in a Palestinian refugee camp to foster learning, social networks, and integration [2].

Research conducted on the integration of refugees in the Netherlands with the use of social media stresses the relevance for the acquisition of language and cultural competences. The refugees were able to build bonding and bridging social capital [3]. An additional investigation focused on the role of social media in the migration decision of refugees, meaning the information they gathered before and during migration to decide where they want to settle. Information that comes from existing social ties and is based on personal experience is considered to be most trustworthy [15].

7.1.2 Research framework

This is the gap our study fills. The presented investigation is about what information and communications technology (ICT) asylum seekers utilize, and what kind of social media and other online media they use when settling in a new country, in this case Germany.

Case and Given [12:48] state, "context and situation are important concepts for information behavior research." In line with Pettigrew, Fidel, and Bruce [28:44] we define "information behavior" as "how people need, seek, give, and use information in different contexts, including the workplace and everyday living." Thus, our approach does not only consider information seeking and consumption behavior (as often found in information science), e.g., [13,21]) but information production and dissemination behavior as well. Wilson [38:49] also defines "information behavior" in a rather broad way: "Information Behavior is the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use." Human information behavior is embedded in the users' "information horizons" [33] including the users' social contacts and networks (their social capital) as well as their concrete contexts and situations. As on social media and messaging services both, information production as well as information seeking and reception behavior, is always given, only this broad definition of information behavior is sufficient for our research.

As media provide different kind of information, it also satisfies a variety of needs. The Uses and Gratifications Theory (U&GT) defines four central motives for people to apply different kinds of media—in this case social media or online media, and messaging services: *information*, *entertainment*, *social interaction*, and *self-presentation* [24,10]. Information means the motive of giving or finding knowledge (including everyday information knowledge) [26]; personal identity is related to our motive to define our identity or to present ourselves (e.g., constructing an own Facebook page); entertainment comprises escaping from problems, relaxing, or filling time; social interaction is the motive to interact with other people and to maintain social capital. Users derive a sense of gratification when using the different forms of media, making this theory the basis for our research study: How do asylum seekers satisfy their needs for the different motivations? What kinds of online media, especially social media, do they apply?

Since Germany received the largest number of asylum applications for all years, including 2018 with around 161,931 first time asylum applicants and North Rhine-Westphalia being the Federal state (*Bundesland)* with the highest number as well (39,579; 24.4%), the research was conducted in this area. Most of the asylum seekers arriving in Germany in 2018 originate from Syria (27.3%), Iraq (10.1%), Iran (6.7%), Nigeria (6.3%), Turkey (6.3%), and Afghanistan (6.1%) [17].

As soon as migrants arrive in Germany, they have to report on seeking asylum in the country

[18]. Then, the asylum seekers receive a proof of arrival (*Ankunftsnachweis*) which grants them access to state benefits. The Federal Office decides, based on the German Asylum Act (*Asylgesetz*), between four forms of protection: entitlement to asylum (Art. 16a of The Basic Law (*Grundgesetz*)), refugee protection (§ 3 of the Asylum Act), subsidiary protection (§ 4 of the Asylum Act), or a ban on deportation (§ 60 V+VII of the Residence Act). In our study, all interviewees received the "entitled to asylum" status.

Research about digital skills and information behavior as well as the social media usage of refugees and asylum seekers is still in its beginnings, especially in Germany [31], making this research necessary to understand asylum seekers application of ICT, their perceived skills, as well as their motivations to use (online) media. Studies suggest that the genders as well as generations behave on and use social media differently [8,19,23]. According to Joiner et al. [22], women use the internet and social media to get connected with other people and to communicate with them, whereas men use it for entertainment purposes, respectively gaming. Looking at the user-generated content by gender, men are more likely to discuss public events (e.g., sports and politics) whereas women tend to share personal matters (e.g., family related) [36]. The United Nations High Commissioner for Refugees [35:16] reports about challenges of connecting refugee women and the elderly as they "are less likely to have access to mobile phones and the internet." Different generations were confronted with the internet and ICT in distinct stages of life and therefore had more or less the opportunity to adopt it to their everyday life [20].

This study analyzes the differences of ICT and social media usage of refugees among the age and gender groups accordingly. All in all, we arrive at the following research questions:

RQ1: Can gender- and age-dependent differences in the application of ICT be observed?

RQ2: How do asylum seekers perceive their skills to accurately use ICT?

RQ3: What social media and other web services do asylum seekers apply to satisfy their needs for information, entertainment, social interaction, and self-presentation? Are there gender- and age-dependent differences?

7.2 Methods

As the analysis of asylum seekers' information behavior is a very current and highly topical research area, there is no established theory to illustrate the interrelationships between asylum seekers (including the aspects of gender and generation), their information behavior, and their ICT as well as media usage. Beside the data collection and data analysis, researchers are permanently required to conduct coding, due to the steady arrival of new data. Indeed, as there

were new and unexpected data in the first interview round (in Dorsten), we added new aspects to our research questions and subsequently into the interview guide of the next interviews (in Düsseldorf, Moers, and Wesel).

To gather the necessary data and information, a mixed-method approach [14] was applied. For qualitative data, semi-structured face-to-face interviews were performed and quantitative data were collected with a questionnaire. First, different associations, institutions, and organizations as well as city governments in North-Rhine Westphalia were contacted as early contact points. It was recommended to interview asylum seekers from German language classes in order to properly communicate with them. We were able to interview a number of 25 adults in Dorsten and Düsseldorf aged between 21 and 55 years in November and December 2018 as well as in February 2019. All interview partners were attendees in German language courses of different levels (A1 (beginner) to C1 (proficiency)), who voluntary took part in our interviews. For asylum seekers who were not fluent enough in German yet, an Arabic native speaker was present. The interviews took around 15 to 30 minutes each. During the interviews, parents often mentioned their children using a specific service they were not using. Therefore, after a first analysis of the collected data, a second round of semi-structured interviews and filling in questionnaires was performed with 21 children and adolescents aged between 8 and 18 years. The procedure took place in April 2019 during a holiday care program for children of asylum seekers in Wesel and Moers. All children took part voluntarily in the interviews. If someone was not able to understand the interview-questions, the children helped each other with the translation or there was the opportunity to speak English. In total, 45 people from Syria (N=23), Afghanistan (N=8), Turkey (N=5), Iraq (N=4), Iran (N=2), Azerbaijan (N=2), and Lebanon (N=1), were interviewed. The questionnaire as well as the interview guides focused on the asylum seekers ICT and (social) media service usage in relation to the U&GT [10] and the summarized four central motives to use media by [24], which are information, entertainment, social interaction, and self-actualization. Self-actualization was transformed to self-presentation for producing content [32].

First, the interviewees were asked for demographics, their country of origin, age, gender, and educational level. They should also state what ICTs (smartphone, Internet, TV, laptop, tablet, PC) they are using and how they rate their skills to use ICT (especially their smartphone) and (online) media on a 5-point Likert-scale. Afterwards, a question asked what social media and messaging services (e.g., WhatsApp, Facebook, YouTube, Instagram, Twitter, Reddit, Live Streaming, TikTok) as well as further online media (news websites, online encyclopedias like Wikipedia) or ICT devices they are using to get information (knowledge). For the entertainment dimension, the interviewees were asked about which kind of social media (see above) and online media

(e.g., Apps, streaming services like Netflix) they like to use for fun and relaxation. Social interaction means all kinds of contact with relatives, friends or even strangers on the Internet. Therefore, the participants were asked which social media or messaging services (see above) they use to get in contact with other people to satisfy their need for social connection. For the self-presentation aspect, the asylum seekers were asked on which social media and messaging systems they share pictures, videos, or postings and about their motives to produce online content.

The interviews were transcribed by the two researchers. For this research article, the texts had to be translated from German to English, whereby most sentences are reproduced analogously to their meaning because of the language deficit of the interview partners.

7.3 Results

In our study, we interviewed 45 asylum seekers from the Middle East. First, some demographic data is presented, which is followed by the statistical analysis of the gender- and age-dependent differences regarding the applied ICT, as well as the perceived ability to handle those ICT. Furthermore, the gender- and age-dependent differences regarding the motivations suggested by the Uses and Gratifications Theory were statistically analyzed applying SPSS.

As for the age distribution, two groups were formed: children and teens aged 19 and below (46.7%) as well as adults aged 20 and older (53.3%). This distribution matches the one of the first-time asylum applicants in Germany, as around 44% of all applicants are less than 18 years old [16]. 28 (62.2%) of our participants were male and 17 (37.8%) female. 70% of all first-time asylum applicants in Germany are male for the age group 14-34, and 59% for the age group 35-64 [4], matching our distribution. Most of our participants came from Syria (51.1%), Afghanistan (17.8%), and Turkey (11.1%). As for the education of our participants, 17 (70.8%) of the adults had a high school diploma or higher education. Nine (42.9%) of the young participants are currently in primary school, eleven (47.6%) are in middle or high school, and two (9.5%) attend a vocational college.

7.3.1. Applied ICT and media

Overall, the most used ICT products are the smartphone (95.6%) as well as the internet (95.6%), followed by the TV (88.9%). “I do not watch movies on television, most of the time I use my smartphone or laptop for it,” explained one boy (IP26); “I prefer to use my smartphone instead of the computer, but I am not able to use all the functions on my smartphone that I want to use,” claimed one girl (IP29). Another girl states (IP28) “what am I supposed to do on the notebook that I am not able to do on the smartphone?” highlighting the importance of

smartphones for boys and girls, especially in contrast to other ICT like tablets, the TV, and PCs. Men and women seem to share this opinion: “Everything is on the smartphone; on YouTube, news, information, everything,” explains one man (IP1). Another man (IP4) proclaims “you can do everything on your smartphone, why use something else.” Other adults had conflicting thoughts about smartphones and media in general: “I don’t have any free time to use media, I need the time to care for my children as well as learning German,” as one father states (IP7). “When the kids are sleeping, I am able to use my smartphone and have a little bit of free time” confirms a mother (IP14). One man (IP25) even contrasts: “In Syria, I played a lot with my smartphone, now, in Germany, I am not interested anymore.” Laptops (46.7%) and the radio (42.2%) are utilized as well, whereas not as much. Ranking last, we find tablets (31.1%), landline telephones (24.4%), and the PC (17.8%). Here, one woman (IP10) states “I do have a tablet, but I do not use it.”

Gender-dependent differences. Gender-dependent differences regarding the use of ICT can be obtained from Table 7.1. More female (100%) than male (92.5%) participants apply smartphones and use the internet. PCs (male 21.4%, female 11.8%), laptops (male 57.1%, female 29.4%) as well as tablets (male 39.3%, female 17.6%) are chosen more often by male participants.

Table 7.1: ICT and media usage of the genders

ICT	Male N=28	Female N=17
Smartphone	92.9%	100%
Internet	92.9%	100%
TV	85.7%	94.1%
Laptop	57.1%	29.4%
Radio	39.3%	47.1%
Tablet	39.3%	17.6%
Landline	21.4%	29.4%
PC	21.4%	11.8%

Age-dependent differences. Considering the age-dependent differences of the application of ICT and media, a few differences can be observed (Table 7.2). More adults (100%) use smartphones than the younger ones (90.5%). If tablets (42.9%), PCs (23.8%) and laptops (57.1%) are concerned, they are preferred by the younger users in contrast to the older ones (tablet 20.8%, PC 12.5%, laptop 37.5%), even though they are losing importance for the children as well.

Table 7.2: ICT and media usage of the age groups

ICT	Children N=21	Adults N=24
Smartphone	90.5%	100%
Internet	95.2%	95.8%
TV	90.5%	87.5%
Laptop	57.1%	37.5%
Radio	38.1%	45.8%
Tablet	42.9%	20.8%
Landline	23.8%	25.0%
PC	23.8%	12.5%

7.3.2 Perceived ability to use ICT and media

The participants were asked to rank their perceived ability to handle different ICT on a Likert-scale from 1 ("not able to") to 5 ("fully efficient"). The findings are displayed as Boxplots (Figure 7.1). It can be observed that boys and girls do not differ in their perception of their skills to use ICT (median of 4, IQR 2) with the lowest value being a 3. However, adult men and women do differ quite a bit in this regard. Men overall display greater confidence in their ability (median 4, IQR 2) with the lowest value at 3, whereas women are not as positive (median 3, IQR 2) with the lowest value at 2.

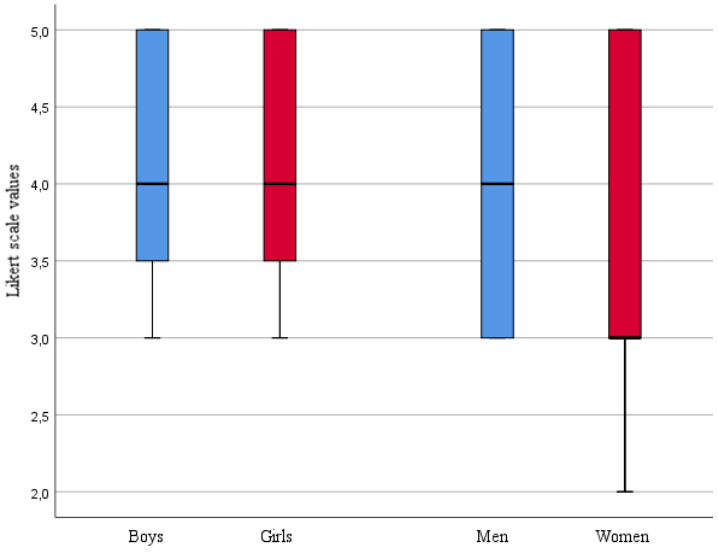

Figure 7.1: Perceived skills to use ICT

7.3.3 Social media, web services, and needs

Moving on to the applied social media, other web services and the asylum seekers needs. In general, the (social) media services are employed to a big extent.

Some restrictions were mentioned by the participants. As some services are inhibited or not as widely used in their home country, they did not adapt them. For example, "some services are restricted by the government in Iran, therefore new ones need to be developed," as one man

(IP4) expresses.

Another man (IP23) discloses: “In Turkey, live streaming is not allowed, therefore I do not use it” and “we are not allowed to use Wikipedia in Turkey,” “in Turkey, the younger generation does not use Facebook, only ‘older people’ are using it. It is different to Germany, here, you need to use Facebook when you are young.” One boy (IP27) proclaims “my parents have restricted the functions on my smartphone. I am not able to use social media or to download apps from the Google Play Store. And even for YouTube, I am only allowed to use YouTube Kids.”

Children and adolescents are using (social) media to find information and knowledge and to learn German. “I am even able to translate everything via Apps and to learn German via YouTube,” one girl (IP28) tells us. It is also used as a tool for homework. “For my homework, I always use YouTube and Google,” “I use YouTube to learn about school topics and for my homework,” disclose a girl and a boy (IP33 and IP37 respectively). As for the adults, “information about jobs is most important,” proclaims one woman (IP24). Another woman states “when there was war in my country I used Twitter to get information about the city I lived in” (IP3).

Others are actively trying to avoid some form of knowledge. One woman explains (IP24): “I don’t want to read, see, or hear about news from my home country—it hurts me,” and “my home country is destroyed, so I am not looking for information and news about it,” states one man (IP9). To observe the information critically is important: “For a good understanding about the news you always have to consider various news portals—Russian, US-American, and different European ones—because politics are opinion-forming,” as one man (IP20) states. Another man (IP13) explains: “There are a lot of fake news on Facebook, you have to be careful about what you believe.” Even social media traditionally used for social interaction is utilized to gather information: “I have many WhatsApp groups to stay up-to-date and to get information,” reports one man (IP23). Other channels like YouTube are employed as well: “I’m using YouTube for everything, there is a lot of information on YouTube,” and “YouTube is better than everything else, there are all information you will need,” as two men (IP4 and IP7 respectively) explain.

Children like to use (social) media to entertain themselves; especially TikTok was mentioned in this context: “Making videos on TikTok is a lot of fun, but I do not show myself in the videos I make, they are always about other things,” tells one boy (IP40). Another boy confirms (IP45): “Of course I use TikTok to make videos, but not about myself, I prefer to create them about other things.” When it comes to adults and entertainment, one man states (IP25) “there is no time for entertainment.” A sentiment shared by other asylum seekers, as was outlined before.

Social media plays an important role for social interaction and staying in contact with family and

friends from Germany as well as their home country. “With my friends and family, I can share all my experiences via WhatsApp, I can send them pictures of my whole day,” proclaims one girl (IP33).

One boy tells us (IP40) “my grandmother lives in Syria; we are writing and talking via Facebook.” For some adults, this is the only priority when it comes to social media: “I deleted all my social media accounts except WhatsApp to stay in contact with my family and friends,” as one woman (IP24) emphasizes. One man (IP1) says “sometimes we are talking with video calls or audio calls via WhatsApp.” For others, social media lost its appeal: “I used to interact on a lot of different social networking services, but since I am in Germany, I do not,” explains one man (IP20).

Concerning self-presentation, the children use it also as a medium to interact with other people. A boy (IP34) says “I upload pictures on Instagram and Facebook to show everybody what I am doing and to get in contact with new people.” One girl states “I post things on Facebook and WhatsApp, it is fun and leads to conversations with others” (IP36). Another girl (IP42) also mentions “I make my own videos on TikTok where I am singing. It is a lot of fun and my friends like it.” Regarding self-presentation and adults, a woman (IP15) expresses: “On WhatsApp, Facebook, and Instagram I upload pictures, so people who know me see all the news about my life and it is fun.” “Posting things online and self-presentation is a lot of fun,” confirms one man (IP21). Self-presentation is also a form of distributing good news. A father (IP25) told us “I share posts online to tell everyone that my family is fine and that we are all spending time together. It makes me happy.”

Gender-dependent differences. The applied social media and other web services in order to satisfy the different needs according to the Uses and Gratifications Theory can be observed in Table 7.3 for the gender-dependent differences.

Regarding the need for information, all female and almost all male interviewees are in need of them (96.4%). Overall, search engines (m 100%, f 88.2%), YouTube (m 88.9%, f 70.6%), as well as WhatsApp (m 77.8%, f 88.2%) are used the most often to get information.

The male participants use Facebook (63.0%), Instagram (48.1%), Twitter (25.9%), and live streaming services (3.7%) more than the female ones.

Table 7.3: Gender-dependent differences of motivations to use web services; Male N=28, Female N=17

Web Service	Information		Entertainment		Social Interaction		Self-Presentation	
	Male N=27	Female N=17	Male N=28	Female N=17	Male N=27	Female N=15	Male N=17	Female N=15
WhatsApp	77.8%	88.2%	39.3%	64.7%	88.9%	88.9%	58.8%	60.0%
YouTube	88.9%	70.6%	89.3%	88.2%	0	0	5.9%	0
Facebook	63.0%	58.8%	42.9%	41.2%	37.0%	50%	70.6%	40.0%
Instagram	48.1%	35.3%	42.9%	23.5%	22.2%	11.1%	47.1%	26.7%
Twitter	25.9%	5.9%	3.6%	0	0	5.6%	0	0
Reddit	0	0	3.6%	0	0	0	0	0
Live Stream.	3.7%	0	7.1%	0	3.7%	0	0	0
9Gag	NA	NA	0	5.9%	NA	NA	NA	NA
TikTok	NA	NA	25.0%	29.4%	7.4%	5.6%	29.4%	26.7%
Snapchat	NA	NA	0	17.6%	7.4%	16.7%	11.8%	20.0%
Apps	NA	NA	75.0%	41.2%	NA	NA	NA	NA
Search Engine	100%	88.2%	NA	NA	NA	NA	NA	NA
Website news	29.6%	29.4%	NA	NA	NA	NA	NA	NA
Wikipedia	37.0%	17.6%	NA	NA	NA	NA	NA	NA

All participants like to use some kind of (social) media to entertain themselves. YouTube is the most applied social media service by both groups (m 89.3%, f 88.2%). For female participants, they like to use WhatsApp (64.7%) and Snapchat (17.6%) and therefore interaction with others as a form of entertainment much more than male users (WhatsApp 39.3%, Snapchat 0%). For the male participants, they are the only ones that use Twitter (3.6%), Reddit (3.6%), and Live Streaming (7.1%) for entertainment purposes. They also use Apps as, for instance, games (75.0%) much more than female participants (41.2%).

Social interaction is sought by all female participants and almost all male participants (96.4%). WhatsApp is used the most often by both genders (m 88.9%, f 88.9%). Female participants are more inclined to use Facebook (50.0%), Twitter (5.6%), and Snapchat (16.7%) for social interaction in contrast to the male participants (Facebook 37.0%, Twitter 0%, Snapchat 7.4%). The male participants use Instagram (22.2%) and Live Streaming (3.7%) more than the female interviewees.

If the self-presentation aspect is concerned, more female (88.2%) than male participants (60.7%) are interested in it. Most of the male participants like to use Facebook (70.6%) and WhatsApp (58.8%) to present themselves. Female participants prefer WhatsApp (60.0%) overall. More male participants apply Instagram (47.1%) and YouTube (5.9%) than the female interviewees (Instagram 26.7%, YouTube 0%) for self-presentation.

Age-dependent differences. Differences for the applied social media and web services to satisfy the four needs suggested by the U&GT can be identified for the two age groups (Table 7.4).

Table 7.4: Age-dependent differences of motivations to use web services; Young N=22, Adult N=24

Web Service	Information		Entertainment		Social Interaction		Self-Presentation	
	Young N=20	Adult N=24	Young N=21	Adult N=24	Young N=19	Adult N=24	Young N=13	Adult N=19
WhatsApp	80.0%	83.3%	33.3%	62.5%	75.0%	100%	53.8%	63.2%
YouTube	75.0%	87.5%	90.5%	87.5%	0	0	7.7%	0
Facebook	40.0%	69.2%	14.3%	66.7%	15.0%	62.5%	23.1%	78.9%
Instagram	35.0%	50.0%	38.1%	33.3%	5.0%	25.0%	38.5%	36.8%
Twitter	10.0%	25.0%	0	4.2%	0	4.2%	0	0
Reddit	0	0	0	4.2%	0	0	0	0
Live Stream.	5.0%	0	9.5%	0	0	4.2%	0	0
9Gag	NA	NA	0	4.2%	NA	NA	NA	NA
TikTok	NA	NA	42.9%	12.5%	5.0%	8.3%	46.2%	15.8%
Snapchat	NA	NA	9.5%	4.2%	10.0%	8.3%	30.8%	5.3%
Apps	NA	NA	90.5%	37.5%	NA	NA	NA	NA
Search Engine	95.0%	95.8%	NA	NA	NA	NA	NA	NA
Website news	5.0%	50.0%	NA	NA	NA	NA	NA	NA
Wikipedia	25.0%	33.3%	NA	NA	NA	NA	NA	NA
Netflix	NA	NA	33.3%	20.8%	NA	NA	NA	NA

All of the older users (100%) and almost all younger users (95.2%) search for information on the internet. Most of the interviewees like to use search engines to find information (children 95.0%, adults 95.8%). Significantly more adults (50.0%) visit news websites to gather information than the younger ones (5.0%). When looking at social media, the older participants also employ YouTube (87.5%), Instagram (50.0%), and Twitter (25.0%) more, especially Facebook (69.2%). Live streaming is only used by the young participants (5.0%).

If the motivational factor entertainment is concerned, all participants want to satisfy this need by using social media or web services. YouTube is the preferred medium for both groups overall (young 90.5%, adults 87.5%), but also gaming Apps for the youngest users (90.5%) with a significant difference. WhatsApp (62.5%), Twitter (4.2%), and Reddit (4.2%) are more used by adults, as the younger ones do not use Twitter or Reddit at all. Live Streaming is only applied by the younger users (9.5%), and especially TikTok (42.8%) is favored by the younger participants.

Social interaction is sought by all adults and almost all children and adolescents (90.5%) on social media. The most applied service is WhatsApp for both groups (young 75.0%, adults 100%), but is preferred by adults. Adults also use live streaming services (4.2%), TikTok (8.3%), Twitter (4.2%), Instagram (25.0%), and especially Facebook (62.5%) more often to interact with others.

To present oneself is important for 61.9% of the children or adolescents and to 79.2% of the adults. Here, Facebook is used the most often by adults (78.9%); however, WhatsApp (53.8%) is applied more often by the younger participants. The latter also like to use Snapchat (30.8%) and TikTok (46.2%) for this matter.

7.4 Discussion and limitations

The results of this study offer insights into the age- and gender-dependent differences of asylum seekers' ICT and online media usage (RQ1), their perceived skills to use ICT (RQ2), and their motives to apply (social) media (RQ3) after their arrival in Germany. For this purpose, semi-structured interviews and a survey were conducted. 45 participants from the Middle East were interviewed. Most of the participants use a smartphone, the internet, and the TV. For nearly all children the smartphone replaces many other ICTs, they are watching movies on it like they normally did on television, they even look up information and can do all the things on their smartphone instead of using a notebook or computer. Some younger children got restrictions from their parents and are not even allowed to own a smartphone. When it comes to the perceived ability to interact with ICT, children in general had higher confidence in it than adults.

Adults, men and women alike, often mentioned that they do not have free time, in contrast to back in their home country, to use their smartphones or (social) media anymore, since they are busy learning German, searching for a job, and caring for their children—which has priority for them. The results showed that all adults do utilize (social) media in their free time for entertainment, social interaction, and to find information, but not to which extend. But it is safe to assume from the interviews that they do not use it for many hours a day. This is in stark contrast to a study conducted with asylum seekers in the Netherlands. They mentioned that "the average amount of time spent on social media was seven hours per day. […] Prior to their arrival in the Netherlands, participants from Syria reported using fewer social media due to their busy working schedules in their homeland" [3:1595f.]. This should be investigated further. Why does the application of social media differ this much for asylum seekers in two neighboring countries (Germany and the Netherlands)?

Governments of a few asylum seekers' home countries prohibit the usage of social media services and restrict the information on news portals and online information systems; therefore, these services were also not adapted since arriving in Germany.

Although many of the adult asylum seekers are interested in information about their home country, some reported about the bad conditions, that there is sometimes no chance to get in contact with relatives and acquaintances, and that they do not want to get information or news about it. A few of the interviewed adult participants had a critical point of view about online information in general and about knowledge from social media systems, which is a sentiment shared by other asylum seekers [3]. Nonetheless, information is often searched for with the use of search engines, WhatsApp, and YouTube. This can be explained as "information" also includes details about the wellbeing of relatives, information from other asylum seekers about jobs,

integration and so on, which can be satisfied with messaging services. For adults, this also includes Facebook and news websites. The interviewed children often mentioned the usage of web-based systems, the search engine Google, the video-sharing platform YouTube or WhatsApp groups for doing their homework and finding information for it. When it comes to entertainment, YouTube is a central system, for consuming music and movies, for all age groups and genders. TikTok was highly favored among the boys and girls, as well as different gaming apps, but more by the male participants. Surprisingly, self-presentation, e.g., posting pictures or short videos of oneself, for example on Instagram or especially TikTok, is a form of social interaction for a few boys and girls. The older interviewees share pictures to show their family members in their home country how they experience their new life in Germany. The importance of smartphones and social media to stay in contact with family was emphasized in other studies as well [3,29].

Overall, Facebook and Twitter do not have a significant status for children and adolescents. This can be attributed to a general trend in social media usage, as younger users are adapting to new services and abandon the traditional ones [20].

Some limitations of this study should be discussed. First, the interview citations do not reflect the opinion of all asylum seekers, even of all interview participants, of course, but sometimes, a few trends or the general mood could be detected. For a statistical analysis, the number of participants is rather small, but helped us to gain first insights into the (social) media and ICT usage.

For future research, it will be interesting to see if the social media usage of asylum seekers changes or adapts to the behavior of German residents, or if there are any differences even. In contrast to Germany, countries' immigration offices use social media in order to help the asylum seekers to integrate into society [3]. Furthermore, research should determine what kind of information asylum seekers need and are searching for on (social) media. Some participants also stated that they do have difficulties integrating into the German society since it is not easy to establish contact with Germans, due to language barriers, time constraints, but also, to the German nature and attitude. This sentiment was shared by asylum seekers even in the Netherlands: "For me…what I notice is that Dutch people like refugees. There is no racism in the Netherlands. In Germany and Sweden, the case is different, refugees are suffering there" [3:1597]. Surely, Germany offers many different initiatives for asylum seekers to integrate into society and establish contact with German people, but still, this point of view tells an aspect of a different story. The smartphone plays an essential part in immigration and integration, as the asylum applicants can translate, search for information and stay in contact with relatives

through the medium. Hopefully, this research is a first step into the direction to help asylum seekers and their integration into a new life.

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Part III: Gender aspects of information behavior and information horizons

8 Gender differences in perception of gamification elements on social live streaming services

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8.1 Introduction

More and more Social Live Streaming Services (SLSSs) are appearing on the world wide web. Especially in China are already over 200 live streaming platforms (Lu, Xia, Heo, & Wigor, 2018). Even Instagram and Facebook added the function of streaming live to their systems. SLSSs are a synchronous type of social media where users are able to stream their own live program and share information during their stream. Other users are able to communicate with the streamer via chat messages or reward the broadcaster by sending virtual gifts (Zimmer, Scheibe, & Stock, 2018). It is a combination of live-tv and social networking service (SNS), where everything happens in real-time. It can be differentiated between general SLSSs, like Periscope, Nico Video, or YouNow, which do not have a thematic limitation, and topic-specific SLSSs, like the well-known e-sports and gaming-based service Twitch, respectively Picarto for art-related content (Scheibe, Fietkiewicz, & Stock, 2016).

Many SLSSs offer a variety of gamification elements on their system (Scheibe & Zimmer, 2019). Gamification is used on different kinds of online systems and mobile applications. It is known and defined as “the use of game design elements in non-game contexts” (Deterding, Nacke, & Dixon, 2011, p. 1), like badges or leaderboards, and should also accomplish behavioral and engaging results (Hamari, Koivisto, & Sarsa, 2014). Another definition, that also addresses the motivational outcomes for users by applying gamification to a system from Seaborn and Fels (2015, p. 14) says that gamification “is used to describe those features of an interactive system that aim to motivate and engage end-users through the use of game design elements and mechanics.” Concluding, gamification is used to design systems to motivate its users and to achieve repetitive (information) system usage (Deterding, 2012).

One of the most important points in studying human needs and (user) motivation is the Self-Determination Theory by Ryan and Deci (2000a). They describe motivation as “what ‘moves’ people to action” (Ryan & Deci, 2017, p. 13) by internal and external factors. Therefore, one can distinguish between internal and external motivation, as well (Ryan & Deci, 2000b). The so-called intrinsic motivation “involves people freely engaging in activities that they find interesting, that provide novelty and optimal challenge” (Deci & Ryan, 2000, p. 235). And the

extrinsic motivation “refers to doing something because it leads to separable outcome” (Ryan & Deci, 2000b, p. 54). Game design elements are intrinsically motivating users of a service (Hamari, Koivisto, & Sarsa, 2014). Users will rather recommend a social networking service, like Facebook or LinkedIn, to others if it is gamified, also, their intention to use the service increases (Hamari & Koivisto, 2013).

Gender studies have always been an important field in research, due to gender roles, distinct expectations by society, defined stereotypes for genders, and related behavioral differences (Diamond, 2002). Even in early stages of development, children learn to play with gender related toys (Cherney et al., 2003). Furthermore, gender-dependent differences have been observed in internet and social media usage. Men use it for games and entertainment purposes, while women use it for communication and connecting purposes (Joiner et al., 2005). Research on general gender differences in gamification show that women are likely to perceive gamification more positive than men (Koivisto & Hamari, 2014).

As YouNow offers many gamification elements (Scheibe & Zimmer, 2019) and users of YouNow are highly motivated by the applied game mechanics (Scheibe, 2018), the researchers choose YouNow as the case study of this investigation. The study focuses on the differences by gender, because there is only limited research about gender on SLSSs and gender studies is a necessary ongoing research field for representation of gender and to register changing in gender. In line with this, the following research questions are important for our investigation:

RQ1: What is the general opinion about YouNow differentiated by gender?

RQ2: Which gender is more content to spend real money on YouNow?

RQ3: Which gender is more motivated by YouNow’s gamification elements?

8.2 Background

8.2.1 Motivations to use SLSSs

The first step is to take a look at the viewers’ motivations to use social live streaming services (Zimmer & Scheibe, 2019). One study found that the main reason behind the positive impression of live streaming is that live streams make people happy and relieve stress (Chen & Lin, 2018). According to Hamilton et al. (2014), another major reason to start watching streams on Twitch is to learn about games.

But why do people continue to use live streaming services? Two big factors for viewers to watch live streams are entertainment and information seeking (Chen & Lin 2018; Hamilton et al., 2014; Sjöblom & Hamari, 2017; Hilver-Bruce et al., 2018; Sjöblom et al., 2017). As for the SLSS Twitch,

Hilvert-Bruce et al. (2018) found that the time a user spends on the platform can be explained by the factor's entertainment, information seeking, and social interaction. "Six of the eight motivators (social interaction, sense of community, meeting new people, entertainment, information seeking, and external support) significantly explained at least one indicator of live-stream engagement (emotional connectedness, watching, subscribing, or donating)." Viewers also feel emotionally connected through the social dynamics of SLSSs (sense of community, social interaction, and meeting new people).

Research also suggests that people with fewer social ties in real life are more inclined to engage in live streams than people with more robust social ties (Hilvert-Bruce et al. 2018). That is how the social aspect of SLSSs comes into play. Live streaming "provides a perfect place for befriending strangers in a socially acceptable way," as Lu et al. (2018, p. 10) state. The feeling of a sense of community in the watching experience of the viewer is one of the strongest determinants to follow streamers and subscribing, and also increases the time viewers watch live streams (Sjöblom & Hamari, 2017). A study by Gros et al. (2017) confirms this significant correlation between motivation for socialization and usage time.

This social element is also at play when social media influencers on SLSSs are concerned. The interactive communication between users and social media influencers brings them closer in their at least, perceived, social distance (Zhou et al. 2019). This lessened social distance also fosters a form of broadcast and group identification. This positively associates with continuous watching intention, meaning, the more a viewer identifies him- or herself with the streamer, the more the viewer watches the broadcaster. It is implied that this is a new phenomenon compared to other types of social media (Hu et al., 2017). The scope in which the audience recognizes or has a positive attitude towards the streamer, the more the perceived worthiness of the streamer increases which encourages the viewer to interact during a live stream (Chen & Lin, 2018).

This also applies the other way around. When it comes to the continuation of contributing content this is primarily affected by the streamer's social capital, i.e., the relationships between broadcasters and the followers that participate with him or her, and is not dependent on individual motives. The only individual motives that have any effect are enjoyment and information dissemination, whereas the amount of content that the streamer contributes depends much stronger on his or her individual motives (Bründl & Hess, 2016). Other reasons that contribute to the desire of streamers to continue to broadcast is the performance expectancy and the attractiveness of a website (Zhao et al. 2018), meaning that SLSS websites should focus on their performance and design.

8.2.2 SLSSs usage by gender

Gender research on SLSSs is in its beginnings and only a few studies could be found. Overall, around 60% of streamers on SLSSs are male and 40% are female (Friedländer, 2017; Tang et al., 2016). A study on general SLSSs, for example Ustream, Periscope, and YouNow, shows that the produced content is not different for male and female (Friedländer, 2017).

But regarding the motivations to stream, show different results for the genders. Whereas a study by Fietkiewicz et al. (2018) found that men are slightly more motivated to make money with live streams than women are; there is no difference when it comes to the desire to become famous. Furthermore, there is even a negative attitude regarding the chance of becoming famous for most female and male users. If social aspects are concerned, the sense of belonging is a more important factor for female users than male users (Fietkiewicz & Scheibe, 2017). Furthermore, "females may be more affect-oriented than logic-oriented, compared to males. Thus, there were proportionately more female than male live streamers in pursuit of intrinsic motivation fulfilment," as Zhao et al. (2018, p. 415) state. But another study showed no difference in motivations of female and male streamers to broadcast themselves (Friedländer, 2017). There are even some legal implications that differ for the male and female live streamer. Male streamers potentially commit more road traffic acts and violate sports broadcasting rights more often (Zimmer et al., 2017). Women tend to commit music copyright infringements more often than male streamers (Zimmer et al., 2017; Fietkiewicz & Scheibe, 2017)

If the viewers are concerned, differences of the genders' motivations to watch live streams can be observed. Female viewers seem to have a more favorable impression of streamers if they admire them in some form. In contrast, males like a streamer more if they interact with the streamer or even other audience members. This is inconsistent with research on other social media, since usually, females use those platforms to interact with others rather than males (Chen & Lin, 2018). When it comes to the content of a live stream, males prefer to watch live videogame play and female take more interest in streamers sharing their life (Chen & Lin, 2018).

8.2.3 Gamification on SLSSs

Taking a look at research about gamification on SLSSs, only a minority of research in the context with motivation was conducted. Some research suggests that viewers are motivated by the reciprocal acts of streamers, for example if the streamer welcomes someone publicly who usually tips the streamer a lot of money when the user enters the online live streaming room (Lee et al., 2018). Or, in other words, the more benefits people believe they can receive from a live stream, the stronger the intention to continue to watch the live stream (Chen & Lin, 2018). Furthermore, on Twitch "individuals are motivated to subscribe in order to build deeper

involvement with the community and feel like a larger part of shared experiences", as Sjöblom et al. (2017, p. 8) state. As mentioned, Chinese services implement a large amount of SLSSs which integrate a wide variety of game mechanics (Scheibe & Zimmer, 2019). There, one reason why SLSSs are so successful could be explained with the following statement: "Chinese people think highly of 'guanxi' in social interactions, which may be why they reward streamers with virtual gifts. They may perceive the rewarding process not only as a consumer behavior, which can be an impulse purchase, but also a social interaction for circulating guanxi and keeping 'face'," how Lu et al. (2018, p. 10) describe.

Wilk, Wulffert, and Effelsberg (2015) developed a mobile broadcasting application in three different versions. Starting with a base version (A) without game mechanics, they added levels to the next version (B), and finally they added challenges as well as badges to the third version (C). The investigation showed that the users' streaming time increased significantly by the number of applied game mechanics. Another study differentiates between distinct user groups (producer, consumer, and participant) on SLSSs and if they feel rewarded through the gamification elements (Scheibe, 2018). The results show that the streamers who are producing content feel the most rewarded. Finally, an investigation of Scheibe, Meschede, Göretz, and Stock (2018) conducted a study on how users on SLSS perceive the action of giving and receiving gameful rewards.

8.2.4 Gamification on YouNow

YouNow is the most gamified US-American SLSS (Scheibe & Zimmer, 2019) and its users are highly motivated by the gamification elements (Scheibe, 2018). Any registered YouNow user has a level which represents the user's experience and increases through several website activities, for example, active viewing of streams or broadcasting activities. The progress of reaching the next level is shown with the aid of a progress bar, which should motivate the user to continue the usage of the service. Also, it is possible to collect coins, the virtual currency on YouNow, through active participation on the service. That can be broadcasting, inviting friends to the SLSS, and by simply logging-in into YouNow every day. Coins are needed to like a stream and to reward streamers with virtual gifts. The other currency on YouNow is called "bars," they have to be bought with real money and can be applied as a tip for a streamer as well as to bestow streamers with premium gifts. The user who gives away bar-based gifts mostly wants to "stand out of the crowd" (YouNow - What are bars?, 2019). Gifts are like stickers or emojis that are presented in the chat (see Figure 8.1), some of them even have an impact on the live stream. There is the opportunity to use a free spin every 24 hours. With a free spin, a user has the chance to win premium gifts to reward one streamer.

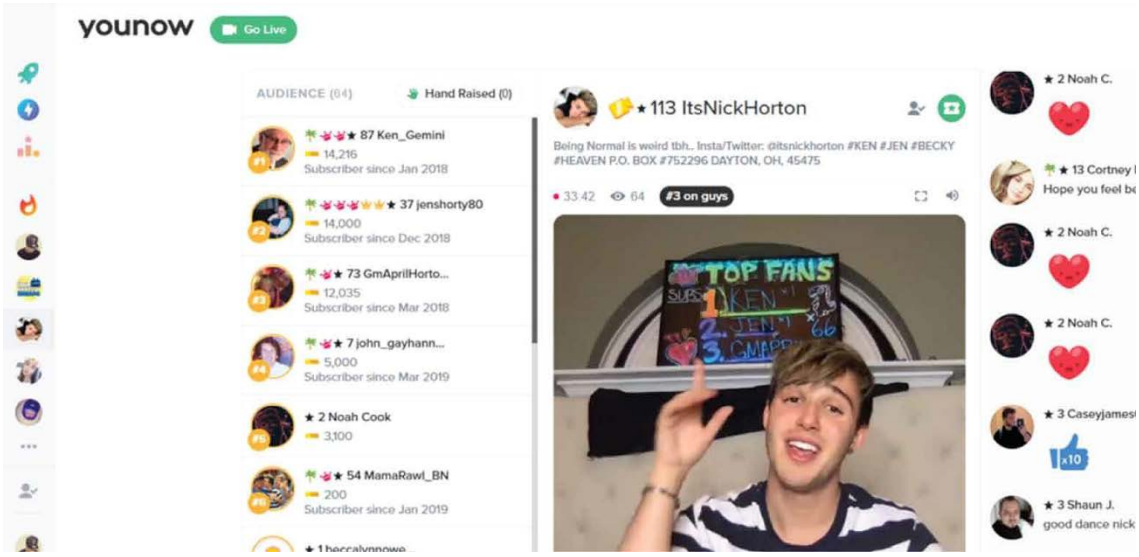

Figure 8.1: Screenshot of a live stream on YouNow by ItsNickHorton. Screenshot taken by one of the authors. (Source: YouNow.com, March 31, 2019)

If users want to stay updated about the activities of another user, there is the function to become a fan of someone. Fanning on YouNow is like following on Instagram or Twitter, users are getting notifications if, for example, someone is starting a live stream. Another opportunity is to become a subscriber of a user by paying a monthly fee of 4.99 US dollars. "[S]ubscribtion includes a Super Gift, 20 onscreen messages, priority chat, subscriber-only chat, and access to the broadcaster's replays" (YouNow - What is a subscription?, 2019). While watching the streamers broadcast subscribed to, all subscribers will be identified by a unique badge. On YouNow are three different kinds of badges available. The mentioned unique subscription badge, a badge to represent the broadcasting level of a streamer, and red as well as golden crowns. The crowns are a symbol for top fans, who are supporting streamers with bars. The more bars a user is spending, the higher he raises in the crown level. A user can own up to 5 red or golden crowns. Coming back to the broadcasting badge, there are nine different levels, which represent the skills of a broadcaster. Streamers are raising up to a next badge if they reach certain goals (e.g., getting a designated number of likes for the stream). The nine levels are, by order: Novice, Rookie, Junior, Captain, Rising Star, Boss, Ace, Superstar, Pro, and finally, Partner (of YouNow).

Streamers have also the opportunity to collaborate on YouNow, what is known as being a guest broadcaster in a stream. A user of the audience has to click the "Raise Hand" button to give the streamer his or her permission to be a guest. Users of the audience can capture a moment of the stream by clicking on the lightning button. Thereby the previous 15 seconds of the live stream will be recorded and posted on the streamer's as well as on the user's profile, who captured the moment. A "Trending Now" leaderboard shows popular broadcasters which are live at that moment. Some factors to move up in the ranking are the number of likes for the

stream, the number of viewers, broadcasting activities as well as the broadcasts length (YouNow - How do Trending People & Tags work, 2019). Further leaderboards are: Editor's Choice, Top Broadcasters (of 24 hours, weekly, monthly), Top Fans (of 24 hours, weekly, monthly), and Top Moment Creators (of 24 hours, weekly, monthly as well).

8.3 Methods

To answer the research questions, an online questionnaire about the gamification elements on YouNow was conducted via umfrageonline.com. Based on the top five browsing locations (Alexa, 2016) it was available in five different languages, namely German, English, Spanish, Arabic, and Turkish. Participants were able to access the link from 30th August 2016 until 13th March 2017. It was distributed through Facebook groups, YouNow boards, and the social news service Reddit. After checking and cleaning the data, a number of 211 filled in questionnaires was left and 94 users of YouNow who stated their gender answered all questions of the questionnaire.

At the beginning, the participants had to answer if they are a user of YouNow, and what they are using the SLSS for. There was the possibility to answer "only streaming," "only watching streams," "both: streaming and watching streams," or "I do not use YouNow." If the survey attendee was not a user of YouNow, the survey terminated automatically. The next questions asked if the users have ever bought bars, subscribed to someone, or have been a guest in a stream. Furthermore, we wanted to know their general opinion about the synchronous service YouNow, based on the Technology Acceptance Model (Davis, 1989), and if they are experiencing "flow" while using YouNow (Csíkszentmihályi, 1975).

The majority of survey items were pre-formulated statements about each gamification element on YouNow (e.g., "Levels on YouNow motivate me to use YouNow"). Statements could be rated on a 7-point Likert scale (Likert, 1932) from "totally disagree" (1) to "neutral" (4) up to "totally agree" (7). Additionally, a note stated that the distances between adjacent numbers are the same size to get interval scaled data. With the neutral point we did not force the survey attendees to decide on an answer. Also, a 7-point Likert scale allows a more accurate and detailed result than a 5-point Likert scale. The pre-formulated statements were based on the theoretical definitions of gamification and its motivating function (Deterding, 2012; Seaborn & Fels, 2015; Zichermann & Cunningham, 2011). Finally, the users of YouNow were asked about their demographic data. For this study, the researchers needed to know the gender, the users were also asked about their age as well as the country they live in.

Since the data are not normally distributed, most results are presented as boxplots to show the median as well as the interquartile range of the data. Further results consider the median as well as the mean to make it possible to generate a ranking of the gamification elements.

8.4 Results

Starting with demographics, from all 94 filled in surveys, there are 48 female and 46 male participants. Most of the survey attendees are from the US (27.7%), followed by Germany (23.4%), United Kingdom (7.4%), Saudi Arabia (6.4%), Canada, and the Netherlands (5.3% each). The age ranges from 12 years to 62 years, with the mode at 17 years, the median at 23 years and the mean at 26.36 years. Starting with the general opinion about the social broadcasting service YouNow (Figure 8.2), the majority of female and male users agree with a median of 6 that YouNow is easy to use (first boxplots).

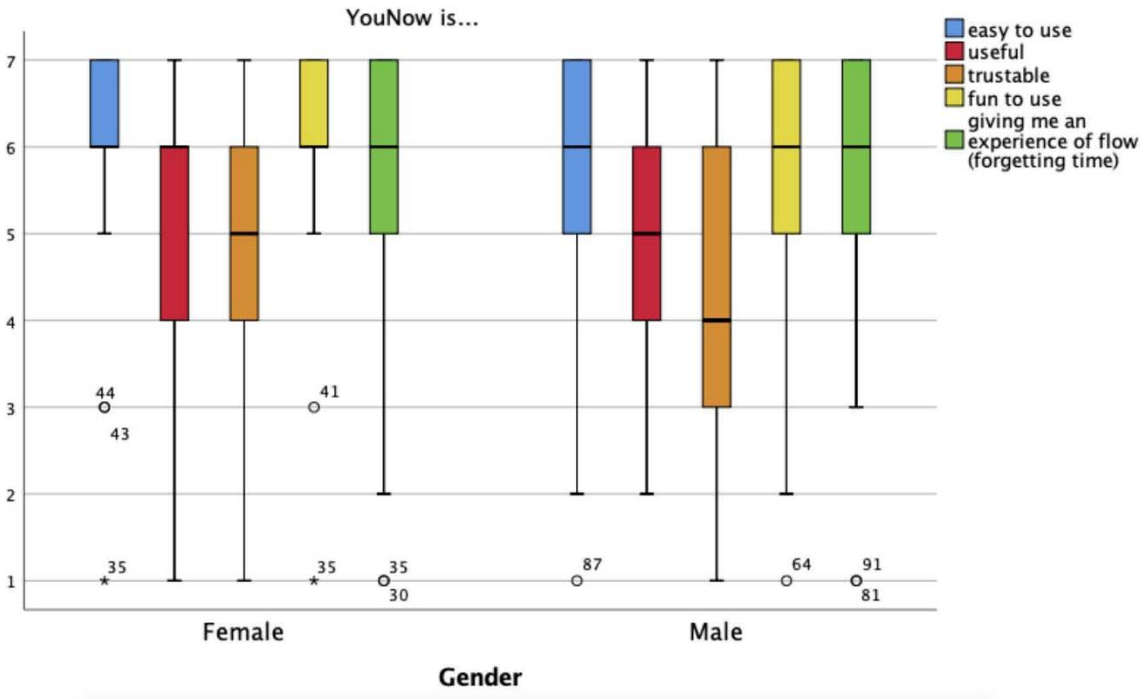

Figure 8.2: What female (N = 48) and male users (N = 46) think about YouNow

For the statement that YouNow is useful (second left boxplots) most female users agree (median 6) and the male users slightly agree (median 5). YouNow is perceived as slightly trustable for female users and most male users have a neutral point on this statement (middle boxplot). The second right boxplots represent if the users have fun using YouNow, here both, female and male users, agree with a median of 6, each. For flow (last boxplots), female and male users of YouNow both agree with a median of 6 to experience it. All statements are rated slightly better by female users.

Answering the second research question, 45.8% of the female users (N = 48) state that they have bought bars, and 54.2% did not. Considering the answers of the male users, 59.1% of them have bought bars at least once, and 40.9% did not (N = 44). 52.1% of the female users (N = 48) have already subscribed to someone on YouNow, whereby 50% of male users (N = 44) subscribed. In contrast, 50% of the male users and 47.9% of the female users have not subscribed yet. The question “Have you ever been guest in a stream?” was answered with “Yes” by 52.1% of the female users (N = 48) and 34.8% of the male users (N = 46). “No” has been the answer of 47.9% female users and 65.2% male users. Therefore, girls are more often a guest in a broadcast on YouNow than boys are.

Moving on to the third research question, looking at Figure 8.3, giving likes is slightly more motivating to female users (median 4.5) than to male users, who rated it with a neutral opinion (median 4).

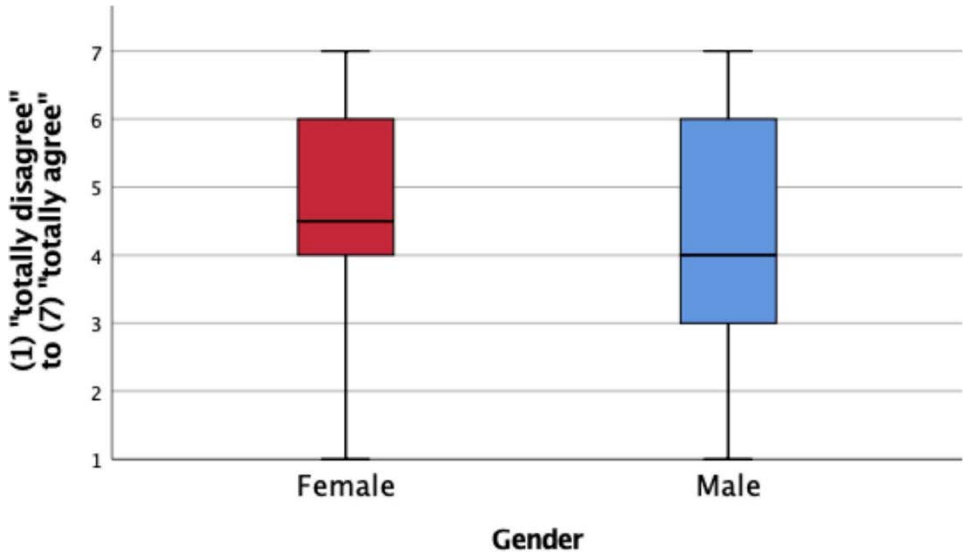

Figure 8.3: Giving likes motivates to use YouNow; female (N = 48), male (N = 46)

For the action of becoming a fan of a streamer (Figure 8.4), female users agree that it is motivating (median 6) and male users are motivated as well, but a little bit less (median 8.5).

Female users agree (median 6) that earning coins is motivating for them. And male users are a little bit less motivated by earning coins with a median of 5 (Figure 8.5). Receiving gifts (Figure 8.6) is for both, female and male users, slightly motivating (both with a median of 5 and the same interquartile range).

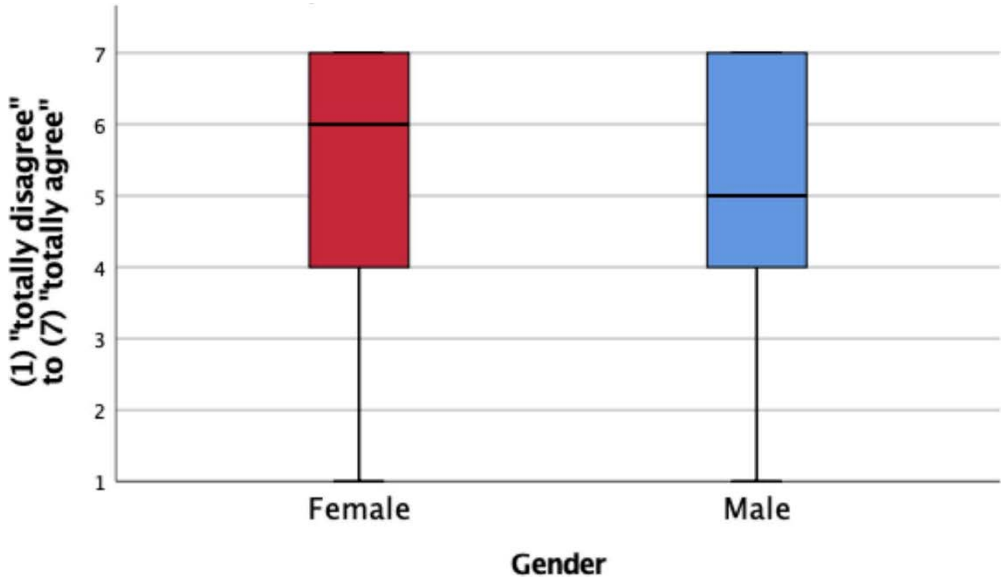

Figure 8.4: Becoming a fan motivates to use YouNow; female (N = 48), male (N = 46)

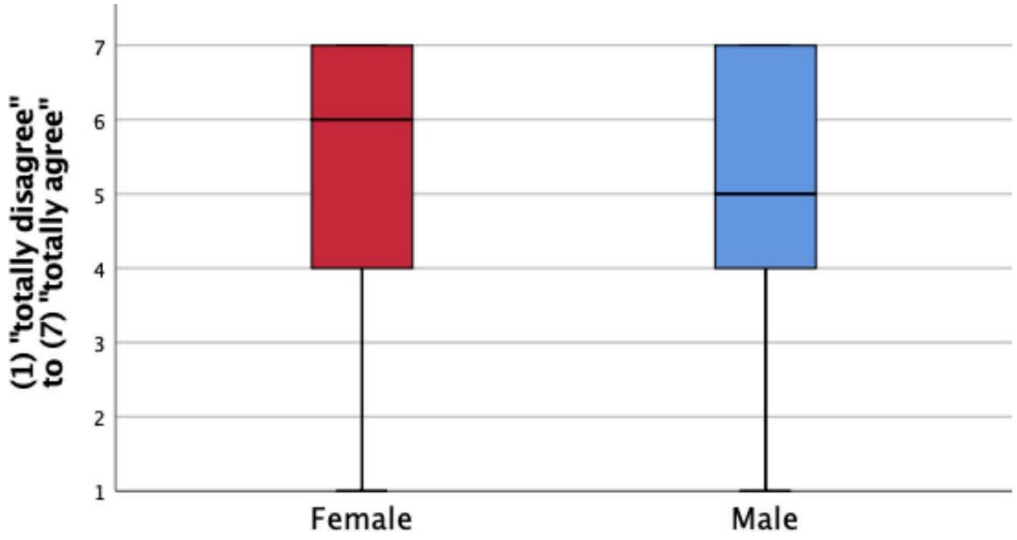

Figure 8.5: Earning coins motivates to use YouNow; female (N = 48), male (N = 46)

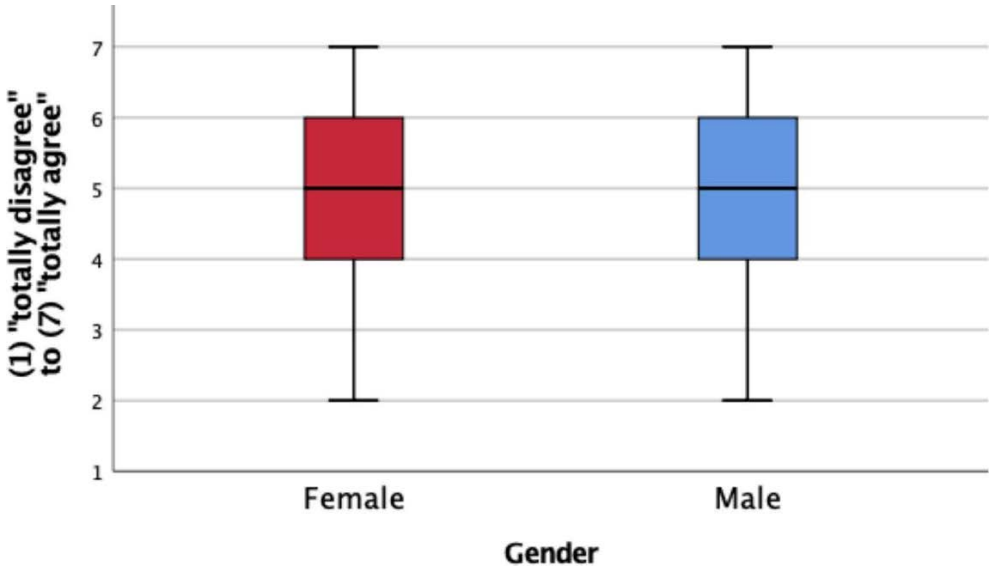

Figure 8.6: Making gifts motivates to use YouNow; female (N = 48), male (N = 46)

The statement that levels are motivating (Figure 8.7) was rated with a median of 6 (“agree”) by female users and with a median of 5 (“slightly agree”) by male users. Therefore, again the gamification element is rated more motivating by female users. The level progress bar was slightly motivating for male users (median of 5) as well and motivating (median of 6) for female users as well (Figure 8.8).

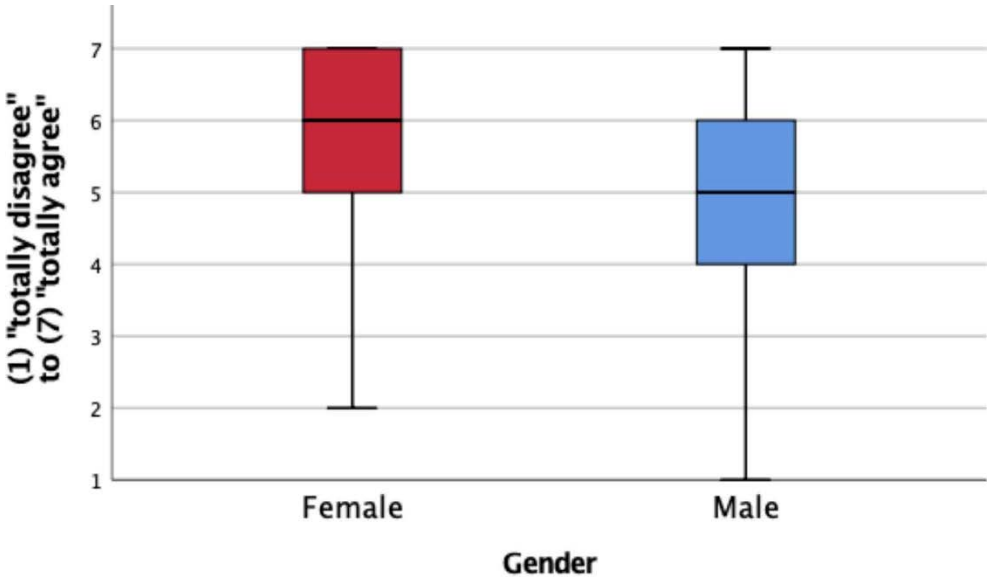

Figure 8.7: Levels motivate to use YouNow; female (N = 48), male (N = 46)

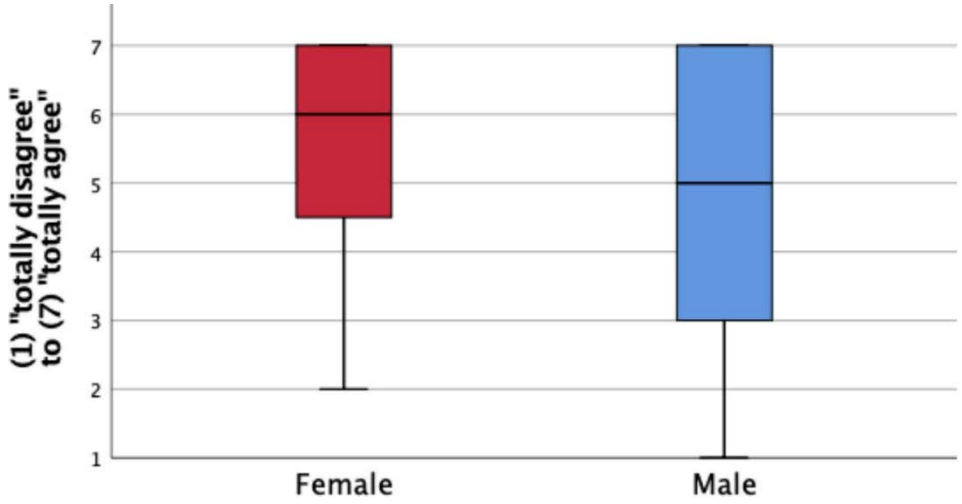

Figure 8.8: Progress bar motivate to use YouNow; female (N = 48), male (N = 46)

Male users rate the statement if badges are motivating (Figure 8.9) with a neutral point (median of 4). In contrast, it is rated with a median of 6 (“agree”) by female users. For the “Trending Now” leaderboard there is only a slightly different opinion of its motivational impact (Figure 8.10), the interquartile range for female and male users ranges from 4 to 7, but the median is at 5 (“slightly agree”) for female users and at 4.5 for male users.

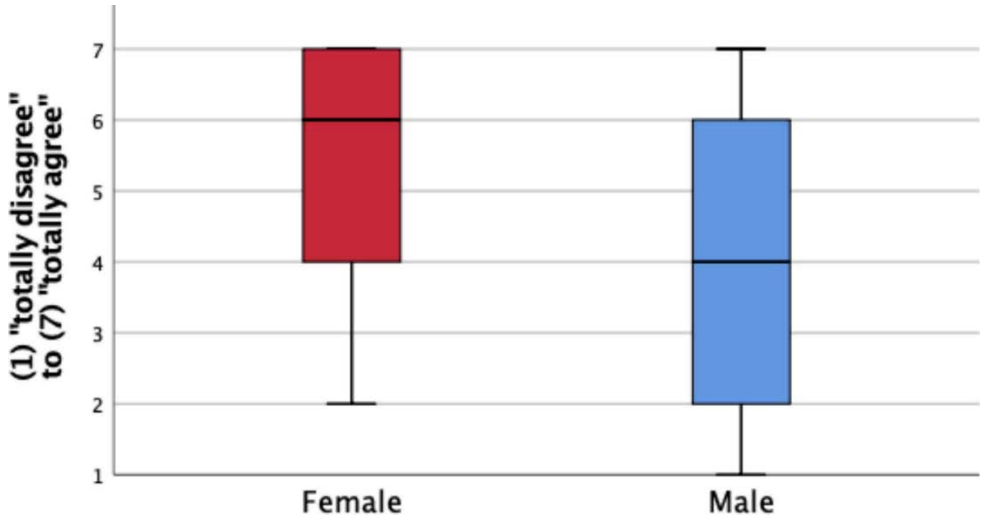

Figure 8.9: Badges motivate to use YouNow; female (N = 48), male (N = 46)

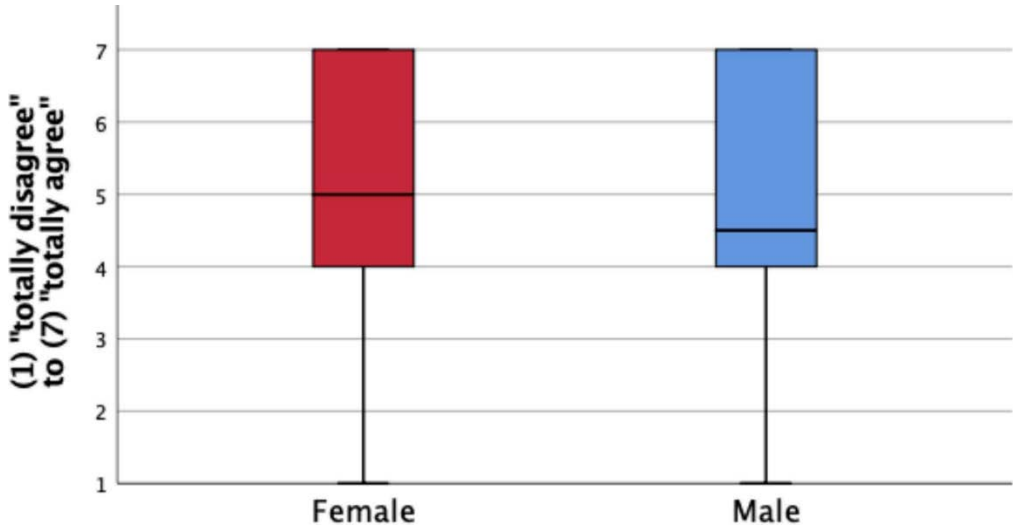

Figure 8.10: Trending Now motivates to use YouNow; female (N = 48), male (N = 46)

If capturing moments of a stream is motivating was rate by both, female and male users with a median of 4 (“neutral”), but female rate it slightly better with a smaller interquartile range (Figure 8.11). Table 8.1 shows the comparison of gamification elements acceptance distributed among female and male streamers.

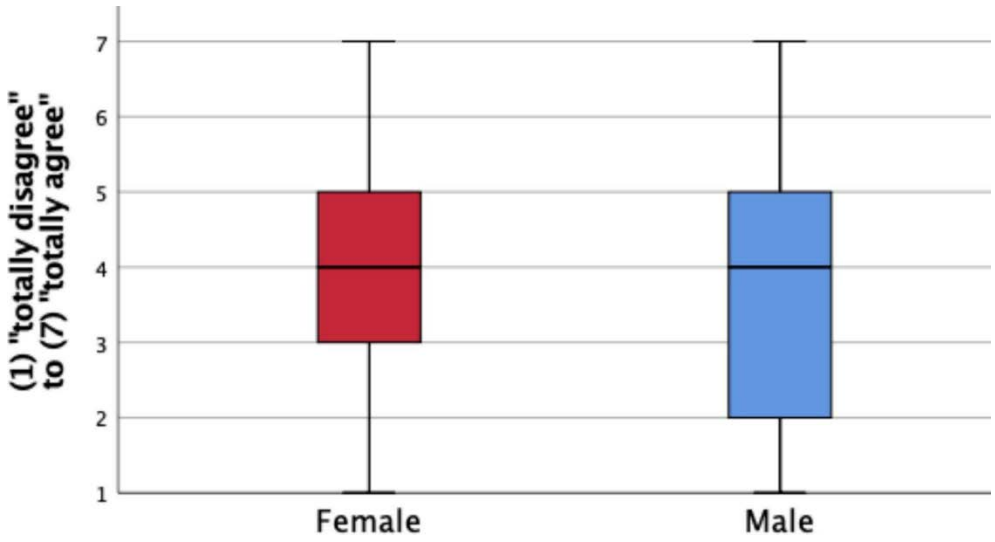

Figure 8.11: Capturing Moments motivates to use YouNow; female (N =48), male (N = 46)

All elements are at least rated as neutral and the least motivating one for both, female and male users, is "capturing moments." Female streamers are more motivated by all gamification elements than male users are. For the female streamers, all gamification elements have a mean above 5 except for two aspects (Likes (mean 4.79), Capturing Moments (mean 4.09)), whereas for male streamers, only one element has a mean of 5 (Coins). Male streamers prefer Gifts (mean 4.96) and Levels (mean 4.93), which are followed by Fans (mean 4.89), Trending Now (mean 4.76), Progress Bar (mean 4.72), Likes (mean 4.27), Badges (mean 4.12) and lastly, Capturing Moments (mean 3.96). In contrast, female streamers prefer Levels (mean 5.52), the Progress Bar (mean 5.48) and Badges (mean 5.39), followed by Coins (mean 5.38), Fans (mean 5.37), Trending Now (mean 5.11), Gifts (mean 5.09), Likes (mean 4.79) and Capturing Moments (mean 4.09).

Table 8.1: Comparison of gamification elements acceptance distributed among female and male streamers

Element	Female			Element	Male		
	Rank	Mean (Median)	N		Rank	Mean (Median)	N
Level	1.	5.52 (6.0)	46	Coins	1.	5.00 (5.0)	44
Progress Bar	2.	5.48 (6.0)	44	Gifts	2.	4.96 (5.0)	46
Badges	3.	5.39 (6.0)	36	Level	3.	4.93 (5.0)	45
Coins	4.	5.38 (6.0)	45	Fans	4.	4.89 (5.0)	46
Fans	5.	5.37 (6.0)	46	Trending Now	5.	4.76 (4.5)	46
Trending Now	6.	5.11 (5.0)	45	Progress Bar	6.	4.72 (5.0)	46
Gifts	7.	5.09 (5.0)	45	Likes	7.	4.27 (4.0)	44
Likes	8.	4.79 (4.5)	48	Badges	8.	4.12 (4.0)	41
Moments	9.	4.09 (4.0)	44	Moments	9.	3.96 (4.0)	46

8.5 Conclusion

This investigation analyzed how female and male streamers perceive the applied gamification elements on the general Social Live Streaming Service YouNow. To this end, a survey with 94 participants was conducted and evaluated. To our knowledge, this is one of the first studies that investigated the relationship between the acceptance of gamification elements and the genders on SLSSs.

The results show that, overall, female and male streamers experience YouNow to be a positive experience, where female streamers rate it a bit more favorable than male steamers. YouNow is perceived as easy to use, provides fun and lets the user experience flow equally effectively for both genders. But male streamers trust the service less than female users. They also see a lower degree of usefulness in the application of YouNow. This is congruent with research on social media, as males see the application of SNSs as a waste of time more often than female users (Shen & Khalifa, 2010).

More male streamers seem inclined to spend money on bars on YouNow than female broadcasters are. But slightly more female streamers spend money for subscribing to other streamers than male streamers do. Also, female streamers seem to be more favored as a guest, as 52.1% of them appeared in another broadcaster's stream, whereas only 34.8% of male streamers were invited to, or at least accepted to be part of another person's stream.

Concerning the gamification elements, female streamers are more motivated by gamification elements than male streamers are, just like Koivisto and Hamari (2015) detected before on the general usage of gamification. Female users are more motivated by the approval of their viewers, as they want to receive likes and fans more than male streamers do. They are also more motivated by earning coins. Surprisingly, levels, the progress bar, and badges motivate female streamers more than male streamers, even though they are more competitive elements. If badges are concerned, male streamers even have a IQR of 2-6 with a median of only 4, whereas for female streamers, the IQR ranges between 4-6 with a median of 6. To be trending is also slightly more important to female streamers than male streamers. Male and female streamers are only equally motivated by receiving gifts and capturing moments.

When comparing which gamification elements are more favored by which gender, some differences can be observed. Female streamers seem interested in the more competitive gamification elements (Level, Progress Bar, Badges) whereas male streamers like Coins, Gifts, and also Levels. Nevertheless, even though Coins and Gifts are the most important gamification elements for male streamers, female streamers still have a higher mean for both elements

compared to men. Female streamers are generally more motivated by gamification elements than male streamers. Therefore, it is suggested that SLSSs need a range of gamification elements to keep their streamers interested in their platform, since female as well as male streamers rate the motivational factors of the elements as very high.

This investigation has some limitations that need to be acknowledged. First, there is only a small number of survey participants who answered every question (N = 94). Furthermore, if divided into female (N = 48) and male (N = 46) YouNow users, the N is, of course, smaller for each sample. Most of the participants are from Germany and the US, providing only a small cultural sample. In addition, qualitative interviews with YouNow users can be directly performed in an online broadcast on YouNow for further insights. This study only represents the evaluation regarding the user base of YouNow and is therefore not generalizable.

Since live streaming is extremely prominent in China, where all major SLSSs apply a wide range of different gamification elements, further research should focus on the SLSSs there and how the female and male streamers use gamification to motivate themselves to broadcast continually. As further investigation, it would be interesting to compare the results to other social live streaming services and to users from other nationalities, for example Chinese live streaming users.

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9 User-oriented quality estimation of social news systems and its content: Gender-dependent assessment of Reddit

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9.1 Introduction

Information systems are developed and designed to enable their users to access the needed information, which also facilitates the process of information seeking [16]. Studying the user-oriented estimation of a system's quality is therefore necessary to understand which expectations and needs are fulfilled by seeking information and the use of a service [15]. Moreover, it gives insights about improving the quality of information services as well as managing and designing them [1].

A widespread information system, also known as a social news aggregator, popular among adolescents and young adults, is Reddit (Figure 9.1). It was launched in 2005 and reports over three billion page views per month [5]. Looking at Alexa's [2] global ranking of all websites worldwide, it is on the 14th position and therefore the most popular social news service, next to, e.g., Digg and HackerNews.

Following the definition by Weninger et al. [29:579], social news websites are services "[...] in which (1) users generate or submit links to content, (2) submissions are voted on and ranked according to their vote totals, (3) users comment on the submitted content, and (4) comments

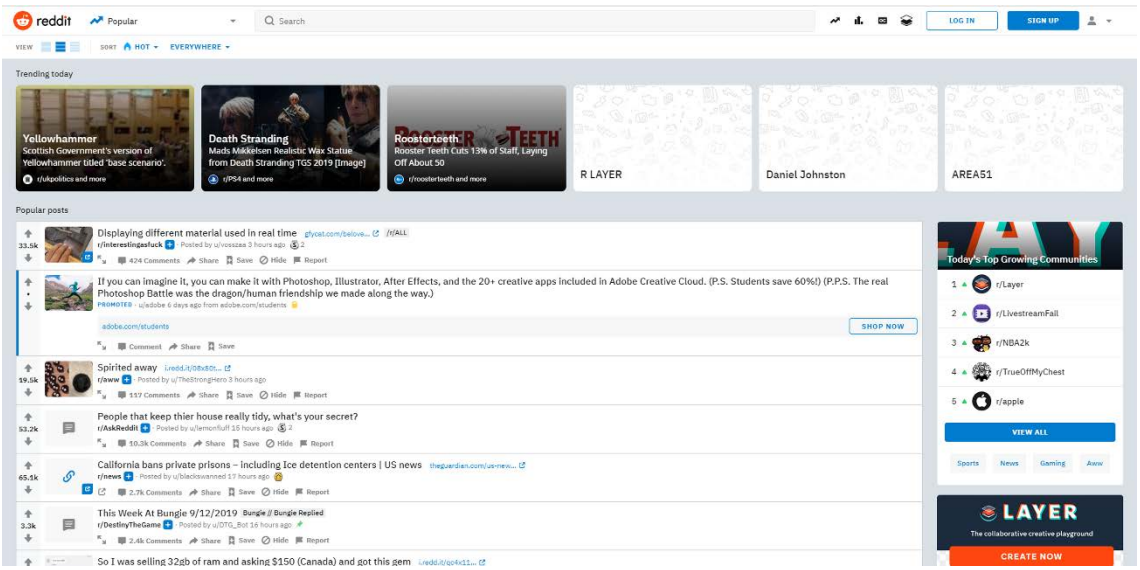

Figure 9.1: The frontpage of Reddit

are voted on and ranked according to their vote totals." Also, users are interacting anonymously on Reddit and are able to post their own content in form of texts, images, or videos. But the primary focus of Reddit is on its user-generated content and the information exchange of external sources [25]. It provides a platform for communication about internet-based information where many different topics are discussed in sub-communities, so called "subreddits" [26]. An example would be the subreddit r/funny, where users post humorous and fun content, another subreddit is r/worldnews where current events and news are shared.

Zimmer et al. [31] investigated the information service quality and the content quality as well as information service acceptance by the users of Reddit following the Information Service Evaluation Model. The Information Service Evaluation (ISE) Model by Schuman and Stock [22] displays a comprehensive research framework that unifies, e.g., different models and techniques to investigate the quality of an information system and thereby the (information) behavior of its users. It also considers the aspect of acceptance (e.g., adoption of the system), the environment (e.g., information marketing and similar services) as well as time (development of the system over time). Information systems are made to satisfy human information needs. While applying a service, people are expressing information behavior when following their information needs. Wilson [30:49] defines information behavior as "[...] the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use." According to Schuman and Stock [22:2], the concept of information behavior includes "the behavior of information production (e.g., user-generated content in social media) and the behavior of information seeking (e.g., browsing through web sites or applying search engines)."

In this evaluation of Reddit as an information system, the focus will be set on the user perception of the system's quality and the system's content, as Kusunoki and Sarcevic [16:860] outline the importance of the user's perspective. Therefore, we limit facets of the ISE model to the perceived information system quality following the Technology Acceptance Model (TAM) [7], the perceived content quality based on different aspects defined by Parker, Moleshe et al. [20] as well as the information seeking behavior of users. Furthermore, it is necessary to study what motivates users of Reddit, and especially different genders, to apply this particular social news and information service, as Bogers and Wernersen [4] found that the social aspect of Reddit is not important, but the informational value of the service is.

In 1974, the researchers Katz et al. [13] outlined findings about uses and gratifications research, which resulted in the Uses and Gratifications Theory (U&GT). It is a popular theory in media and communication studies to explain why people are using certain media. According to the U&GT, media consumption is goal-directed and should result in the satisfaction of a person's needs.

The audience, or the users, are searching for gratifications while being exposed to media. It is always guided by expectations and depends on a person's social and psychological background and which media is chosen. The audience decides actively whether to apply a service or not [3]. A total of 35 different needs for media consumption were identified by Katz et al. [14]. Whereof later four central motives were summarized by McQuail [18], which are information, entertainment, social interaction, and self-actualization. In line with Shao [23] one can also speak of self-presentation (with regard to self-actualization) for the activity of producing content on a social media service.

According to different research articles [4, 8, 9], Reddit is applied by more male than female users. To some extent, men and women use social media and the internet in general for different purposes, e.g., men might use it more for gaming and entertainment, whereas women for communicating and connecting with people [12]. In this research article, the perceived information system quality and the perceived content quality of the information service Reddit, the information seeking behavior of Reddit's users and the motives of Reddit's users following the Uses and Gratifications Theory are analysed with particular attention to the different opinions of female and male users. The principal question here is whether the perceived service and content quality or the motivation to use Reddit differ between genders and if those are the reasons why Reddit is applied more by male users. Furthermore, gender research on Reddit is limited and our findings may serve as recording for ongoing gender studies. Based on these considerations, this study aims at answering the following research questions (RQs):

RQ1: What are the motives of male and female users to use Reddit?

RQ2: How do male and female users rate the information service quality of Reddit?

RQ3: How do male and female users rate the content quality of Reddit?

RQ4: How do male and female users seek for information on Reddit?

9.2 Related work

When looking at the aspect why different genders use social networking sites (SNSs), a few differences can be observed. Overall, men seem to use social networking sites to form new relationships, women use them to help keep existing ones [19]. A study determined that women are more likely to apply SNSs to compare themselves with other users and to search for information. In contrast, men seem to look at profiles of others in order to find friends [11]. When it comes to the production of content, female users tend to share personal issues (for example, family matters) whereas men like to discuss public events like politics and sports [28], or technology and money [21]. In this context, Reddit should be named, as it "essentially started

out as very techy-and nerd-oriented" [24:6], which could explain the majority of the users being male. Nonetheless, Reddit is since being enjoyed by both genders. Even though Reddit is defined as being a SNSs, only few people use it in this traditional sense. Reddit is almost never applied to build or sustain long-term relationships [4, 24]. If the users want to stay in contact, they usually shift the conversations to Facebook or other SNSs. As Reddit is a relatively anonymous SNS, the users are mindful in how they present themselves if their real identity could potentially be traced back. This form of anonymity also potentially gives a platform to the culture of careless words [24]. But Reddit is valued for the information as well as its quality. Users also like the possibility to customize Reddit. They are able to actively shape the placement and reception of posts in their favorite subreddits of interest by comments and votes [4]. A number of studies examined the content of Reddit. For example, Stoddard [26] found that higher quality articles seem to be the most popular forms of content. To determine which users post such content, a study observed that the users, regardless of whether they are experienced or inexperienced with various levels of reputation, tend to post any kind of content, being it professional articles or conversational posts [17]. In this context, it was also observed that the earlier a post is voted on, the more likely its popularity will be affected [26]. This phenomenon also extends to the top comments – the early comments receive the most replies [29]. Also, the number of downvotes increases faster than of upvotes [27]. Furthermore, half of the valuable content on Reddit seems to be ignored on the first submission. This potential threat could be solved by a combination of social norms, repeated interaction, and reputation mechanisms [10]. Even though Reddit is seen favorably for its content, the design of the website is perceived rather negatively, as the interface, navigation, user hostile search function as well as the search results are not seen as being positive. Nonetheless, a bonus factor is the friendly community which is highly valued by Reddit's user base [31].

To sum up, gender research on social media is an emerging topic, but to date, there is no study that examined the perception and use of Reddit by male and female users. This study should serve as a first contribution to this research field.

9.3 Methods

To answer the research questions (RQ1–4), an online questionnaire was developed. The survey was constructed on Umfrageonline.com and took place between May 29, 2017 and July 7, 2017. It was shared on different social media platforms like Facebook survey groups and on different subreddits. The survey was answered by all participants on a voluntary basis with no compensation. All participants had to state their Reddit usage status ('I use Reddit', 'I do not use Reddit anymore', 'I never used Reddit'). Overall, the survey was answered by 672 participants,

of which 599 are active Reddit users, 58 never used the service and 15 are not using it anymore. Only the answers given by active users, meaning they visit the site regularly, were used for this investigation. 495 of those active users completed the survey.

At the end of the survey, the attendees were asked about demographic aspects (age, gender, country of origin, highest educational level). The majority of the questions contained pre-formulated answers, for example, regarding the question, "how do you search on Reddit?". The answers given were "only by browsing", "via search query box,", and "using advanced search". To answer RQ1, questions modelled after the Uses and Gratifications Theory according to Katz et al. [13] were used. The participants could select via a multiple choice question the four dimensions: entertainment, information, socializing, and self-presentation.

In line with the Technology Acceptance Model (TAM) proposed by Davis [7], the second research question (RQ2) on how the different genders perceive the information service quality of Reddit, can be answered. The aspects that were asked about included: how enjoyable [6], useful, trustable [7], and easy to use Reddit is regarded as. Here, the participants could rate each aspect on a five-point Likert scale (1 meaning "strongly disagree" to 5 meaning "strongly agree").

To answer RQ3, how the different genders perceive the content on Reddit, again, a five-point Likert scale (1 meaning "strongly disagree" to 5 meaning "strongly agree") was used. The content could be rated by each category: it is up-to-date; true; credible; unbiased, unprejudiced and impartial; can be easily read; has a formal structure; can be easily understood or comprehended. The categories for this were derived from Parker et al. [20]. As the quality of content is hard to quantify, users should be asked about aspects such as freshness of content, its believability, objectivity, readability, or understandability.

For research question four (RQ4), how female and male users search on Reddit for information, a multiple-choice question was modelled. As Reddit offers the users the possibility to utilize advanced search options, the participants could select the answers "only by browsing (clicking through subreddits)", "via a search query box", and "using the advanced search".

As RQ1, RQ2, RQ3 and RQ4 are answered by one survey question each, Cronbach's Alpha was not calculated for validity of the survey. The data analysis was conducted with IBM SPSS 25. To answer the stated research questions, several statistical tests were applied. For general overview of the sample, descriptive statistics, the Pearson Chi2 were calculated. In order to estimate whether there are statistically significant differences between male and female users, the non-parametric Mann Whitney U test was conducted (since the answers marked on the Likert scales were handled as ordinal data).

9.4 Results

A total of 495 Reddit users participated in the survey, whereof 59.80% are male and 40.20% are female participants. This quite balanced distribution in our sample gives us a good basis for calculating gender-dependent differences. Overall, the median age of the participants is 23. For female participants, the median age is 23 and the mean age 24.93. Whereof for male participants, the median age is 22 and the mean age 23.43. The female participants were slightly older. Furthermore, most of the participants (around 40%) are from the United States of America.

Answering the first research question (RQ1), what motivates users of Reddit to apply the information system (differentiated by gender), 96.00% are using it for entertainment purposes (Table 9.1). There is nearly no difference between male (95.90%) and female (96.00%) users regarding this aspect. 86.70% of all participants agreed that their motivation to apply Reddit is to get information. Here, male users (87.50%) are a little bit more into getting information on Reddit than female users (85.40%). Exactly 21.00% use Reddit for socializing and getting in contact with other people. More female (22.10%) than male (20.30%) participants named socializing as their motive. And, only 5.10% named self-presentation as to why they apply Reddit (6.10% male users and 3.50% female users). Therefore, male users are a little bit more into getting informed on Reddit as well as to present themselves and a few more female users stated that they are motivated to use Reddit for socializing. The main reason to use Reddit is the aspect of entertainment followed by information.

Table 9.1: Motives of users to apply Reddit differentiated by gender

Motives	All users (N=495)	Male users (N=296)	Female users (N=199)	Sig.
Entertainment	96.00%	95.90%	96.00%	.985
Information	86.70%	87.50%	85.40%	.506
Socializing	21.00%	20.30%	22.10%	.022
Self-Presentation	5.10%	6.10%	3.50%	.057

For the perceived service quality differentiated by gender (RQ2), participants should rate statements about Reddit being enjoyable, useful, trustable, or easy to use (Table 9.2). For the statement that Reddit is enjoyable, looking at male users (median: 5.00) and female users (median: 4.00) they both agreed, while the male ones rated it slightly better (median: +1.00). Therefore, most of the male respondents strongly agree that Reddit is an enjoyable service. Looking at the usefulness of Reddit, male (median: 4.00) and female (median: 4.00) users both agreed on this aspect, while male users rated it slightly better, as the interquartile range (IQR) for female users is 2 and for male users 1.

Table 9.2: How different genders perceive the service quality of Reddit

Service quality	All users		Male users		Female users		Sig.
	Median	IQR	Median	IQR	Median	IQR	
Enjoyable	4.00 (N=494)	1	5.00 (N=295)	1	4.00 (N=199)	1	.778
Useful	4.00 (N=492)	1	4.00 (N=293)	1	4.00 (N=199)	2	.206
Trustable	3.00 (N=487)	2	3.00 (N=292)	2	3.00 (N=195)	0	.832
Easy to use	4.00 (N=495)	2	4.00 (N=296)	2	4.00 (N=199)	2	.802

The perception of Reddit as being trustable has a median of 3.00 (neutral) for both genders. Again, female and male users rate it mostly the same, whereas the IQR for female users is 0 and for male users is 2. According to all users, they agree (median: 4.00) on the statement that Reddit is an easy-to-use information system. Here, for both genders the median is 4 and the IQR is 2.

How do different genders perceive the content quality of Reddit is the third research question (RQ3) of this study. The results are shown in Table 9.3. Looking at the answer of all users, they agree (median: 4.00) that the content on Reddit is up-to-date. Female users (median: 4.00) as well as male users (median: 4.00) both rate the contents' freshness with a median of 4.00. Considering the statement that the content on Reddit is true, all users have a neutral point of view on this aspect (median: 3.00). Again, there is no difference between male users (median: 3.00; IQR: 1) and female users (median: 3.00; IQR: 1). The credibility factor (median: 3.00) was rated the same as the truth factor by all users. However, male users (median: 3.00; IQR: 1) perceive the credibility of the content exactly the same as female users (median: 3.00; IQR: 1). Further results show that all users (median: 2.00; IQR: 1) do not perceive the content of Reddit as unbiased, unprejudiced, and impartial. Here, both genders view it nearly the same, but male users (median: 2.00; IQR: 2) a little bit less negative than female users (median: 2.00; IQR: 1). For the next statement that the content on Reddit can be easily read, the users overall agree with a median of 4.00. Female users agree more (median: 4.00; IQR: 1) than male users (median: 4.00; IQR: 2). Users of Reddit have a neutral opinion on the formal structure of the content (median: 3.00; IQR: 2). For this, male users (median: 3.00; IQR: 1) agree more than female users (median: 3.00; IQR: 2), but it is only a minor difference. There is agreement with the statement that the content can be easily understood or comprehended (median: 4.00; IQR: 1). Male users agree a little bit more with a median of 4.00 and an IQR of 1 whereas female users agree with a median of 4.00 and an IQR of 2.

All in all, the users agree that the content is up-to-date, can be easily read, and easily understood or comprehended. The statements that the content is true, credible, and has formal structure have been rated as neutral. Only disagreement was given for the statement that the content is unbiased, unprejudiced, and impartial.

Table 9.3: How different genders perceive the content quality of Reddit

Service quality	All users		Male users		Female users		Sig.
	Median	IQR	Median	IQR	Median	IQR	
Up-to-date	4.00 (N=486)	1	4.00 (N=291)	1	4.00 (N=195)	1	.747
True	3.00 (N=479)	1	3.00 (N=288)	1	3.00 (N=191)	1	.179
Credible	3.00 (N=484)	1	3.00 (N=290)	1	3.00 (N=194)	1	.526
Unbiased, unprejudiced, and impartial	2.00 (N=488)	1	2.00 (N=293)	2	2.00 (N=195)	1	.680
Easily read	4.00 (N=494)	1	4.00 (N=295)	2	4.00 (N=199)	1	.114
Has formal structure	3.00 (N=470)	2	3.00 (N=287)	1	3.00 (N=192)	2	.095
Easily understood or comprehended	4.00 (N=491)	1	4.00 (N=292)	1	4.00 (N=199)	2	.156

Table 9.4 shows how users of Reddit are seeking for information on the service (RQ4). Most users are simply clicking through the web pages, posts, and subreddits on Reddit by browsing (73.70%), whereby 73.00% of the male users and 74.90% of the female users apply this method. More female users (65.30%) than male users (62.20%) are using the search query box for seeking information. Overall, 63.40% of the participants use it. The advanced search is used by more male users (28.40%) than female users (22.60%).

Table 9.4: The information seeking behavior of different genders on Reddit

Seeking behavior	All users (N=495)	Male users (N=296)	Female users (N=199)	Sig.
By browsing	73.70%	73.00%	74.90%	.637
Search query box	63.40%	62.20%	65.30%	.474
Advanced search	26.10%	28.40%	22.60%	.152

9.5 Discussion

By applying a survey with around 500 participants, we shed light on the gender-dependent differences in usage of and user's motives to apply Reddit. In addition, it was investigated how the service quality as well as the content quality is perceived. Another aspect of this research was the question about how the users apply the search functions of Reddit and if the genders prefer different functionalities.

If the motivational aspects according to the Uses and Gratifications Theory of this study are concerned, slight differences can be observed. In this study, male users apply Reddit more often than female users to find information. They also use the service more to present themselves than female users. Female users in contrast like to use Reddit to socialize with others. Indeed, more female users than male users are using Reddit for socializing as Joiner et al. [12] stated about general internet usage. Overall, the most important reason for all users is Reddit's

entertainment factor as well as its informative content.

Taking a look at the perceived service quality and the aspects if Reddit is enjoyable, useful, trustable, and easy to use, both genders seem to agree on their perception of these dimensions. They perceive Reddit as being enjoyable. Male users rate Reddit as a little bit more useful than female users. Both genders seem to find the service easy to use. But female as well as male users do not fully seem to trust Reddit.

Moving on to the perceived content quality of the posts on Reddit, both genders agree that the content is up-to-date, can be easily read and understood. If the truthfulness and credibility of the content is concerned, male and female users rate those statements as neutral. The same applies to the content structure. One point stood out: both genders do not see the content as being unbiased, unprejudiced, and impartial.

Last but not least, the information seeking behavior was observed. Reddit offers its users advanced search options, which is only utilized by around 30% of the male users and 23% of the female users. Most of the systems' users like to only browse the web pages, posts, and subreddits. A few more female users than male users use the simple search query box.

Overall, Reddit is enjoyed by both genders. Its application does not seem to vary among the genders, as only a few differences could be observed. This research hopefully shed light on the usage of one of the internet's most favored websites and its utilization by men and women. It appears that once the service is being applied, there are only few significant gender-dependent differences.

When it comes to a general conclusion, users (it does not matter whether female or male) of the social news system Reddit seem to prefer the service because of the informative, but easy to read and entertaining content. Moreover, the simple and unpretentious design of Reddit (Figure 9.1) makes it easy to use. Social news systems benefit from their user-generated content and user base.

Some limitations of this work have to be mentioned. First, the questionnaire was answered by 495 participants, which is a small fraction compared to Reddits popularity and its billion monthly visits. The results may display a larger difference in the perception of different genders if the sample was bigger. It could be possible to detect more gender- related insights by interviewing former users and non-users of this service (e.g., why are female internet users less interested in applying Reddit?).

Further research should focus on the aspect of anonymity on social networks. It is striking to see

that male and female users seem to apply Reddit nearly the same way and have similar motives. The question arises if this is due to the nature of the service itself and its content, or if people tend to behave the same on social networks if they are nameless. As one Reddit user puts it “you don’t have to worry about being tagged for who you are. It’s more about what you say” [24:11]. Furthermore, it would be helpful and interesting to conduct interviews in order to collect qualitative data and describe more detailed results. It would also be interesting to study the service and content quality of similar information platforms, like the social news system HackerNews or Digg to compare the perceived quality of those services.

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10 Anonymous expression in an online community for women in China

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10.1 Introduction

Gender issues discussed in online spaces include workplace harassment, intimate partner violence (IPV) and misogyny, among many others (Saguy and Rees, 2021; Xu et al., 2022). Talking about these issues openly can help the people affected by such circumstances to seek help or at least feel understood. In Western cultures, there seems to be an increasing trend to post these stories non-anonymously, as prevalent by the #MeToo movement on social media (ElSherief et al., 2017; Saguy and Rees, 2021).

Nevertheless, the situation can be especially dire for women in certain countries where familial issues like IPV are not openly talked about, e.g., in China, where face-saving and shame can hinder open discussion (Xu et al., 2022). This does not mean that these issues do not exist in Mainland China. A study focusing on this region estimates that the victimization of IPV in the general population can be estimated to be around 17.4% to 24.5% for psychological violence, 2.5% to 5.5% for physical violence, and 0.3% to 1.7% for sexual violence (Yang et al., 2019). Furthermore, it was noted that studies on IPV are relatively rudimentary and have had a low priority for research about Chinese society. Zhang and Zhao (2018) state that there seems to be a lack of empirical studies investigating the risk factors associated with IPV as well. However, recently, it seems increasingly common for Chinese women to anonymously reveal their (mostly negative) experiences such as unfair treatments by partners or mental issues to Sina Weibo influencers, and the influencers would post their experiences which can be seen by the followers (see Figure 10.1). Some typical examples include, e.g., being forced to get married early by one's parents, one's cheating behavior as a retaliation to her partner's cheating behavior, misogynistic speech by co-workers, etc. Such topics can strike a response in other women, and a discussion would take place in the comments, containing both empathy or practical advice, but also, personal attack or moral judgment.

Toward understanding how gender issues are anonymously discussed by women on Chinese social media, an exploratory content analysis by observing 100 anonymous experiences shared with a female influencer on Weibo was conducted. Twenty gender issues were identified in the

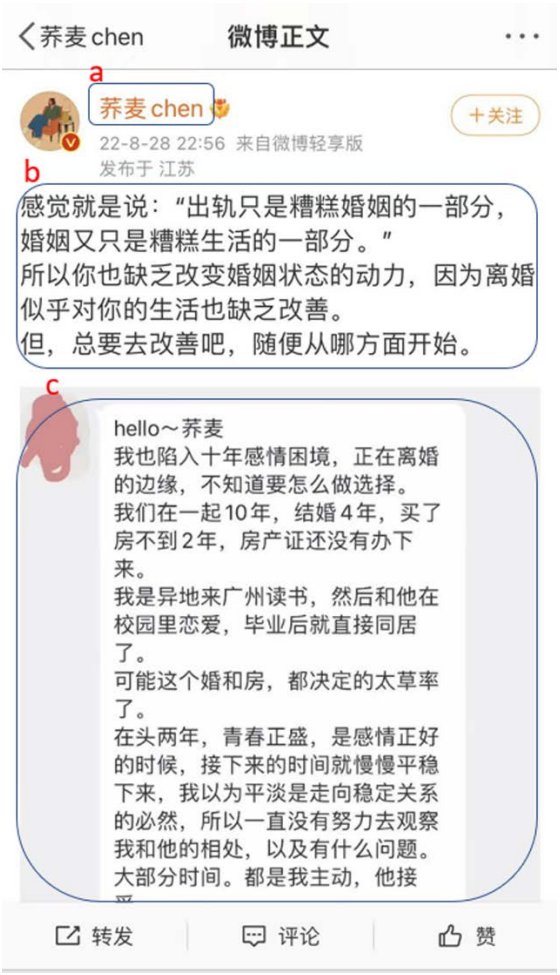

Figure 10.1: An example of anonymous post. a: influencer name; b: influencer comment; c: anonymous experience shared by a user, whose name has been hidden by the influencer

anonymously expressed experiences, including, e.g., harassment, lack of emotional support from partners, cheating, domestic violence—most of which are associated with intimate relationships. It was also observed that some women seem to show tolerance towards their partners, as well as to attribute the issues in relationships to themselves. To the author's knowledge, this is the first empirical understanding of how gender issues are anonymously discussed by women on Chinese social media.

Following, related work on anonymous online expression and female online communities will be outlined, and the research questions proposed. Then the methodology is described and results reported. Summarizing main takeaways as well as suggesting future directions conclude this study.

10.2 Related work

There are two lines of research closely related to this study: anonymous online expression and online communities for women. Anonymous expression on the Internet describes the ability to interact online without having to use identifying markers, e.g., birth names or age (Kang et al., 2016). Sometimes, women can feel more confident in sharing their experiences in online spaces designed for or frequented by them, anonymously or not.

10.2.1 Anonymous online expression

Anonymity is a preferred feature of online communication at times, which could encourage expressiveness and interaction among users, and allow more honesty, openness, and diversity of opinion (Kang et al., 2016). People share various types of content in anonymous communication applications, ranging from deep confessions and secrets to light-hearted jokes and momentary feelings. Important motivations for participation and posting are to get social validation from others, even though they are anonymous strangers (Kang et al., 2016), or just out of boredom and for fun (Jüttner et al., 2021). Although researchers often regarded user identity and data permanence as central tools in the design of online communities, a study of

4chan, an anonymous English-language imageboard website, found that over 90% of posts were made by fully anonymous users (Bernstein et al., 2011).

Anonymous online communities make online spaces valuable for users, especially regarding sensitive topics. When the state cannot provide a particular service, people may turn to the Internet to find alternative information and social support. For example, a case study of a Russian Alcoholics Anonymous (AA) online group uncovered how people sought help for their drinking problems (Lyytikainen, 2016). Members were less likely to enact "unidentifiability" if they were more connected to the particular community and had more time in recovery (Rubya and Yarosh, 2017).

Favoring anonymity may be positively correlated with narcissism and low self-esteem and research suggests that users with stronger anonymity preference tended to be younger, highly trusting, having strong ties to online communities while having few offline friends (Keipi et al., 2015). There is also research suggesting that anonymous sites such as Reddit are more often used by male than female users. In the case of Reddit, citizens of the United States represent the largest user group (Bogers and Wernersen, 2014; Dou et al., 2015; Scheibe and Zimmer, 2020).

With anonymity on social media, there also come potential problems, such as prevailing sexual harassment, bullying, or even illegal acts (Nova et al., 2019). An analysis of YikYak, an anonymous, location-based social media smartphone application, found frequent occurrences of profanity, vulgarity and sexual references. However, the potential for abusive postings may be mediated by online community policies (Black et al., 2016).

Online communication, whether anonymous or not, may breed socio-demographic homophily. By analysing behavioral data of 7,287 users of a Korean anonymous online dating advice platform, Kang and Chung found that one was more likely to respond to problems submitted by advice seekers of a comparable age, and advice seekers were more likely to approve of a response if the advice seeker and advice provider had similar educational backgrounds (Kang and Chung, 2017).

Focusing on research conducted in China and Chinese online spaces, the most popular microblogging service is Sina Weibo, a service unique to the country, which is more often used by female than male users (Hou et al., 2018). Weibo is described as a platform for maintaining friendships, recording personal lives, expressing oneself, and gathering information in terms of social issues or personal interests (Hwang and Choi, 2016). Themes that are discussed on Weibo include depression, philosophical thoughts on life, medical information, and help seeking (Tian

et al., 2018). Users on Weibo tend to mainly share positive self-disclosure and fewer negative information, especially if the person is less anonymous (Chen et al., 2016). Nevertheless, the combination of anonymity and present opinion leaders on Weibo or other social media helps people to share their experiences (e.g., about IPV). The anonymity feature of social media has also mitigated the negative effect of some traditional mentalities, such as family shame and face-saving, and encouraged more expression and discussion (Xu et al., 2022).

10.2.2 Online communities for women

There are some social networking sites exclusively, mainly, or initially designed for women. For example, CafeMom[19] is a social networking site for moms to discuss parenting issues. POPSUGAR[20] is another one for young women to discuss latest gossip, play games, and share tips with each other. The success of Xiaohongshu[21], a Chinese social media and e-commerce platform, has been known to stem from its emphasis on consumption of media associated with women. Its culture concept, media convergence and marketing are highly connected with feminism (Lian et al., 2021). Chinese moms actively vlog on Xiaohongshu, creating a community for self-expression and mutual support (Shen et al., 2022).

Early research of the formation of communities for women was mostly about entertainment and daily life. For example, an ethnographic study of two Internet communities, one for fans of the American television series The X-Files, and one for the Canadian series Due South, explored fandoms, and examined negotiations of gender, class, sexuality and nationality in making meaning out of a television show (Bury, 2005). MissyUSA[22] is an online community of Korean immigrant women in the United States. These women's shared identity (i.e., being Korean, married, female, and living in the United States) was found important in the formation and development of this online community. In this candid talking space, they vent their innermost feelings about their lives in the United States. Information sharing and help offering were also found in this community (Lee, 2013).

Our study focuses on a community for women on Sina Weibo. The community is initiated and maintained by a woman influencer who identifies as a feminist (Yang and Fang, 2021). Similar to the study on anonymous posts on Weibo about IPV (Xu et al., 2022), it needs to be investigated what other topics are anonymously discussed in Chinese online spaces, especially by women. Therefore, the research questions are:

[19] http://www.cafemom.com
[20] https://www.popsugar.co
[21] https://www.xiaohongshu.co
[22] https://www.missyusa.com/mainpage/content/index

RQ1: What are common gender issues revealed in anonymous expression of female Weibo users?

RQ2: How can the observed issues be contextualized in Chinese cultures?

10.3 Methods

Some Weibo users disclose their personal experiences to well-established influencers with thousands or even millions of followers, expecting their experiences to be posted in de-identified images, often for expression and advice seeking purposes (Tamen, 2022). Based on this observation, we conducted an exploratory study of the anonymous disclosure of gender issues on Weibo under a specific feminist influencer, called Qiaomai (荞麦), for several reasons. First, female users seem to prefer Weibo in contrast to male users, resulting in potentially higher number of posts (Hou et al., 2018). Second, she had over 1.5M followers as of April 2022, and a majority of them were female users. With mainly self-disclosed experiences and comments reflecting women's views, the issues at hand could be better understood. Third, as a feminist herself, Qiaomai made an effort to create a supportive community for women.

In the end, 774 posts from January to March 2022, as well as corresponding comments, were collected. Due to the time limit, only the first 100 of the anonymous self-disclosures were used for analysis in the current study and no statistical analysis was performed. Since they were in the form of images, the text was extracted using an automatic OCR tool[23], and mistakes were corrected manually.

10.3.1 Content analysis

A content analysis was applied because it can be challenging to obtain detailed events or expressions of sensitive subjects when using interviews or questionnaires. This is especially relevant to Chinese culture where face-saving regarding sensitive topics such as IPV can hinder open disclosure (Xu et al., 2022). To our knowledge, there was only one prior study about Chinese women sharing their experiences (anonymously) on social media (Xu et al., 2022). Thus, we applied a conventional approach to content analysis (Hsieh and Shannon, 2005), and let the themes emerge during the analysis.

Two authors independently coded the posts, and ensured reliability by calculating Krippendorff's alpha (Krippendorff, 2018). The research team regularly met and discussed to refine the coding. After a first round of content analysis and categorizing posts, the codebook was updated to guarantee a good inter-coder reliability. Each post was observed for corresponding content categories: if a category was applicable, it was marked accordingly, resulting in nominal data set.

[23] https://saas.xfyun.cn/ocr?ch=sa02

In the subsequent results section, occurrences of the categories will be reported. Quotes from the self-disclosures will be used to contextualize each gender issue. The self-disclosures are all anonymous, thus there will not be ethical concerns regarding anonymity violation.

10.4 Results

Based on the content analysis, anonymously expressed issues experienced by women and their occurrence frequency could be identified. By presenting quotes from the posts, nuanced context of each issue can be vividly displayed.

10.4.1 Descriptive statistics

Among the 100 posts that were annotated, the majority of them were self-reported experiences (N=83). The rest were either narration of other people's experience, or a combination of self-narration and narration of other people. 99 of the 100 posts analysed were contributed by self-reported female Weibo users, confirming the assumption that the site for analysis of our choice is indeed a community for women.

A large range of issues shared by women could be identified during the annotation process, with positive experience, gender stereotype/reproductive freedom, lack of emotional support/romance, cheating-self, cheating-partner, age anxiety/marry early, and controlling parents/dependence as the most prominent ones (N>10). The occurrence of each issue can be found in Table 10.1. It is worth noticing that similar themes may appear together, as the sharing of one experience may motivate the sharing of more similar experiences.

The two coders reached a high agreement on most issues with Krippendorff's Alpha larger than 0.8 (Krippendorff, 2018, p. 241). The rare exceptions are with love vs. money and concealing of illness/family issue. The overall Krippendorff's Alpha averaged 0.92 on all variables, demonstrating a high degree of agreement between the two coders.

A non-negligible percent, i.e., 10%, of the content contributors showed, in the eyes of the authors, a lot of tolerance for their partners. They may nevertheless describe their partners as having many strengths even if they were treated badly. Further, 5% of the content contributors attributed the issues in the relationship to themselves, even though it is not obvious who caused the issue, at least in the author's eyes.

Table 10.1: Descriptive statistics of content categories. Multiple assignments may apply to each post

Content Category	Occurrence	Krippendorff's Alpha
ambiguous relationship	8	1
positive experience	14	1
reflection on relationship, life, etc.	8	1
health issue	3	1
harassment	1	1
workplace issue	5	1
gender stereotype/reproductive freedom	10	0.879
parenting	3	1
love vs. money	3	0.653
betrothal gift	1	1
debts/gambling	3	1
domestic violence	8	0.936
lack of emotional support/romance	12	0.906
sex mismatch	5	1
concealing of illness/family issue	1	0.663
work-family balance	8	0.826
cheating-self	11	0.889
cheating-partner	19	1
age anxiety/marry early	14	0.96
controlling parents/dependence	16	0.922
tolerance	10	0.756
self-attribution	5	0.754

10.4.2 Contextualizing gender issues

In posts regarding **ambiguous relationship**, one may confess her mental struggle or reflection on early-stage relationships such as dating or blind dates. For example, one woman hesitated if she should establish a more "formal" relationship with a newly met man, "*I may look very independent, but when I meet someone I'm fond of, I would want to rely on him, though I'll just hide this feeling. This may cause misunderstanding. I'm wondering if I should have more courage, and express my true feelings from inner inside. This is really hard for me. Hope I can make some progress in the new year*." (Post 3). As could be seen, such posts may overlap with the "reflection on relationship" category. Ambiguous relationship can also relate to cheating behavior, given the ambiguous boundary between cheating and friendship, as in the case of Post 42: "*I happened to see his chat history with a colleague of his. Though there's not much loving content, but I can feel their relationship which goes beyond that of friends in their obviously overly frequent communication*."

The sharing of **positive experience** often follows the narration of a toxic relationship or marriage, e.g., "*After her divorce, my mom often travels to neighboring cities. She also starts to learn dancing, square dancing though. She becomes more relaxed*." (Post 2). Post 66 describes a similar case, "*The most courageous thing I've done in my life is to get a divorce. Now I work hard and get along well with my family and friends. I believe my son will grow happily with his happy, hard-working mother... It's not scary to make choices, but we must have the courage to face reality after making the choices*." Other themes in this category include academic achievement

(Post 14) and satisfactory relationship/partner (Post 31, 51, 69, 75, 78, 88, 89, 97).

Reflection on relationship, life, etc. is commonly found among the posts, including whether or not to go into a marriage (Post 11, 24, 26), the difficulty of finding satisfactory partners (Post 81), and how to live an independent life (Post 93). This category often does not contain any specific life events, while providing reflection of the women.

Health issue is relatively rarely shared. Two posts are about the discrimination faced by Hepatitis B virus carriers, in both workplace and life: "My mom is a really nice person. She faces much discrimination due to her disease. People don't want to be around her. She's isolated by people, but she still constantly strives to become stronger." (Post 85). According to Post 68, the content contributor intentionally isolates herself from others, out of fear for letting others know about her disease and infecting her friends.

Harassment is mentioned only once, where a woman was sexually harassed when she was a child (Post 9).

Severe **workplace issues** were also described. In Post 1, the woman explains how she was verbally abused by a sexist male client: "*The male client proposed a toast. I said to my colleague next to me, 'I'm drunk. I don't want to drink anymore.' The client may have heard my words and said, 'I'd like to marry every beauty here, except her. Do you know why? Because she's not obedient and doesn't give me face (do me a favor). When other people propose a toast, she drinks. When it comes to me, she doesn't.' Then the client kept repeating that I did not obey*." Post 56 tells how a woman strives to leave a toxic workplace. Workplace issue is sometimes related to a toxic relationship, as in the case of Post 66: "*I became weak and self-contemptuous in the relationships. I couldn't see my strengths. When I brought such emotions to the workplace, I was bullied and criticized by leaders*."

Gender stereotypes are an umbrella of many issues related to gender roles, with the lack of reproductive freedom as the most prevalent one. The author of Post 21 describes how her father-in-law forced her to have a baby, regardless of her health conditions: "*His father has the final say in his family. It's a very traditional, patriarchal family. I don't know how many times I've gone to the hospital, in order to have a baby. I've heard much bad words from his parents. Now his father is like, 'either you manage to have a test tube baby, or you divorce.*'" Women are the ones being responsible for housework and taking care of the children, without any help from their partners, as complained about in Post 46 and 70. Gender stereotypes can also relate to traditional mindsets. For instance, some parents do not allow their married daughter to come home on Lunar New Year's Eve and first day of the lunar year, because they believe "*this would*

bring bad fortune to her family." (Post 25).

Parenting issues are raised when differing parenting principles occur between parents. Two posts talk about how bad men seem to be at parenting. In Post 62, the author says, "*Sometimes I really think men, especially after they become fathers, are good-for-nothing. They're lazy and ugly, but keen to show the so-called father majesty. In fact, they're just incompetent and stupid*." The author of Post 71 mentioned that her partner was impatient to their child, and would throw cellphones and feeding bottles.

Sometimes, **love vs. money** is the choice some women have to make when choosing between material standards of living and a romantic relationship. In China, traditionally, men are responsible for down payment of the house when they get married. The content contributor of Post 4 thinks about breaking up with her boyfriend who is not willing to pay the down payment: "*Now whenever we talk about getting married and buying the house, he says he's not able to do it and wants to give up. I just want to ask, am I asking for too much? Should I keep making compromises? Is it the problem with his family?*" Post 67 is also written by a woman who thinks her boyfriend does not spend enough money for her: "*I think he's not spending enough money on me. I'm young, and pretty. I have a good educational background. Also, he's more than ten years older than me. So, he should devote more to provide me with a good material life*." The life of marrying a rich partner, however, is not all fantasy. In Post 60, the content contributor was asked to sign a prenuptial agreement. She felt sad after she realized that her husband and parent-in-laws guarded her in terms of money: "*Sometimes I feel that I have nothing to complain about. My family of origin has no money. With my own efforts, I can't live at this level of life. What else can I expect? But sometimes I feel very sad. While they are good to me, they're also guarding me in terms of money, and they will not let me take a little advantage*."

One post (Post 4) touches on the ancient tradition of **betrothal gift** which is a traditional way of thanking and showing respect to the bride's parents for raising the bride, and a desire to forge good relations with the future parent-in-laws. In this post, the betrothal gift is used to buy the house for the couple.

Three affluent women suffered from the messy financial situation of their male partners, including **debts and gambling**. In Post 9, one woman explains: "*He earned around 7,000 CNY per month. He used loans to support his luxurious lifestyle. I know he has loaned 200 thousand CNY, and he'll never be able to repay. But he never changes his lifestyle. He recruits prostitutes using thousands of CNY each time. He buys clothes without even looking at prices. He's very happy if a young lady calls him a boss or something. He just wants to establish himself as a successful figure outside*." Another woman explains: "*He's also addicted to gambling! He can lose hundreds of*

thousands of big bets in one single night, so many times his debts are repaid by my sister. He sometimes even beats my sister when he comes home after losing a gamble." (Post 37).

Several types of **domestic violence**, or intimate partner violence (IPV), can be identified in the posts, including physical abuse (Posts 2, 37, 40, 77), verbal/emotional abuse (Posts 2, 55, 66, 77, 95), and control (Post 71). Post 77 is a typical example of verbal and emotional abuse. Her husband constantly belittled her: "*Whenever I told him funny jokes, he would say I was vulgar, and should read more books to improve myself and better educate our child. When he saw me watching TV series every day, he would accuse me of not spending my time on meaningful things, like making education plans for our child, and making plans for myself*." After her mother died, she was immersed in sadness. Again, her husband accused her of having a bad mentality and not being able to be a good role model for their child.

Lack of emotional support/respect/romance from their partners was also a common issue reported by women. In Post 29, the content contributor's husband showed no respect for her as well as other women when dining with his friends, but she was forced to show up on such occasions: "*I often sit there and listen to their rhetoric, mixed with swear words, sarcasm about female leaders, or complaint about the constraints that family brings to them. I feel that my gender has become very embarrassing and disrespectful. I'm like a decoration*." Some men seem to not be able to provide emotional value to their partners: "*My husband doesn't care about me at all, and I guess he doesn't even have the ability to do so. I feel that he doesn't know how to be around people, especially when it comes to intimate relationship. I don't demand anything from him now, and can only accept the reality. Divorce is not an option for me*." (Post 46). Post 58 describes a similar situation. In Post 50, the husband was not aware how vulnerable pregnant women could be, and accused his pregnant wife of not doing as much housework.

Sex mismatch seems to be accompanied with the husbands' troubled relation to sex. In Post 34, the content contributor's husband always refused to have sex with her. When she tried to communicate, her husband either refused to discuss it, or blamed everything on her, asking her to lose weight and get into good shape. While this woman saw the sex mismatch as an unsolvable issue, she bought herself sex toys to satisfy her desires and kinks, and acknowledged that she would not refuse to make love to other men if she met suitable ones. However, this is a rare case, and for other Chinese women, they "*have a harder time defending the legitimacy of their sexual desires than men*." (Post 48).

Concealing of illness was described only in one case (Post 12): "*My brother is about to get married, and the wedding date has been set. He has always been a very good person in my mind. He makes money, does housework, and is tidy, but one of his kidneys is not very healthy. He was*

hospitalized before, but it has not been well till now. It probably means that it will affect his future sex life and fertility. However, he hasn't told his girlfriend about this. He, as well as our mom, is not going to disclose this to his fiancé before getting married." The author struggled between keeping the secret for her brother and telling the truth to her future sister-in-law.

Work-family balance is the decision and compromise many women have to make, especially when they work in different cities from their partners. The woman in Post 15 was confronted with such a situation: "*His family urge him to get married, and he wants me to move to his city. But I don't want to give up my career and go to a strange city to start over. Now we're in a semi-breakup state*." In Post 27, the woman's boyfriend agreed to marry her only after she quit her job in a company, passed the National Civil Servant Examination, and became a government official. According to the following post, the decision for women is made harder given the stereotypical measure of a woman's success in Chinese society: "*The pressure of being a woman in China and the oppression of a male-dominated society is too heavy. No matter how well women do their jobs, people still judge them by how successful their marriage is, or how early they get married. Many people are forced to get married, and to have a second child, and then a third child*." (Post 23).

Cheating behavior is heavily discussed in the posts. Nineteen posts were women's narration of their partners' or fathers' cheating behavior, which we categorize as **partner-cheating**. They often appear together (e.g., Posts 40, 41, 42, 44, 45), and given the temporal order of the posts, the content contributors may have been inspired by recent posts which stroke a response in them. Some directly indicated such a motivation: "*I just saw the post about parents' divorce. I'm shocked, because I've been treated exactly the same way.*" (Post 66).

Eleven posts were women's narration of their own cheating behavior, which are categorized as **self-cheating**. They cheated for various reasons, from sex mismatch (Posts 42, 43) to retaliatory cheating (Post 59). The woman in post 77 had suffered from domestic violence and lack of emotional support and romance from her husband before she cheated. Her husband had also cheated before. Thus, she felt less of a moral burden or sense of guilt.

In **age anxiety/marry early** cases, either the women want to marry early or their parents and partners urge them to, with the stereotypical, traditional assumption that young women are more popular on the marriage market. One woman is stuck between the choices of pursuing her degree abroad, or giving up her degree, going back to China, finding a job, seeking a relationship, and, ultimately, marrying a man. She thought at the age of 28, she "*basically had no future in the workplace and in the dating market*." (Post 36). Some parents urge their daughters to marry, even if their boyfriends have perceived bad traits: "*I think he's an extremely terrible individual.*

But in the eyes of my parents, he's a good candidate for marriage." (Post 7). Another traditional mentality is that marriage is more important than career for women, which drives parents to urge their daughters to get married: "*Although my parents are happy with my achievements at work and think that career development is very important, they believe the most important thing for women is to get married and have children*." (Post 23). Some parents even decided when their daughters get married, regardless of their own will, as in the case of Post 8: "*In 2019, my parents introduced my boyfriend to me. We've been in a long-distance relationship and haven't spent much time together. I'm scared about marriage. But how can I break up with him? My parents have set a wedding date for us. I'm over 30, which also makes me anxious*." However, women who had suffered from their marriage still encouraged other women to get married: "*My niece is around 30 years old, and my sister keeps urging her to get married. My niece and I, after seeing her two miserable marriages, have determined not to get married... It's like a dead end. A woman uses her own blood-and-tear experience to teach other women to step into the same river. I guess the bubble which has trapped many women for all their lives will finally burst, only after career-oriented women are recognized by society, and women no longer need to prove their value with their marriage*." (Post 37).

Controlling parents can be either the women's parents, or their parents-in-law. The woman in Post 46 described how her mother-in-law kept bothering and criticizing her: "*If she doesn't like me, she'll just accuse me without hiding her feelings. All I can do is to endure it. I'm depressed, but I can do nothing. I can't afford to buy another house and live separately from her*." In the cases of Post 21 and 94, the parents interfere with and have the final say on every aspect of the couple's life.

10.4.3 Tolerance and self-attribution

In addition to the 20 categories of the presented issues, we also identified some mentalities which could worsen the women's situation.

Tolerance was sometimes found. This was observed if someone does not believe there are many potentially satisfactory male partners in China, so they have a relatively low standard when seeking a partner, as in the case of Post 36: "*I know men are all the same. A man who doesn't cheat and brag is already good enough. I just want someone who can talk with, play with, and who won't kill me when I sleep. All I want is to have a stable home and live an ordinary life*." When one woman was cheated on by her husband, her friends told her that men were basically the same: *"[After my husband cheated on me,] I consulted with my married friends, and it turned out that everyone's marriage was the same. They said I asked for too much, and all men would cheat. The only difference is if they're caught*." (Post 73).

Self-attribution is when the women ascribe the issues happening in their relationship only to themselves. For example, in Post 35, the woman and her boyfriend struggled with the distribution of housework as he suggested that it was only a woman's responsibility. Consequently, she attributes their breakup to herself: "*Most problems in our relationship are because of me. I wasn't able to solve them well at that time, and I also missed the opportunity to learn how to solve problems and communicate, which is a huge regret for me.*"

10.5 Discussion

For some cultures, women are willing to share their negative experiences non-anonymously, as was seen in the #MeToo movements in western countries (ElSherief et al., 2017; Saguy and Rees, 2021). For China, however, this can be different. Influenced by Confucian mentality, cultural norms and social sanctions regarding sex and sexual harassment are issues people are ashamed to talk about (Lin and Yang, 2019). Here, cultural aspects like face-saving and associated shame can make it harder for women to express such problems (Xu et al., 2022).

Research about anonymity on social media suggests that people seem to be freer in their expressions, potentially also leading to harassment and bullying (Nova et al., 2019). By being able to express oneself freely without fear of judgement, people could be more willing to share their own experiences (Kang and Chung, 2017). As such, sensitive topics such as intimate partner violence, workplace harassment or cheating behavior can be openly talked about (Saguy and Rees, 2021; Xu et al., 2022).

Recently, feminist influencers on Sina Weibo started anonymously posting incidences of affected women on their social media channels. With this study, a content analysis was conducted to investigate what types of gender issues are shared anonymously by women through a Chinese influencer, called Qiaomai. To this end, 774 posts were collected from January to March 2022 of which 100 were analyzed due to time constraints. There is a lack of literature about anonymous expression of Chinese women on social media, therefore, the conventional approach for content analysis was applied.

All in all, 20 categories of gender issues were defined through observation of the posts, consisting of such topics as ambiguous relationship, harassment, and domestic violence. Each post was coded by two independently working coders who discussed their results afterwards, resulting in a Krippendorff's alpha of at least 0.663 for all variables (Krippendorff, 2018). The most frequently observed categories deal with cheating-partners, followed by controlling parents, and age anxiety/marrying early. Positive experiences are also shared, e.g., after a divorce from a toxic marriage. Compared to existing literature, our analysis uncovered more

gender/social issues expressed by women on social media, in addition to IPV (Xu et al., 2022).

The observed gender issues anonymously expressed by women are contextualized in a culture which is known to be conservative, where women's value is attached to their family instead of their own achievements, and where women's rights including reproductive freedom are not well protected (Chow and Chen, 1994; Jordan, 1994). What's worse, when confronted with these gender issues, they may find difficulty in seeking supportive resources, due to the limited social support and a lack of psychological professionals. According to Fang et al., China has roughly 5,000 clinical psychologists, only 1/4 of the number in the United States, for a population four times as big. Also, only a small number of economically well-developed areas in China have social workers serving mental health patients (Fang et al., 2020). By sharing their experiences anonymously with influencers, empathy, online interpersonal support and practical advice could be made accessible to the affected women. The comments also allow like-minded women to connect with each other. As we notice, posts of the same topic often appear together, indicating that when a gender issue is publicly expressed, it may arouse similar discussions.

This study's observations echo with previous research which finds that anonymity can encourage expressiveness and interaction among users, and make the disclosure of deep confessions and secrets possible (Kang et al., 2016). In a culture where face-saving is seen important (Xu et al., 2022), the women in this study nevertheless express their personal experiences, which were mostly negative.

While many communities for women have focused on daily life (Lee, 2013) and entertainment (Bury, 2005), this study revealed the role of an online community to help women express their negative experiences.

10.5.1 Limitations and future work

To this end, an exploratory understanding of common gender issues anonymously shared by female Weibo users was provided. A follow-up study can further analyze the dynamics of the discussion around such issues, e.g., if the affected women receive proper help in comments, if moral judgments exist especially when it comes to traditionally taboo subjects such as women's self-disclosure of their cheating behavior.

Given the specific site for observation, the findings may not be generalized to other cultural contexts. Further, the influencer pre-selected submissions before posting them, so there might be a bias. Future research could consider a cross-cultural analysis of gender issues anonymously expressed on social media, e.g., comparing between Weibo and Reddit.

Last but not least, the authors the authors find that the anonymous experiences are mostly shared by well-educated women, with good expression skills. Women with a lower educational level or from rural areas may not have the ability or Internet access to express themselves online. As indicated in (Yin and Sun, 2021), rural and working-class women are largely marginalized and underrepresented in China's present feminist movements. Future research could take marginalized women into consideration.

10.6 Conclusion

With a qualitative content analysis, we gained an in-depth understanding of how women anonymously expressed gender issues, from domestic violence to cheating, on a Chinese social media platform. These issues are sometimes associated with mentalities that could be seen as more traditional, such a misinterpretation of women's value (marry early), and gender stereotypes (lack of reproductive freedom). We sometimes find women to attribute relationship issues to themselves, as well as to tolerate their partners' misbehavior. The initial taxonomy can potentially help policy makers and social media platform designers in providing opportunities for women to share their experiences, and encourage more study on this subject.

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Part IV: Fake news and information horizons

11 What is truth? Fake news and their uncovering by the audience

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11.1 Introduction

"Post-Truth" was named word of the year 2016 by the Oxford Dictionaries. They define "post-truth" as "relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief." In the same scope, "fake news" is defined as a type of journalism which consists of deliberate misinformation or hoaxes spread via traditional print and broadcast news media or online social media (Leonhardt and Thompson, 2017).

Even Pontius Pilate once famously asked "What is truth?" to which Jesus responded – with silence. Günter Wallraff, one of the pioneers of investigative journalism, issued a statement that media competence needs to be taught at school (Wallraff, 2017). He argues that media outlets need to be critical with their own products. Are they making sure that in the digital age even online-journalists are learning the basis of research? Are they verifying that journalists have the time to check different sources or to be investigative? Is media still an important controlling organ for democracy or is it being controlled by lobbyists and the interests of companies? Others are critical of today's news outlets, even the ones which are regarded as high-quality sources because the outlets are not critical of themselves (Bredemeier, 2017).

According to Raab, Unger and Unger (2016, p. 131), decision making behaviour is influenced by the fact that decisions are made under uncertainty. Judgement heuristics deal with thinking strategies through which judgements are made. The anchoring and adjustment heuristics say that people always start with an initial value in their judgments that acts as an anchor, which leads to a judgement. Regarding fake news, this means that people who do not yet have any information on a topic can find fake news as a first piece of information. This information is the anchor that remains in the person's memory. Thus, the neutrality towards the subject is lost and the person becomes biased.

This paper compares fake news and the lost meaning of truth in our contemporary society. To this end, we investigated what the definition of truth is according to some philosophers. Literature on fake news and post-truth was systematically collected and the meaning of truth that the authors stated extracted. The articles were matched with the different truth theorems.

Lastly, some possible solutions to discern fake news and non-fake news are offered. Finally, it is discussed if there is a solution even. In the empirical part of the paper, an online survey was distributed and answered by 448 German-speaking participants. The aim of the empirical study is to determine whether the source of an article or its content is the main determinant for the reader to distinguish truth and fake news.

11.2 Fake news and post-truth

The meaning of the term “fake news” has changed in the last few years, with scientific articles representing the word differently in 2005 and today. Then, the term “fake news” was used when someone was speaking of satirical content to discuss public affairs, for example entertainment TV shows like The Daily Show (Pavlik, 2005; Marchi, 2012). In 2007, the term was used in context with Fox News and their published news which were not based in facts (Alterman, 2007). Today, satirical news is still regarded as fake news, since they do not state to publish what is considered true. Another form is citizen satire, which is a website where obvious satire is posted and displayed as that. But this gets more complicated when sites are involved that pretend to distribute facts. What makes fake news especially problematic today is that they circulate on social media, which is becoming an important news source (Bredemeier, 2017). Another potential risk factor is the decreasing number of circulations and subscriptions of traditional news, and news producers depending on online advertising revenue based on page views (Chen, Conroy and Rubin, 2015; Dale, 2017). This makes news outlets susceptible for the distribution of news which is aimed to gain clicks on their website. The same definitions are made for “post-truth politics,” which is made up of empirical falsehoods, misleading associations, and mainly appeals to emotions (Tallis, 2016). The statements are delivered through video and social media, especially Twitter, where discussion and argumentation is limited due to character restrictions. Especially Donald Trump likes to use Twitter to state his opinion (Figure 11.1).

“Fake news” can have different definitions. A simple one illustrates it as news articles which are intentionally and verifiably false (Allcott and Gentzkow, 2017). Fake news can be posted with a disclosed, anonymous, or from a bogus source. Anonymous sources are often concealed within a newsgroup or bulletin board where unaccountable free expressions can be spread among a potential wide reader base. Bogus sources are defined as truly covert operations, but the sources seem authentic (Allcott and Gentzkow, 2017; Berghel, 2017; Gross, 2017). Lastly, there are the enablers. They are legit sites which inadvertently supply a platform for hoaxers (Frank, 2015). These enablers are, for instance, some “Yellow Press” or clickbait articles, provide a wide spectrum of unverified news and eye-catching headlines (Chen, Conroy and Rubin, 2015). Clickbait articles have distinctive characteristics. The headlines are exaggerated and often try to

appeal to emotions. The article itself does not contain valuable content and commonly it is not true. Sensationalizing is the main motif of those articles.

Figure 11.1: Donald Trump tweeting about fake news and a user commenting on it

Fake news is easily spread on social media (Walton, Goldstein and Coonan, 2016). This can be partially attributed to their design, for example Facebook, and how the network presents the news. The news is shown in the same format with a small icon validating which news source it originates from, making it difficult to understand if the news is credible. Every click on those articles makes the algorithm recognize that more of this content should be displayed, which can negatively affect the quality of news articles that get filtered by those algorithms. Some even compare fake news to propaganda (Bean, 2017; Cramer, 2017; Walton, Goldstein and Coonan, 2016; Rider, 2017). Another take on fake news is the outlook on democracy. For political participation, one needs to be informed correctly. This means a person cannot give their consent when they cast their vote, which makes demographic consent an illusion (Fish, 2016).

11.3 Truth theories

To answer the question what constitutes as truth, different approaches via literature were accumulated and compared with articles about fake news and how the truth was articulated in them. The different theories of truth which were observed when reading about fake news are the following: *theory of reflection*; *coherence theory of truth*; *consensus theory of truth*; *evidence theory of truth* (Figure 11.2).

A word on the *correspondence theory* of truth: Although there are similar definitions of correspondence already in Aristotle's work, the canonical form of this truth theory originates from the early 20th century. Bertrand Russell states, "(t)hus a belief is true when there is a corresponding fact and is false when there is no corresponding fact" (1971 [1912], p.129). A

person who will make true propositions on a certain state of affairs in reality, must perceive (watch, hear, etc.) this part of reality personally, in real-time and on site. In our context of journalism, the journalist reporting on a state of affair makes a true proposition ("true" for his self-consciousness) when he luckily is in the right spot at the right time. In times of social media, the term "journalist" includes professional investigative journalism as well as citizen journalists reporting via channels like Twitter or Periscope. For the audience of those journalists, there is no chance to verify or to falsify the correspondence between the read or heard proposition in the newspaper, the tweet or the TV broadcast and the part of realty, since they simply were not there. This is the reason why the correspondence theory of truth only plays a minor role, if any, in the context of fake or alternative news (Muñoz-Torres, 2012).

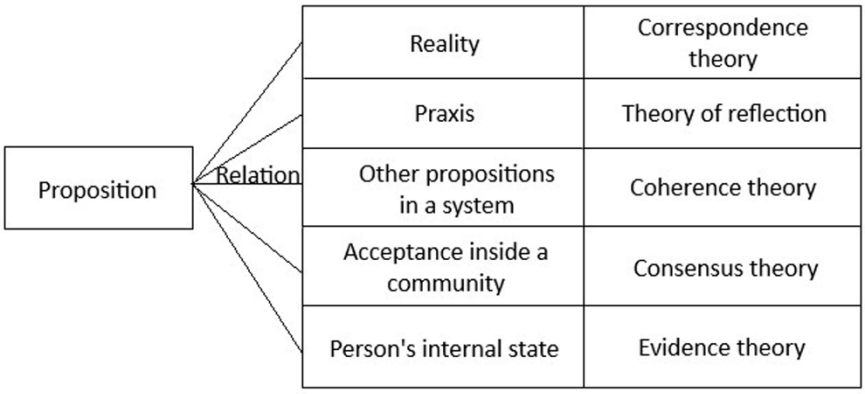

Figure 11.2: Truth theories in context to their relations and proof

Accordance with the objective reality and personal awareness is the key factor of the *theory of reflection*. If the human mind contains truth is not a question of theory, but of praxis. In praxis (evidence, deduction, reduction, decision procedure), humans must proof the truth of their thinking (Pawlow, 1973; Klaus and Buhr, 1972). One possible aspect of news is the reporting of unverified rumors as truth and thus the wilful manipulation of facts (Allcott and Gentzkow, 2017). Therefore, recognizing things as they are, is no longer possible (Hempelmann, 2017). Facts cannot be wished to be true; they need to be reproducible as well. They need to be measurable and have been validated. But this also means that facts may be interpreted differently, as errors, inadvertent falsehoods, misconceptions, or downright lies (Griffiths, 2017), especially if they appeal to emotion (Gross, 2017). An example is the tobacco industry, which is regarded as one of the pioneers of fake news. McKee (2017) states that the industry funded several studies which provoked that smoking was not harmful. To further their agenda, they also appealed to the concept of personal freedom. If smokers are not allowed to smoke wherever they want, they are denied the right to do as they please. So, they created their own facts in order to make profit. An example of potential financial losses which are caused by news is the following. On October 7th, 2016, the Pound Sterling suffered a thirty-one-year trading low and

an eight percent fall against the Dollar on the Singapore currency exchange in just two minutes, because the algorithm trades on the back of news sites and social media like Twitter. The algorithm picked up negative headlines, evidence, about the Brexit and thus sold the pound (Laybats and Tredinnick, 2016). The problem with the theory of reflection is that it is impossible to consider all facts because they are always a product of selection. Facts are not value-free, which means facts can be presented to elicit certain actions and emotions (Horton, 2017). A problem of the media is that it sometimes takes a while to gather all facts to accurately use them. By the time the facts were gathered, the media momentum has passed (Peters, 2017).

The *coherence theory of truth* declares that one statement correspondents with another statement, or with the maximal coherent sum of opinions and accepted clauses of statements. There cannot be an opposite statement within an already accepted system of statements. If the statement can be integrated, it is true. Instead of rejecting the new statement, it is possible to change the whole system of statements to integrate it into the system (Ritter, Gründer and Gabriel, 2004). The statements need to be logically derivable from each other. A good example how the coherence theory works and can cause financial damage is the following case. The Wall Street Journal (WSJ) published an investigative article about PewDiePie (real name Felix Kjellberg), the most successful person on YouTube with currently 59 million subscribers, in which they showed evidence that he uses anti-Semitic jokes and Nazi imagery in his videos, implying that he is a Nazi sympathizer himself (Winkler, Nicas and Fritz, 2017). The examples that the WSJ gave do show Nazi imagery, but they took them out of context, since Mr. Kjellberg used them in a satirical fashion, even stating that he is not an anti-Semite. But the journal did not clarify this, painting him as a Nazi sympathizer. The story was picked up by many major news outlets (Guarino and Philips, 2017; Major, 2017; Mahdawi, 2017). The Guardian went on and blew the story out of proportion even more, stating Mr. Kjellberg "helped anti-Semitism become just a little bit more mainstream" (Mahdawi, 2017). The story was picked up and lastly, a newspaper stated that he is a fascist (Major, 2017). If his satirical jokes are appropriate or not is not the focus in this example. It highlights that one newspaper can publish news, take a story out of context, which gets picked up by another newspaper that draws their own conclusions and makes their own narrative about it.

The definition of the *consensus theory of truth* states that truth is what is agreed upon by all people in a group. First, the speaker needs to be clear in what he is saying to ensure that everyone understands what he means, he is insinuating each other truthfulness and his words are accurate. A discourse needs to determine if the claim of the speaker is indeed to be accepted. Everyone needs to have the same level of influence to rule or to oppose (Habermas, 1972). These factors are represented in social media like Facebook and Twitter (Peters, 2017) or Instagram,

where the line between individual and collective memory is blurred (Spinney, 2017). A study showed that by the age of 18, 88.0% claim to receive their news through Facebook or other social media (Nature Communications, 2017). There, everyone can post their own truth and if others agree with it, they can share it with other people (Bredemeier, 2017). This creates an echo chamber (Dale, 2017; Laybats and Tredinnick, 2016; Nature Communications, 2017), or bubble effect (Gross, 2017), where people only see what they want to see, algorithms filter the posts accordingly (Dale, 2017; Higgins, 2016; Walton, Goldstein and Coonan, 2016), creating social reinforcement among the group (Laybats and Tredinnick, 2016). This prevents others to interact with sociocultural and political differences, which is strengthened since social media is dislocated and shields the person from distant others (Bowell, 2017). Another example is an article by the Daily Mail which published a story about Beijing displaying the sunrise on a screen, stating that it is not possible to see the sun since the city is filled with too much smog (Nye, 2014), but the sun that is displayed is part of a commercial, unrelated to the smog in Beijing. This story was picked up by the TIME (Liljas, 2014) and CBS News (Lusk, 2014) without fact checking and simply trusting another news site. Relying only on the consensus theory of truth is difficult and does not necessarily lead to the truth. As Albert (1994, p.238) states: "Even a consensus of an ideal community under ideal circumstances is not a substitute for truth."

Brentano describes the *evidence theory of truth*: "When I have evidence, I cannot err" (1974, p. 143). A judgement is true if it expresses a simple quality of experience. Brentano adheres to the traditional view that there are two different ways for a judgement to be evident; either it is immediately, or it is evident in so far as it is inferable from evident judgements by applications of evident rules. But evidence is a primitive notion; it cannot be defined, it is only experienceable (Ritter, Gründer and Gabriel, 2004), and thus, found in oneself. One can be convinced others are telling the truth (Bilgin, 2017), which leads people to believe in conspiracy theories (Bredemeier, 2017; Cramer, 2017). An example for this is the page *inforwars.com*, which wrote an article about the FBI, stating that no one was killed at the Sandy Hooks shooting in 2014, which is of course a conspiracy theory (Salazar, 2014). Verifiable facts are less important for shaping the public opinion and the appealing of emotions and personal beliefs are more favored (Podjed, 2016). The pandering to emotions has even been credited as the reason why Trump was so successful (Tallis, 2016). He is constantly referencing an elusive past greatness and this emotional appeal outweighs any arguments based on facts (Gross, 2017). An example of many of Trump's statements outlines the pandering to evidence found within oneself. He proposed that "we got 306 because people came out and voted like they've never seen before so that's the way it goes. I guess it was the biggest Electoral College win since Ronald Reagan" (Rhodan, 2017). This was proven to be wrong, since George H.W. Bush, Bill Clinton, as well as Barack

Obama won bigger margins in the Electoral College (Patel and Andrews, 2016). Butler-Adam concludes: When people are presented with evidence that contradicts their personal beliefs of truth, they are quick to announce them as false (2017, p. 1).

The truth theories illustrate that truth is often in the eyes of the beholder. It is troubling to think that even trustworthy newspapers like the *TIME*, *WSJ* or *The Guardian* can publish news which were just a fabricated story and not based in facts. What are the indicators of truthfulness? Is it the content itself? Or is it the source, the seriousness of a newspaper or a social media channel? Here, our empirical investigation starts.

11.4 Method

A survey, divided into two parts, was developed to determine if people either believe a source or the facts of a news story. The survey was distributed in Germany. This will help us understand how people form their opinion on their sense of truth. In the first part, the participants are asked about their interaction with the news. A seven-point Likert-scale is used to measure how important it is for the participant to follow current news. The participants are asked about preferred media types for reading the news and which online news pages they are aware of. In the second part of the survey, the participants must decide whether a news item is fake news and state their reasons by rating two seven-point Likert-scales, the first deals with the credibility of the facts, the second with the seriousness of the source. This part of the survey consists of four separate groups. Each participant is assigned to one of the groups at the beginning of the second part by choosing one of four given numbers. Each participant is shown four different news items with its disclosed source successively. The two news articles which are (hopefully) true are the following. According to the *Westdeutsche Zeitung* [*WZ*] (2017), the first article deals with a 39-year-old Ugandan woman who has given birth to 44 children (News 1). The second news item, according to the *Frankfurter Allgemeine Zeitung* [*FAZ*] (2017), deals with demonstrators who stormed the parliament in Macedonia (News 2). The two satire articles, or fake news, are the following. In the third article, *Die Tagespresse* (2017) writes that the Islamic State is cheering about Donald Trump refusing to shake hands with Angela Merkel (News 3). According to *Der Postillon* (2017), the fourth article describes that a forgery-proof 1-cent coin will be circulated (News 4). Two of the sources mentioned will be renamed to other sources. *dietagespresse.com* is renamed to the nationwide known boulevard newspaper *bild.de*, since *dietagespresse.com* is an Austrian satire page, which is unknown in Germany. The page *faz.net* will be renamed into *spiegel.de*, as this newspaper has a significantly higher number of copies. The four groups of participants differ in the indication of the source with which the news is provided. In the first group, the corresponding, or right, sources are indicated, in the three other

groups the news are assigned to the foreign sources (Table 11.1). This creates comparison groups.

Table 11.1: Original sources distributed among group 1, the foreign sources of the same news items distributed among groups 2-4

	News 1	News 2	News 3	News 4
Group 1	WZ	Spiegel Online	Bild	Der Postillon
Group 2	Der Postillon	WZ	Spiegel Online	Bild
Group 3	Bild	Der Postillon	WZ	Spiegel Online
Group 4	Spiegel Online	Bild	Der Postillon	WZ

To compare the influence of the source with the influence of the content, a complete Pearson-correlation is initially determined for the sixteen news items between the indication of whether the item is fake news and as how reliable the source has been classified. The same calculation is made between whether the item is fake news and how credible the facts are. Outliers are ignored in further calculations. An outlier, for example, is a sparsity in data, a great deviation of one of the edge values, or if the correlation value is significantly changed due to the exclusion of the outlier. Then, excluding the outliers, the Pearson-correlation is calculated. There are several ways to interpret the correlation coefficient. According to Cohen, Manion and Morrison (2007), correlations with a value between 0.20 and 0.35, respectively -0.20 and -0.35, indicate only a very small correlation between the variables, correlations between 0.35 and 0.65, respectively -0.35 and -0.65, indicate a small correlation. A value between 0.65 and 0.85, respectively -0.65 and -0.85, implies a high correlation and values between 0.85 and 1.00, respectively -0-85 and -1.00, imply a very high correlation.

11.5 Results

Between May 25th and July 07th 2017, the survey was completed by 448 German-speaking participants. The results for the first part of the survey, how the participants interact with news, are as follows. The mean value of the seven-point Likert-scale regarding the question of the importance to follow the news, is 5.43, meaning that most of the participants believe it to be relatively important. The participants choose the internet to inform themselves about current news (87.50%), followed by the radio (59.38%). Only 1.79% do not inform themselves at all. Regarding the question which online news pages are known, it should be noted that 54.24% know the web page *wz.de*, 77.90% are aware of the page *spiegel.de*, 61.61% know *bild.de* and 51.12% are familiar with the page *der-postillon.com*.

In the second part of the survey, from 448 participants, 80 people were in the first group, 137 in the second, 132 in the third, and 99 in the fourth. On average, only 61.04% of the participants can allocate correctly whether a news item is fake news (Table 11.2). Overall, the trust in the

source seems to be bigger than in the content of the story. If the satirical newspaper *Der Postillon* was given as a source, the story was assumed to be satire, even if it was true, which is indicated in the cells News 1/Group 2 (18.98%) and News 2/Group 3 (34.85%). Conversely, if a story was satire and the source seemed credible, the story was more often assumed to be true, indicated in cells News 3/ Group 2 (54.01%) and News 3/Group 3 (59.85%).

Table 11.2: Relative frequency of the participants' correct decisions about whether a news item is fake news; A.M.=Arithmetic Mean

	News 1	News 2	News 3	News 4	Total
Group 1	35.00% (N=80)	81.25% (N=80)	75.00% (N=80)	91.25% (N=80)	
Group 2	18.98% (N=137)	83.94% (N=137)	54.01% (N=137)	79.56% (N=137)	
Group 3	34.09% (N=132)	34.85% (N=132)	59.85% (N=132)	71.21% (N=132)	
Group 4	35.35% (N=99)	76.77% (N=99)	65.66% (N=99)	65.66% (N=99)	
A.M.	30.86%	69.20%	67.16%	76.92%	61.04%

The calculation of the total correlation between the indication of whether the news item is fake news and the indication of as how reliable the *source* is classified, results in a correlation coefficient of -0.98. For the calculation, a total of 14 outliers were excluded. The calculation of the coefficient of determination with unrounded values results in r^2=0.9534. This means that 95.34% of the variables are related. There is therefore a very strong negative correlation between the variables.

When calculating the total correlation between whether the news item is fake news and how credible the *facts* are, a correlation coefficient of -0.87 was determined. For this calculation, eleven outliers were identified. The calculation of the coefficient of determination with unrounded values results in r^2=0.7556. In this case, 75.56% of the variables are determined by correlations. Again, there is a negative correlation.

Overall, both calculated correlations are negative. This means that with increasing confidence in the facts or in the source, the number of people claiming a story to be fake news decreases. Overall, it is illustrated that the influence of the *source* is more distinct than of the *content* or the *facts* on whether something is seen as fake news, since the correlation of the former is higher than of the latter.

11.6 Discussion

It is difficult to state what the "truth" is and which news are to be considered as non-fake, or credible news. Apart from the correspondence theory which is not applicable in media, there is no way to measure truth and thus, there is no dependable theory of truth. There is also no post-truth and there is no fake news either. Trump can say whatever he pleases. But to navigate the world, one needs to estimate the truth at some point. For this, everyone uses one of the truth

theories in different forms and strengths. To adequately handle different sources of information and thus, the truth, one needs to have the ability to think critically. This, of course, also applies to different media, where distinguishing what information to trust is becoming more important and difficult. Since the source of a newspaper has such an enormous influence on the reader, as was outlined in our survey as well, people can take advantage of this. For example, serious news websites can be faked and provided with fake news to convince people that the fake news is true. Several solutions have been proposed, which come with limitations. Algorithms (Bean, 2017; Walton, Goldstein and Coonan, 2016) and browser add-ons (Berghel, 2017) can be implemented to filter out fake news, but they are rarely transparent and can even be used for censorship. Fact checking websites (Berghel, 2017) can be used, but again, even journalists who work for those websites can make mistakes. Natural Language Processing (NLP) approaches are used, which are based on newspaper sources, signals of truth, and the time of circulation of a news item. But of course, this can also be used to create believable news which is not based in facts (Dale, 2017). So, for a person to make their own decision, what she or he perceives as truth, requires that the person critically questions everything (Walton, Goldstein and Coonan, 2016). Furthermore, training in information literacy is advised (Laybats and Tredinnick, 2017; Stock and Stock, 2015). Teachers should not only transfer facts to students, but instead teach them also how they can find, evaluate, and use the information (Bowell, 2017). Evidence suggests that people who spend more time with the consumption of media and have a higher educational level display a more accurate belief about news (Allcott and Gentzkow, 2017). But it is argued that media literacy backfired, it resulted in a society which encourages everyone to do their own research, not trusting news outlets, Wikipedia and social media, forming own communities where one agrees with each other on which sources to trust and which to disdain. In the end, shielding people from fake news will not solve the underlying problem: what is truth? No one can ever be fully informed, as Boyd (2017) so accurately states.

The study displays several limitations. First, the questionnaire was distributed only in Germany. Different cultural areas might interact in other ways with news, especially with foreign news. Factors like the educational background, age, and how much time one spends with gathering information might be indicators about people and how they determine their sense of truth, which could be studied in further research.

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12 Echo chambers and filter bubbles of fake news in social media. Man-made or produced by algorithms?

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12.1 Introduction

"Whether we like it or not, deception happens every day and everywhere" [37, p. 3]. News on online press sites and on social media is no exception. Deceptive information "has had dramatic effect on our society in recent years" [57, p. 575]. Deceptions and fake news may possibly survive very well in environments of filter bubbles and echo chambers as well as in all kinds of social media, be it weblogs, microblogging services, or social networking services [55]. "Despite optimistic talk about 'collective intelligence,' the Web has helped create an echo chamber where misinformation thrives. Indeed, the viral spread of hoaxes, conspiracy theories, and other false or baseless information online is one of the most disturbing social trends of the early 21st century" [43, p. 60] leading even to the "emergence of a post-truth world" [36, p. 357].

However, why? For *The Guardian*, "social media filter bubbles and algorithms influence the (British, a/n) election" [27]; for the *Observer*, "the problem isn't fake news, it's bad algorithms" [28]; the University of Amsterdam's *Master of Media* blog addresses filter bubbles as algorithms customizing our access to information [36]. These three examples clearly point out, what the cause for filter bubbles of fake news is: it is bad algorithms. Nevertheless, you may find divergent opinions in the popular press. *The New Statesman* claims, "Forget fake news of Facebook—the real filter bubble is you" [47]. Now, the cause of filter bubbles is the information behavior of individual people.

These different estimations on the causes of echo chambers and filter bubbles directly lead to our central research question: Are echo chambers and filter bubbles of deceptions and fake news man-made or produced by algorithms? If echo chambers are supported by machines through the automatic construction of filter bubbles, how do such algorithms work? And if echo chambers are indeed man-made, what are the information behavior patterns of those individuals reacting on deceptions and fake news?

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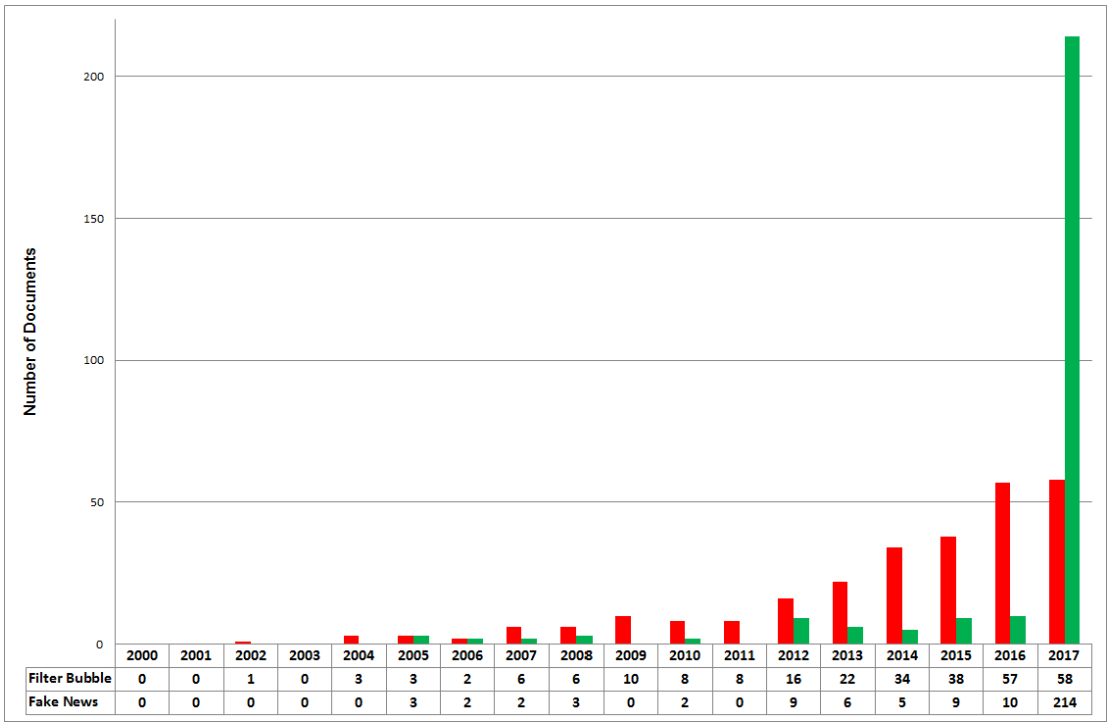
through the automatic construction of filter bubbles, how do such algorithms work? And if echo chambers are indeed man-made, what are the information behavior patterns of those individuals reacting on deceptions and fake news?

This paper is an interdisciplinary study including aspects of computer science, information science, and philosophy.

A brief bibliometric analysis on Scopus (Figure 12.1) shows that the number of scientific articles on “filter bubbles” and “echo chambers” increases slowly in the 2000s and stronger in the 2010s resulting in just under 60 articles in 2016 and 2017 each. Albeit there are some articles on “fake news” before the year 2017, there is a stark increase of papers in 2017—from 9 and 10 in 2015 and 2016 to a number of 214 in 2017. This figure exhibits the great current scientific interest on both topics “filter bubbles / echo chambers” as well as even more “fake news.” Especially historically relevant events as the UK’s Brexit vote, the 2016 presidential election in the United States, and the excessive use of the term “fake news” by Donald Trump led to discussions about the role of fake news and deception on the traditional press and social media. The related term “post-truth” was named word of the year 2016 by the Oxford Dictionaries [59].



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Filter Bubble	0	0	1	0	3	3	2	6	6	10	8	8	16	22	34	38	57	58
Fake News	0	0	0	0	0	3	2	2	3	0	2	0	9	6	5	9	10	214

Figure 12.1: Articles on “Filter Bubble(s) / Echo Chamber(s)” (red) and “Fake News” (green) 2000 to 2017. *Source*: Scopus; Search arguments: (1) “filter bubble*” OR “echo chamber*” (TITLE-ABS-KEY), N = 272; (2) “fake news” (TITLE-ABS-KEY), N = 265

12.2 Background

First of all, we should define our main concepts. *Fake news* is information including "phony news stories maliciously spread by outlets that mimic legitimate news sources" [55, p. 3977], it is misinformation (transmitting untrue propositions, not considering the cognitive state of the sender) and disinformation (again, transmitting untrue propositions, but now consciously by the sender) [48]. *Deception* is a kind of disinformation, which brings an advantage to the sender.

A *user* of internet services acts as consumer (only receiving content), producer (producing and distributing content), and participator (liking or sharing content) on all kinds of online media [60]. In classical communication science we spoke of the *audience* of media; nowadays, especially on social media, audience members are called "users."

Algorithms are sets of rules defining sequences of operations; they can be implemented as computer programs in computational machinery. In this article, the term "algorithm" is only used in the context of computer programs running on "machines."

Filter bubbles and *echo chambers* are metaphorical expressions. An echo chamber describes "a situation where only certain ideas, information and beliefs are shared" [15, p. 1]. For Dubois and Blank [15, p. 3], a filter bubble means "algorithmic filtering which personalizes content presented on social media." Both concepts are closely related; however, echo chamber is more on human information behavior and *filter bubble* more on algorithmic information filtering and results' presentation in online services. Echo chambers are clusters of users with similar ideology or interests; they occur "when people with the same interests or views interact primarily with their group. They seek and share information that both conforms to the norms of their group and tends to reinforce existing beliefs" [15, p. 3]. Users in echo chambers are on a media or content "diet" concerning a certain topic. Such a diet may result from *selective exposure of information* [35][50]. "The strongest form of the selective exposure proposition is that people prefer exposure to communications that agree with their pre-existing opinions" [46, p. 197]. A further explanation of the creation of man-made echo chambers relies on *priming*, as "priming is the activation of mental representations to influence subsequent behavior" [13, p. 139].

In contrast to traditional media with articles written by investigative journalists, especially social media documents are skipping the intermediation process. "Indeed, social media enabled a direct path from producers to consumers of contents—i.e., disintermediation—changing the ways users get informed, debate, and shape their opinions" [4, p. 1]. Prima facie, this sounds great. However, if we take a look on the other side of the coin "confusion about causation may encourage speculations, rumors, and mistrust" [4, p. 1].

News can be posted in a disclosed, anonymous, or from a bogus source. Anonymous sources are often concealed within a newsgroup or bulletin board where unaccountable expressions can be spread among a potential wide reader base. Bogus sources are defined as truly covert operations, but the sources seem authentic [2][3]. Additionally, there are the enablers. They are legit sites which inadvertently supply a platform for hoaxers [19]. These enablers are, for instance, some "Yellow Press" or clickbait articles, providing a wide spectrum of unverified news and eye-catching headlines [7]. Clickbait articles have distinctive characteristics. The headlines are exaggerated and often try to appeal to emotions. The article itself does not contain valuable content and commonly it is not true. Sensationalizing is the main principle of those articles.

Fake news is easily spread on social media. This can be partially attributed to website design and how the source presents the news. On Facebook, for instance, the fake news is shown in the same format as other links with a small icon validating which news source it originates from, making it difficult to understand if the news is credible.

Another take on fake news is the outlook on democracy. For political participation one needs to be informed correctly. This means a person cannot give their consent when they cast their vote, which makes demographic consent an illusion [18].

Other authors compare fake news to satire and parody, fabrication, manipulation, and propaganda [54]. All of these aspects are concerned with the two dimensions of the levels of facticity and deception [54].

The users' appraisement of a news story as fake or non-fake depends on the content of the story and—a little bit more—on the source of the transmitted information [59] as well as on the presentation format [30]. If we want to distinguish between fake (misinformation and disinformation) and non-fake (knowledge) we should know what knowledge, information, and truth are.

12.3 Knowledge, information, and truth

Only a proposition is able to be true or false. In epistemology, one kind of knowledge ("knowing that" in contrast to "knowing how") is based on true propositions. Chisholm [8, p. 138] defines knowledge:

> *h* is known by *S* =Df *h* is accepted by *S*; *h* is true; and *h* is nondefectively evident for *S*.

h is a proposition and *S* a subject; *=Df* means „equals by definition." Hence, Chisholm demands that the subject *S* accepts the proposition *h* (as true), which is in fact the case (objectively speaking) and that this is so not merely through a happy coincidence, but precisely

“nondefectively evident.” Only if all three determinants (acceptance, truth, evidence) are present, knowledge can be seen as well and truly established. In the absence of one of these aspects, such a statement can still be communicated—as information—but it would be an error (when truth and evidence are absent), a supposition (if acceptance and evidence are given, but the truth value is undecided) or a lie, fake or deception (when none of the three aspects apply).

Knowledge cannot be transmitted as such; it is in need of a sender, data to be transmitted, a channel, and a receiver [53]. Information dynamically sets knowledge “into motion.” Knowledge always has a truth claim. Is this also the case for information, if information is what sets this knowledge in motion? Is there something like true or false information [53, p. 39]?

Apart from knowledge, there are further, related forms of dealing with objects. If beliefs, conjectures, or fakes are put into motion, are they not information? “Information is not responsible for truth value,” Kuhlen [32, p. 41] points out. Buckland [6, p. 50] remarks, “we are unable to say confidently of anything that it could not be information;” and Latham [33, p. 51] adds, “even untrue, incorrect or unseen information is information.” The task of checking the truth value of the knowledge, rather, must be delegated to the receiving subject S. She or he then decides whether the information retrieved represents knowledge, conjecture, or untruth. Therefore, it is terminologically very problematic to speak of “true/false information,” as only propositions are truth bearers.

Propositions, linguistically presented by declarative sentences, can be true or false. Here, one basic philosophical question arises. Even Pontius Pilate once famously asked “What is truth?” to which Jesus responded—with silence [59]. Truth is a relation between a proposition and a reference object. There are different truth theories working with different reference objects (Figure 12.2).

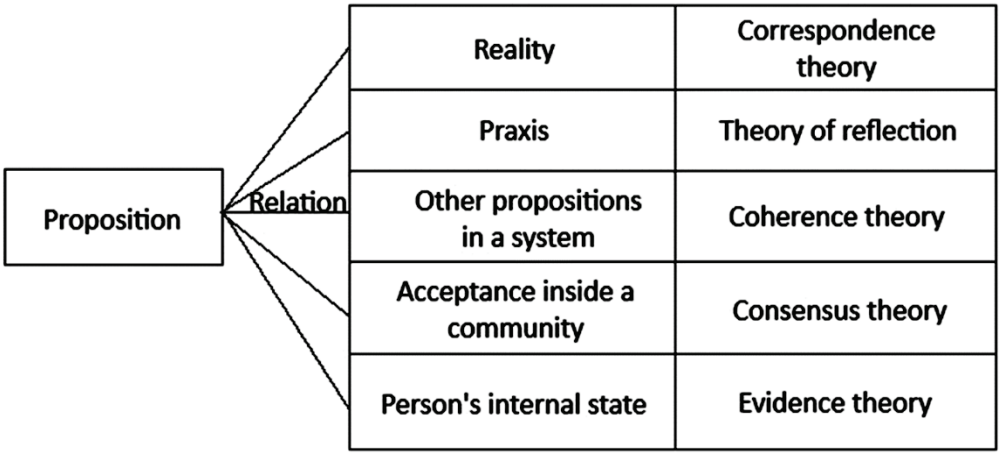


Figure 12.2: Truth theories

A word on the *correspondence theory* of truth [10]: Although there are similar definitions of correspondence already in Aristotle's work, the canonical form of this truth theory originates from the early 20th century. Bertrand Russell states, "(t)hus a belief is true when there is a corresponding fact and is false when there is no corresponding fact" [44, p. 129]. A person, which will make true propositions on a certain state of affairs in reality, must perceive (watch, hear, etc.) this part of reality personally, in real-time, and on site. In our context of journalism and social media, the person reporting on a state of affair makes a true proposition ("true" for his self-consciousness) when he luckily is in the right spot at the right time. In times of social media, the term "journalist" includes professional investigative journalism as well as citizen journalists reporting via channels like Facebook, Reddit, Twitter, or Periscope. For the audience of those journalists, there is no chance to verify or to falsify the correspondence between the read or heard proposition in the newspaper, the tweet, or the TV broadcast, and the part of reality, since they simply were not there. This is the reason why the correspondence theory of truth only plays a minor role, if any, in the context of fake or alternative news [38].

Accordance with the objective reality and personal awareness is the key factor of the *theory of reflection.* If the human mind contains truth is not a question of theory, but of praxis. In praxis (working, any decision procedure), humans have to proof the truth of their thinking in their practical behavior [41]. A sentence is true if its proposition works in practice. The problem with the theory of reflection is that it is impossible to consider all facts because they are always a product of selection. A problem of the media is that it sometimes takes a while to gather all facts to accurately use them in practice. By the time the facts were gathered, the media momentum has passed [42].

The *coherence theory* of truth declares that one statement correspondents with another statement, or with the maximal coherent sum of opinions and accepted clauses of statements [40]. There cannot be an opposite statement within an already accepted system of statements. If the statement can be integrated, it is true, otherwise it is false. However, instead of rejecting the new statement, it is possible to change the whole system of statements to integrate the new one into the system. The statements need to be logically derivable from each other.

The definition of the *consensus theory* of truth states that truth is what is agreed upon by all people in a group. First, the speakers need to be clear in what they are saying to ensure that everyone understands what they mean, they are insinuating each other's truthfulness and their words are accurate. A discourse needs to determine if the claim of the speaker is indeed to be accepted. Everyone needs to have the same level of influence to rule or to oppose [24]. Relying only on the consensus theory of truth is difficult and does not necessarily lead to the truth in the

sense of the correspondence theory. As Albert [1, p. 238] states: “Even a consensus of an ideal community under ideal circumstances is not a substitute for truth.” We would like to illustrate this widespread truth theory with a (rather unsavory) popular example: “Can millions of flies err?” They all believe in the “truth” that eating shit is delicious.

Brentano describes the *evidence theory* of truth, “When I have evidence, I cannot err” [5, p. 143]. A judgement is true if it expresses a simple quality of experience. Brentano adheres to the traditional view that there are two different ways for a judgement to be evident; either it is immediately, or it is evident insofar as it is inferable from evident judgements by applications of evident rules. But evidence is a primitive notion; it cannot be defined, it is only experienceable, and thus, found in oneself.

The philosophical truth theories illustrate that truth or lies are in the eye of the beholder (evidence theory, theory of reflection), the community (consensus theory), or in the system of accepted propositions (coherence theory). As the correspondence theory of truth is not applicable in the environments of journalism and social media, we have big problems to state what exactly is true and what is not. If we do not know what the truth is, we also cannot know exactly what “fake news” is. It is the individual person, who decides, based on a (probably unknown) truth theory, what is considered as truth, as lies, as “true news,” and as “fake news.” By the way, attempts of automatic semantic deception detection [9] are faced with the same problems, especially when they rely on the coherence or the consensus theory of truth.

12.4 Relevance, pertinence, and ranking algorithms

The concept of relevance is one of the basic concepts of information science [53]. Users expect an information system to contain relevant knowledge, and many information retrieval systems, including internet search engines and social media services, arrange their results via relevance ranking algorithms. In information science, we distinguish between objective and subjective information needs. Correspondingly to these concepts, we speak of relevance (for the former) and pertinence (for the latter), respectively.

Since relevance always aims at user-independent, objective observations, we can establish a definition: A document, for instance, a website, a blog post, a post on Facebook or Reddit, or a microblog on Twitter (or, to speak more precisely, the knowledge contained therein) is *relevant* for the satisfaction of an objective (i.e., subject-independent) information need.

The research result can only be *pertinent* if the user has the ability to register and comprehend the knowledge in question according to his cognitive model. Soergel [49, p. 590] provides the

following definition: “Pertinence is a relationship between an entity and a topic, question, function, or task with respect to a person (or system) with a given purpose. An entity is pertinent if it is topically relevant and if it is appropriate for the person, that is, if the person can understand the document and apply the information gained.” Pertinence ranking presupposes that the information system in question is able to identify the concrete user who works with the system; it is always subject-dependent ranking.

Facebook’s sorting of posts is a pertinence ranking algorithm; it works with the three factors affinity, weighting, and timeliness. According to these three aspects, a user will see posts on her or his Facebook page with the posts sorted in descending order of their retrieval status values [61]. Affinity is concerned with the user’s previous interactions with the posting pages, with different interactions weighted differently. If a user frequently views another user’s (say, user A) posts, likes them, comments on them or shares them, A’s future posts—depending on their weights (resulting from the numbers of likes, shares, and comments)—get a higher weight. Facebook also considers the position of the creator of the post (is this user often viewed, annotated, etc.?) and the nature of the post (text, image, or video). The timeliness states that a contribution becomes more important the newer it is. However, other factors play a role, and the algorithm is constantly being adapted. For example, an already viewed ranked list is not displayed a second time in exactly the same order (i.e., the criteria for the sorting are each slightly modified) in order to make the lists more interesting. Also, posts from people (as opposed to those from companies) are weighted higher, and the spatial proximity between the receiver and the sender of the post plays an important role. In particular, the affinity causes a user to see the one source at the top of his or her list, which he or she has often viewed in previous sessions.

The ranking on Facebook is always personalized and based on the user’s common interests, her or his information behavior on the service, and her or his Facebook friends [56]. The more a user repeatedly clicks on the posts of the same people, the more the selection of posts stabilizes, which always appear at the ranking’s top positions. Thus, in a short time—with high activity on Facebook—an information diet may occur that presents users only those posts on top of their pages, whose creators they prefer. So, it can be assumed that such personalized content representation leads to “partial information blindness (i.e., filter bubbles)” [25, p. 330]. Nevertheless, this assumption could not be empirically confirmed [25].

It depends on the user to form a “friendship” on Facebook, and it is on the user to often select certain friends’ posts for reading, liking, sharing, and commenting. Facebook’s pertinence

ranking algorithm indeed amplifies through filter bubbles ways into echo chambers, while the information behavior of the users plays the important primary role.

Here, we arrive at a first partial result: Algorithms by themselves do not produce filter bubbles or subsequently echo chambers, they only consolidate the users' information behavior patterns. Concerning the reception of fake news, it is not possible to argue that they are solely distributed by "bad algorithms," but by the active collaboration of the individual users. Also, Del Vicario et al., for instance, found out that "content-selective exposure is the primary driver of content diffusion and generates the formation of homogeneous clusters, i.e., 'echo chambers'" [12, p. 554 f.]. DiFranzo and Gloria-Garcia arrive at a similar result. "The related filter-bubble effect is due to the user's network and past engagement behavior (such as clicking only on certain news stories), that is, it is not the fault of the news-feed algorithm but the choices of users themselves" [14, p. 33 f.]. There are results concerning fake news and the algorithms of Facebook: "While this criticism has focused on the 'filter bubbles' created by the site's [Facebook, a/n] personalisation algorithms, our research indicates that users' own actions also play a key role in how the site operates as a forum for debate" [45, p. 1]. Although algorithms are able to amplify filter bubbles, obviously, the users play the leading roles concerning construction and maintenance of echo chambers of (fake) news.

12.5 Patterns of cognitive processes of information behavior in response to deceptions and fakes: Two case studies

12.5.1 Methods

When we want to analyze echo chambers of fake news as well as deceptions, and believing as well as mistrusting such false propositions by individual persons, we have to study their cognitive processes in detail [23]. In our research study, we apply case study research and content analysis. As we are going to investigate which concrete cognitive information behavior patterns concerning fake news and deception exist, we start our endeavors with the help of concrete cases. Case study researchers "examine each case expecting to uncover new and unusual interactions, events, explanations, interpretations, and cause-and-effect connections" [26, p. 218 f.]. Our first case includes the first (probably fake) news and comments on it. It is the story on Hillary Clinton selling weapons to the Islamic State (Figure 12.3). Our second case contains reactions on Facebook after the disclosure of a deception. In the election campaign for the presidency of Austria, the candidate (and later elected president) Alexander van der Bellen was called a cancer patient as well as demented and therefore unable to become president. Shortly afterwards, van der Bellen presented a bill of health by his doctor testifying that he is healthy (Figure 12.4). At this point our analysis starts. The case studies come from different continents; case no. 1 from the U.S., and case no. 2 from Austria. With these two cases, we are able to find

cognitive patterns and to understand information behavior at two stages of the process of deception: on the one hand, at the time shortly after the publication of the fake post; on the other hand, at the time when the fake is disclosed. We translated all Austrian comments into English; however, for some propositions we additionally present the original version in Austrian German to show the terminological atticism.

Figure 12.3: Triggering fake article about Hillary Clinton and her relations to the "Islamic State" on "The Political Insider"

To analyze the cognitive patterns of the commenting users, we apply quantitative and qualitative content analysis [31] of posts in social media. In order to create the appropriate categories for the content analysis, we applied both, inductive (or conventional) as well as deductive (or directed) measures [16][29]. By applying the conventional approach with a first and preliminary analysis of comments concerning the two cases, we defined the first codes; and we arrived at codes while studying relevant published literature. Every comment or reply was coded with only one (the best fitting) category. The coding process was conducted by two of the article's authors, whereas all steps were conducted intellectually. In a first round, the coders worked independently; in a second round, the (few) disagreements became discussed and solved. In the end, there was an inter-coder consistency of 100 %.

Our approach is similar to research in microhistory describing posts and comments on social networking services in order to find information on historically relevant—especially local—events and developments [51][52]. Similar to our approach, Walter et al. [58] studied user comments in echo chambers concerning the topic of climate change. Gilbert et al. [22] defined agreement as manifestation of an echo chamber. They found that about 39% of all comments agree with the blog author, 11% disagree and half of all commentators react in other ways.

Figure 12.4: Disclosure of the fake news on van der Bellen's health on Vienna.at's Facebook page

For case study 1, we consulted a weblog (*The Political Insider*, a right-wing oriented web site) (N = 43), Reddit's subreddits *r/The_Donald* (a forum "for Trump supporters only") (N = 177) and *r/worldpolitics* (a "free speech political subreddit") (N = 246). For case study 2, we worked with a combined set of comments on Facebook published via *Der Standard* (the Facebook page of a leading Austrian daily newspaper) and *Vienna.at* (the Facebook site of Vienna's city portal), both dated of August 31, 2016 (N = 186). We checked all comments and all replies to the comments manually. Analyzing literature and empirical material, we found different patterns of information behavior in response to fake news and deceptions and applied them as codes for our content analysis:

--- Confirmation [4][20][22][46]: broad agreement with post, attempt of verification [55],
--- Denial [4][20][22][46][58]: broad disagreement with post, attempt of falsification,
--- Moral Outrage: questioning the posts, comments and replies from a moral point of view,
--- New Rumor: creation of a new probably false proposition,
--- Satire: satirical, ironic or sarcastic text,
--- Off Topic: ignoring the discussion, arguing on other topics, broad generalization,
--- Insult: defamation of other people or groups,
--- "Meta" Comment/Reply: discussing the style of another post, offense against a commentator.

Additionally, we evaluated the topic-specific orientation (positive, negative, and neutral—similar to the values of sentiment analysis [53]) for all texts. Positive means an articulated or implicated agreement with the original post. If a comment, for instance, argues, "Clinton should be arrested" in response to the post "Hillary Clinton sold weapons to ISIS," it is

counted as positive. Neutral means that there is no relation to the concrete topic of the triggering post, e.g., “Obama is born in Kenya” as a comment on “Clinton sold weapons.” We aggregated all generations of replies (replies to a comment, replies to a reply, etc.) into the code “reply.”

12.5.2 Results

Concerning our case study no. 1, most comments on *The Political Insider* are confirmations of the (false) proposition; likewise, the comments’ orientation is predominantly positive (Table 12.1a). In both analyzed subreddits most comments (about 40 to 50 %) and even more replies (about 70 to 80 %) are off topic (Table 12.1b and 12.1c). In the subreddit *r/The_Donald* we found about 40 % agreement with the fake proposition for the comments; however, only 8 % for the replies.

About half of the comments in *r/The_Donald* expresses a neutral orientation; and the other half a positive one; while most of the replies were neutral. Most comments and more than 80 % of the replies in *r/worldpolitics* are off topic and express no orientation concerning the given topic (i.e., the triggering post). The authors of *r/worldpolitics* are more critical than those of *r/The_Donald* as about 30 % of all comments were classified as denial (in contrast to 0 % in *r/The_Donald*).

The dominating cognitive patterns are arguments being *off topic*. The very first comment on *r/worldpolitics* was “time to put up or shut up,” which diverse authors regarded as an invitation to speculate on different political topics with loose or no relationship to the content of the post. We can find rather senseless texts as, e.g., “LOL who knew,” “Holy shit!!” or “Trump was right all along” (all from *r/The_Donald*). However, most of the off-topic comments and replies pursue a similar tendency, most notably attacking Obama and praising Trump in *r/The_Donald* or discussing the DNC (Democratic National Committee) in *r/worldpolitics.*

Sometimes, commentators are dissatisfied with the discussion and argue from a *meta position* as “I’m really not interested in engaging in a totally off-topic argument with you” (*r/worldpolitics*).

Some (however few) comments are *insults*, as, for instance, “Yet more proof that the people at the very top are, for all practical purposes, gangsters” (*r/worldpolitics*), “Obama is a piece of shit Globalist muslim” or “Aw, come on. Whadya expect from a fuckin’ Kenyan ‘born’ in Hawaii, raised in Indonesia, programmed and sponsored by the Saudi Manchurian School for Gifted Leftists?” (both from *r/The_Donald*).

Here, further cognitive patterns come into play: the construction of a *new rumor.* “The Hawaiian birth certificate (of Obama, a/n) was proven to be a forgery.” “Obama’s entire life is pure fiction, a 100% CIA creation.” “Hillary is the Mother of ISIS.” “They (Obama and Clinton, a/n) wanted this war in Syria, they wanted the refugee influx” (all from *r/The_Donald*).

Some *confirmations* (of the fakes) can be considered to be influenced by priming. For certain authors, Wikileaks is a very serious source; and they believe everything what Wikileaks publishes. “I don’t know what we’d do without Wikileaks?” or “Julian Rules. Thank you Wiki Leaks!” (both from *The Political Insider*).

In the subreddit *r/worldpolitics* (but next to nothing in *The Political Insider* and *r/The_Donald*) we found critical *denials* of the fake news as, for instance, “get suspicious when it’s only niche websites reporting stuff like this. If there were real evidence, every conservative site would make a front page” or “1700 mails about Libya proof that Hillary sold weapons to Isis in Syria? I don’t mean to comment on the allegations but I hate it when headlines are clearly bullshit.”

Table 12.1: Users’ cognitive patterns in reaction on a deception
(Case study 1: Hillary Clinton sold weapons to ISIS)

a) *The Political Insider*. Post: “Wikileaks CONFIRMS Hillary Sold Weapons to ISIS... Then Drops Another BOMBSHELL! Breaking News”

Cognitive Pattern	*Comments*	*Replies*
Confirmation	33.3 %	23.1 %
Denial	3.3 %	---
Moral Outrage	3.3 %	---
New Rumor	13.3 %	15.4 %
Satire	---	---
Off Topic	26.6 %	61.5 %
Insult	20.6 %	---
“Meta”	---	---
Positive Orientation	73.3 %	46.2 %
Negative Orientation	3.3 %	---
Neutral Orientation	23.3 %	53.8 %
N	*30*	*13*

b) *r/The_Donald*. Post: "Breaking Assange: Obama & Clinton not only supplied ISIS with a billion dollars worth of weapons annually, they paid these mercenaries salaries! Obama employed ISIS... let it sink in. Obama was the real leader of ISIS!"

Cognitive Pattern	*Comments*	*Replies*
Confirmation	40.8 %	7.9 %
Denial	---	4.0 %
Moral Outrage	---	---
New Rumor	5.3 %	5.0 %
Satire	1.3 %	2.0 %
Off Topic	47.4 %	78.2 %
Insult	5.3 %	3.0 %
"Meta"	---	---
Positive Orientation	48.7 %	11.9 %
Negative Orientation	---	5.0 %
Neutral Orientation	51.3 %	83.2 %
N	*76*	*101*

c) *r/worldpolitics*. Post: "Julian Assange: '1,700 emails' proves Hillary Clinton sold weapons to ISIS in Syria."

Cognitive Pattern	*Comments*	*Replies*
Confirmation	12.5 %	9.1 %
Denial	29.2 %	6.1 %
Moral Outrage	---	1.0 %
New Rumor	2.1 %	0.5 %
Satire	4.2 %	0.5 %
Off Topic	43.8 %	72.2 %
Insult	2.1 %	0.5 %
"Meta"	6.3 %	10.1 %
Positive Orientation	14.6 %	9.6 %
Negative Orientation	31.3 %	6.6 %
Neutral Orientation	54.2 %	83.8 %
N	*48*	*198*

We come to the second case study (Table 12.2). There is a clear result for the orientation. Most comments as well as replies are neutral, some are positive, and only a few are negative. (Please, have in mind that "positive" here means that the user likes that the fake is disclosed.) Concerning the cognitive patterns of the commenting and replying users, we identified differences. There are much more off topic replies (59.0% in contrast to only 35.9% in comments). We could find moral outrages in 28.2% of all comments, but only in 8.4% of the replies. Satire and the creation

of a (possible) new rumor happens more in comments than in replies; insults by contrast more in replies (here, the users additionally have the chance to attack the commentators).

Similar to case study no. 1, here also the most frequent patterns of comments and replies are arguing *off topic* including generalizations and digressions. For instance, a user makes comparisons to a non-involved politician. “Lately, I remember Jörg Haider again and again. His personal preferences were known to politicians and journalists, but were NOT made public.” That is a very general proposition: “Even a politician is a human being.”

The second most frequent patterns are *moral outrages*. “It is really sad that people acting in public have to justify their state of health because every effort is made to make them look bad.” Or, “It is embarrassing for Austria that you have to break the legal doctor-patient confidentiality in order to be able to resist malicious accusations.” Finally, “I think it is to feel embarrassed for somebody (zum Fremdschämen) that such measures need to be taken. ... There are limits, and to claim that someone is sick to death, only to gain a political advantage, is disgraceful (letztklassig)!”

Table 12.2: Users’ cognitive patterns in reaction on the disclosure of a deception (Case study 2: van der Bellen’s cancer)

Post: Der Standard: “Der is super beinand;” Vienna.at: “Es besteht kein Grund zur Sorge.” [“He is super healthy;” “There is no need to worry”.]

Cognitive Pattern	*Comments*	*Replies*
Confirmation	3.9 %	6.0 %
Denial	9.6 %	7.2 %
Moral Outrage	28.2 %	8.4 %
New Rumor	7.8 %	2.4 %
Satire	12.6 %	3.6 %
Off Topic	35.9 %	59.0 %
Insult	1.9 %	6.0 %
“Meta”	---	7.2 %
Positive Orientation	31.1 %	15.7 %
Negative Orientation	14.6 %	7.2 %
Neutral Orientation	54.3 %	77.1 %
N	*103*	*83*

Some users reacted with *satirical* or ironical comments, e.g., “Could I also find out information about Hofer (the other candidate for presidency, a/n)? It would be because of comparability (Wegen der Vergleichbarkeit warat’s). The author himself points out that his comment is meant satirical: “Be careful, this comment may contain traces of irony.” A user makes a joke on smoking

and its consequences for health, as van der Bellen is a smoker. “Apparently, many previous findings are wrong ... Being a chain-smoker is not unhealthy 😷.” As the deception is disclosed, a user states, “Uh-oh. Now many new lies have to come up.”

Indeed, there are *new rumors* following the original, actually disclosed deception. There are constructions of new fakes concerning van der Bellen, and fakes on the opposite party. This user does not trust in the disclosure of the original fake, as doctors are called corrupt, “We all know how quickly doctors say or do something, if you kindly ask them ...” Here comes a new deception: “VdB (van der Bellen, a/n) did not get cancer—obviously a member of the illuminati.” Another user starts a rumor on Mr. Strache, a member of van der Bellens’ opposite party FPÖ, “Where is the negative cocaine finding of HC Strache?

We found *insults* mainly in replies. “What else could one expect from the blue (FPÖ, a/n) and stupid breed? Hater gonna hate, I’d say (Was will man von der blauen und beschränkten Brut auch anderes erwarten. Hater gonna hate, würd ich mal sagen).” Some insults are addressed personally to one single commentator, “MM (name omitted), and you do not miss a leg (as Mr. Hofer has an injured leg, a/n) but a lot of brain.”

Some replies argue from a *meta level*, discussing not the topic, but the comment or the commentator, e.g., “Sadly, one has to think about such a comment to identify it as sarcasm.” Some other replies start a discussion with a comment’s author, “Does that matter play any role regarding his qualification as Federal President, Mr. XY?” Of course, there are also, however relatively few, comments and replies following the patterns of confirmation and denial. This is a typically *agreement:* “Good education, likeable person, healthy and able to climb a mountain (kommt an Berg rauf). There has never been a better presidential candidate.” A rhetorically very interesting comment (however, only in Austrian German) is this *denial*: “I’m glad that he (van der Bellen, a/n) is very healthy. However, he should get his brain checked. If he thinks that ‘Islamization in Europe’ does not bother him, then he has an injury in his head ;) (Das freut mich, dass er pumperlgesund ist. Nur sollt er sich das Hirn untersuchen lassen. Wenn er meint ‘die Islamisierung in Europa’ stört ihn nicht, dann hat er fix a Della in da Jodldosn).”

12.5.3 Analysis

What can we learn from our two case studies? Do users indeed live inside an echo chamber? The answer depends on the concrete operationalization of “echo chamber.”

If we narrowly define this concept as a community with high confirmation rates (in our case: for fake news) in combination with high degrees of positive topic-specific orientation (and further with the creation of new rumors with the same direction as the original fake), there are indeed

hints for the existence of such communities. A third of the commentators of *The Political Insider* and about two fifth of the commenting audience of *r/The_Donald* seem to argue inside their echo chamber.

However, we can define "echo chamber" broader. As we know from the texts that off-topic comments and most of the neutral-orientation texts argue in the same direction as the entire community, the filter bubble may include most of these comments and replies: The content of the specific (false) proposition is entirely clear and taken for granted, so users lose the specific thread (from the triggering post); however, they do not lose the (ideological or political) direction. In the sense of this broad definition, depending on the source, up to about 90 % of comments (sum of confirmations and off topic comments) in *r/The_Donald*, about 60 % in *The Political Insider*, and about 55 % in *r/worldpolitics* exhibit hints towards the existence of echo chambers in those social media channels. Even when the fake in case study no. 2 is disclosed, still 10 % of the analyzed Austrian audience refuses to believe that it really was a false proposition. Obviously, this minority unteachable rests inside an echo chamber.

12.6 Conclusion

12.6.1 Main results

As the c*orrespondence theory of truth* is not applicable in mediated contexts [38], there remain truth theories which heavily depend on the community (consensus theory) and on the coherence of propositions (coherence theory), but do not point to *the* truth [59]. *Algorithms* (and their mechanisms to form filter bubbles) applied in social media themselves do not form communities alone; however, they amplify users' information behavior. The crucial element of fake news and deceptions and their ways into social media is mainly on the individual *users*, their cognitive patterns and their surrounding echo chamber.

Reading (fake) news and eventually drafting a comment or a reply may be the result of users' selective exposure to information [20][46], leading to prefer news (including fake news) fitting their pre-existing opinions. Taking the (false) proposition as given, uncritically discussing it, while ignoring other opinions, argue further off topic (however, always in the same direction) thus can form and stabilize an echo chamber. In contrast to some empirical findings on echo chambers [17][21][39], we found clear hints for the existence of such communities. Depending on the concrete operationalization of "echo chamber," about one third to two fifth (narrow definition) and more than half of all analyzed comments and replies (broad definition) can be located inside an echo chamber.

Confirmative information behavior on fake news or deceptions goes hand in hand with the consensus and the coherence theory of truth. The (in the sense of the correspondence theory of truth basically false) proposition will be accepted "by normative social influence or by the coherence with the system of beliefs of the individual" [4, p. 2]. This behavior leads directly to a confirmation bias. Our results are predominantly in line with the theory of selective exposure of information.

However, it is not possible to explain all information behavior following fake news with the theory of selective exposure, but with a variety of further individual cognitive patterns. We were able to identify cognitive patterns outside of echo chambers as denial, moral outrage, and satire—all in all patterns of critical information behavior.

12.6.2 Limitations

This study has (as every scientific endeavor) *limitations*. In the empirical part of the study, we analyzed comments and replies on comments on social media. The publication of a comment or a reply on an online medium follows a decision-making process (should I indeed write a comment or a reply?). With our method, we are only able to gather data on individuals who have written such a text; all other remain unconsidered. We did not talk to the commenting and replying individuals. Therefore, we were not able to ask for intellectual backgrounds, motivations, and demographic details of the commentators.

We applied only two case studies. So, the extent of the empirical data is rather limited. Although we collected and intellectually coded some hundreds of texts, that is like a drop in the bucket when faced with millions of posts, comments, and replies on social media.

A serious methodological problem (not only ours, but of all research relying on data from the internet) is the availability of complete data sets on, for instance, a fake news and *all* the comments and replies on the fake news as users and website administrators often delete discriminating posts, comments, or replies. We found hints for deleted comments or replies on *Facebook* as well as on *Reddit.* In lucky cases (as in our case study no. 1 the post and the comments of the *The Political Insider*) you will find some deleted data on web archives.

We only analyzed texts on fake news in order to find cognitive reaction patterns. Research should also study in an analogous way, reactions on true propositions. Are there the same cognitive patterns?

We distinguished between comments and replies and arrived at different cognitive patterns of the respective authors. Are there indeed different cognitive patterns while writing posts, formulating comments, and phrasing replies to the comments?

12.6.3 Outlook

What is new in this paper? As algorithms (as, for instance, Facebook's ranking algorithm) only amplify users' information behavior, it is on the individuals themselves to accept or to deny fake news and denials uncritically, try to verify or to falsify them, ignore them, argue off topic, write satire, or insult other users. If filter bubbles are made by algorithms and echo chambers by users, the echo chambers influence the filter bubbles; however, filter bubbles strengthen existing echo chambers as well.

There are different cognitive patterns of the individual user leading to different reactions on fake news and deceptions. Living in echo chambers (namely the uncritical accepting of the news due to own pre-existing opinions shared within a group or compared with a set of propositions) indeed is a typical, but not the only cognitive pattern.

Therefore, a "critical user" seems to be the decisive factor in identifying and preventing fake news and deceptions. Our analysis at the beginning of this paper has shown that there is no satisfying answer to what can be considered *the* truth in media. In the end—and this is in line with Chisholm's definition of knowledge [8]—it is just a critical user who compares sources and validates the timeliness and evidence of a contribution before believing, denying, or ignoring it and then decides whether it is true or false. So, finally, it is on the individual user's critical literacy, information literacy, digital literacy, and media literacy. However, this is another research project.

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13 Discussion and Conclusion

13.1 Research questions and results

Information science research introduced in this cumulative dissertation puts information behavior and social media user's information horizon into focus as part of our evolving information era. Social media provides several opportunities for scientific analysis and is therefore heavily investigated by various disciplines such as information science, social computing, and human-computer interaction research (e.g., Fietkiewicz et al., 2016; Schumann & Stock, 2014). Information behavior and social media for this dissertation were approached for varying contexts (Courtright, 2007) and contemporary essential aspects, ranging from live streaming services with implemented gamification elements, to gender as an aspect for (anonymous) social media usage, and the acceptance of fake news and echo chamber formation on social media services. Adjacent, the information horizon and needs of asylum seekers were analyzed. Answering the proposed overarching research theme – what is the information behavior and information horizon of social media users? – the subsequent sections describe the results and tie them together, followed by contributions, implications, limitations, future research avenues, and an outlook from an information science perspective.

Part I: Information behavior and gamification on live streaming services

RQ1: What is the information behavior of users on live streaming services? What role does gamification play?

This dissertation started with a holistic framework to analyze the information behavior on an information system – live streaming services, the new social media (*Chapter 2*). As prosumers on live streaming services, people can be consumer, participant, or producer, even at the same time, and change roles depending on the circumstances. The model incorporates established theoretical foundations from various perspectives such as communications (the Lasswell formula), media analysis (Uses & Gratifications theory), users' motivation (Self-Determination theory, flow, gamification), and information science (ISE model). Empirical observational research and statistical data processing on users' information behavior (streamers and viewers alike) can be conducted by applying the framework. Further, the framework can be extended and adapted to analyze various social media services.

Accordingly, live streaming services revolutionize the way we interact with each other (*Chapter 5*). A framework was developed based on a comprehensive literature review on live streaming

usage to showcase this revolution. This observed way of interaction has been part of many people's daily lives, due to changing circumstances in the world (e.g., remote work and online school). Some people may never meet their co-workers or classmates in real-life but still interact with them on a regular basis. Would this be considered as parasocial interaction or parasocial relationship? Certainly not. Therefore, a new concept was needed to name this kind of behavior: Cyber social interaction and cyber social relationship. We are observing a new type of information behavior.

Information behavior and motivation is fostered through gamification, and various gamification elements could be identified on live streaming services (*Chapter 3* & *Chapter 4*). Here, the studies focused on live streaming applications on the web and on mobile apps respectively. The key findings indicate that many successful live streaming services are, one, popular in China (and extended, East-Asia), and two, employ a wide variety of gamification elements. The majority of the popular Chinese services implement most of the investigated game mechanics. We find that services popular in the West (e.g., Facebook Live, YouTube Live) apply relatively few gamification elements (except for Twitch and YouNow).

Part II: Asylum seekers' information horizons

RQ2: What is the information horizon of asylum seekers? What is their information need and how do they use media and ICT to satisfy those needs?

Based on literature review (*Chapter 6*), survey as well as interview methodology (*Chapter 7*), it was revealed that information is crucial for asylum seekers during the integration process. Several ICT, online, traditional media, and social media are applied to search for information, to socialize, be entertained and present oneself. The information needs could be broken down into categories, e.g., language learning, education and employment, or health. Also, information practices were described, particular to asylum seekers as well as problems faced by them. For example, when looking for information, some may compare received news with family back home to determine its credibility. Further, some are actively looking for news about their home country while some want to avoid all related information due to painful memories.

It is suggested that there exists age- and gender-dependent variations. This could be observed for several aspects, such as ICT ownership, ICT skills, preferred information types, and information production behavior. For example, adults seem to focus on aspects such as learning a language, caring for their children, where men are more concerned about finding employment. Children focus on information related to homework, and mainly use their smartphone for various purposes instead of other ICTs.

Part III: Gender aspects of information behavior and information horizons

RQ3: Can gender-dependent differences be observed in the information behavior and information horizon of (anonymous) social media users?

When we speak of context in information behavior research and users' information horizons, the demographic background is one important aspect, and here, the focus lies on gender-dependent observations. This was approached from varying perspectives and social media services to get a broader understanding on to what extent the user's gender could impact the behavior on social media services. Further, the investigated services were considered as part of the users' information horizons, i.e., how the user may shape the social media service and its content based on their behavior. The perception depending on the users' gender of two services, the live streaming service YouNow and its gamification elements (*Chapter 8*), as well as Reddit as an (anonymous) news service (*Chapter 9*) were investigated, and anonymous expressions of women on China's micro-blogging service Weibo analyzed (*Chapter 10*).

Summarizing the findings of *Chapter 8*, live streaming services as part of users' information horizons and motivating aspects to use these services, i.e., gamification, it was observed that female streamers are slightly more motivated by gamification elements on the live streaming service YouNow than male streamers. Female streamers enjoy the approval of their viewers, as is observed by their favoring of likes and fans. They also enjoy competitive gamification elements such as levels, badges, and the progress bar in contrast to male streamers who find coins, gifts, and levels more desirable. Therefore, live streaming services should implement a wide range of gamification elements to keep streamers motivated, since overall, male and female streamers are highly motivated by gamification elements on YouNow.

Chapter 9 gave insights into the usage and approval of the anonymous social news service Reddit as part of users' information horizons. The investigation revealed that there seem to be no major differences in the usage of Reddit if the users' gender is concerned. Slight differences are that male users seem more motivated to use Reddit to search for information than female users and apply the advanced search options, whereas female users prefer Reddit for socialization. Both, male and female participants, value Reddits informative, entertaining and easy to read content. It is obvious that social news systems can benefit from the user-generated content, i.e., information production and user base.

Moving on to *Chapter 10*, women are able to express themselves anonymously through an information broker, and several issues that they experience in their daily lives were observed. The mostly negative experiences that were shared are related to domestic violence and cheating. By sharing their experiences, they may be able to expand other users' information

horizons on specific issues and in return, expand their own information horizon by receiving information of other women experiencing similar issues. The advantage of choosing anonymous social media as case studies for gender-dependent differences is that people may be more open in expressing themselves. Gender norms (*Chapter 9*) and cultural restrictions (*Chapter 10*) as perceived by the users may be mitigated.

Part IV: Fake news and information horizons

RQ4: How do users handle fake news as part of their information horizons?

On social media, people are able to read and disseminate news. It is also observed that the (metaphorical) echo chambers and filter bubbles can be a resulting effect. To investigate how users handle fake news as part of their information horizons, two empirical studies were conducted. The empirical part of *Chapter 11* revealed that the source is believed more than the content, even if the content was not true or seemed exaggerated. Following this, *Chapter 12* reveals that social media users present particular cognitive patterns. Only accepting news as fact if they fit pre-existing opinions shared within a group is a typical example. Therefore, algorithms act based on the user's information behavior – presenting news that fit a narrative. This form of information behavior can result in an echo chamber where similar held believes are shared.

A major key finding for both studies is the observation that truth lies in the eye of the beholder when it comes to fake news. It can be especially difficult to determine the truth on social media as many people interact at the same time. Further, people may use one of the truth theories depending on the situation.

13.2 Contributions and implications

Multiple contributions of this research compendium to the field of information science have been made (e.g., also based on citations of some included publications). This research compendium is split into four parts which relate to each other under the umbrella of information behavior in information science research to investigate social media users' behavior. The four foci were chosen as they represent contemporary important facets of our current information era: the simultaneous information production and reception on the new social media, live streaming services, and the role of gamification elements; the influx of asylum seekers during the European migrant crisis and their information needs in a new home country; gender-aspects of social media users; and the dissemination of fake news on social media and the users' role in this process. A mixed method approach was used to investigate social media users and setting the used methods into a broader context. In the following, the contributions and implications of this dissertation are described.

In part 1, live streaming services were positioned as a new important research area for information science, considering particular characteristics and mechanics, and influence on the user's information behavior (Scheibe et al., 2016). Following, a model for information behavior research on live streaming services was introduced (*Chapter 2*); the importance of gamification elements on live streaming services was empirically investigated for web and mobile applications (*Chapter 3*, *Chapter 4*); a framework for the human-human information behavior on live streaming services, introducing a new concept – cyber social interactions, was proposed for the first time (*Chapter 5*). Based on these insights, the following implications can be made:

(1) Gamification is implemented on several (motivational) information systems, but with varying success (Koivisto & Hamari, 2019). However, they seem to be especially effective on live streaming services. Based on our observations, special attention should be paid to Chinese, and extended, East-Asian live streaming services as several gamification elements were observed there in contrast to Western markets. When implementing gamification elements, the target audience has to be considered to provide users with information systems based on their needs.
(2) There may be a correlation between the success of live streaming services, the culture, gamification elements, and cyber social interactions in relation to information behavior. Information science scholars should investigate this phenomenon further to deepen our understanding on this new type of information behavior.

For part 2, we find that information horizons of asylum seekers change with their new circumstances and we defined their corresponding information needs accordingly (*Chapter 6*); further, we empirically investigated asylum seekers ICT and (social) media usage for information, entertainment, socialization, and self-presentation (*Chapter 7*). Owing to these observations, it can be concluded that:

(3) It is crucial to support asylum seekers in their information practices, every step of the (sometimes) long winded integration process to help them establish a new life. Practitioners and researchers can work together to implement support strategies by further analyzing the information needs.
(4) Asylum seekers who came from countries where ICT skills are not regarded as important (yet) or came from rural areas or who simply perceive the Internet as dangerous, need further assistance. Teaching ICT and digital literacy skills, similar to integration and language courses, are one suggestion. Here, the role of information professionals can be directly considered to offer courses at schools or libraries.

(5) It is important to keep age- and gender-dependent variations in mind. As a first insight, this study showed that different groups have distinct information needs and skills.
(6) Immigration offices and non-government organizations employ social media to reach asylum seekers (United Nations High Commissioner for Refugees, 2016), similar initiatives should be considered by such institutions and provide asylum seekers with access to these sources, e.g., through immigration offices or first-contact points.

For part 3, the social aspects of gender-based behavior on social media was empirically investigated, showcasing a lack of data for these research objectives. Users, depending on their gender, use the anonymous social media service Reddit similarly, contrary to findings on non-anonymous social media (*Chapter 8*). Further, anonymous expression through an information broker on social media in a culture where free expression is restricted is made possible (*Chapter 9*). Additionally, first insights were made into favored gamification elements by YouNow users depending on their gender (*Chapter 10*). Considering these observations, the implications are:

(7) (Anonymous) social media services have an impact on the information behavior of the users depending on their gender. Therefore, it should be considered to use data from such platforms, depending on the research aim, to observe credible gender-dependent results. As the corresponding study showed that users apply anonymous services, in this case, Reddit, similarly.
(8) A new form of information behavior where influencers act as information brokers has been observed, especially in a culture where open expression seems to be restrained. Therefore, being able to express oneself anonymously through information brokers may be a way to open up opportunities for discussions of important issues. Further, it is possible to study this information behavior, deepening our understanding on these first insights.
(9) The implication that users respond differently to gamification elements based on their gender was observed for live streaming services (Koivisto & Hamari, 2014). Tying these results back to observations of part 1, these are further considerations for the development of information systems.

Part 4 showed that people may be inclined to trust sources more than the content (*Chapter 11*); and algorithms may not be at fault for creating echo chambers, it can be tied back to the user's information behavior (*Chapter 12*). Implications that are therefore observed are:

(10) The critical user is able to differentiate between fake news and credible news by comparing sources, validating timelines and evidence before believing or denying whether something is true or not. It is crucial to know which truth theory one

(probably intuitively) follows. Many solutions are proposed (Aïmeur et al., 2023), but if it comes back to the user, suggested tools are information literacy, digital literacy, and media literacy – established concepts of information science. Information practitioners and professionals should offer courses to teach these crucial skills.

Now, looking at the results of this dissertation as a whole and as an important part of information science research, further considerations and implications are possible. Of course, this dissertation was only able to shed light on a few aspects of social media usage and cannot exhaustingly approach every angle, as social media presents a vast landscape with many different services, users, and opportunities. However, some suggestions can be made:

(11) As an extension to our current theoretical understanding in information science research, information production needs to be considered when talking about the information horizons framework. This was proposed and partly proven for the first time with this dissertation. Scholars should incorporate this approach when conducting information science research and applying the information horizons framework to adequately reflect information practices of our times. This has since been observed for other research models of information behavior and information science research as well (e.g., Schumann & Stock, 2014; Savolainen & Thomson, 2022).

(12) Social media offers rich data for information behavior research with its constant changing landscape and resulting user behavior. Information science research offers tools to investigate these changes, ranging from several methods such as survey, interview, case study, content analysis and information system analysis as proposed with this dissertation and should be further considered for research on the information behavior of social media users (Quan & Haase, 2017).

(13) Context and situation of the users, matter. The information behavior of users will present differently depending on their context. Being it the gender of the person, if they are able to be anonymous or find themselves in changing circumstances.

(14) The particular information systems and social media services influence this – synchronous interactions and resulting information behavior, and certain mechanics such as gamification may be reasons why information systems are catapulted into leading economic driving forces, as was observed with live streaming services.

(15) Social media is part of people's information horizons which is directly shaped and influenced by their respective information behavior. This is obvious with the dissemination of fake news. Social media users need to be aware how important their information (search and production) behavior is, especially in light of the great debate on the influence of fake news on aspects such as democracy.

13.3 Limitations

Although described in detail for each respective study, several limitations of this work need to be mentioned. Overall, the results only provide a snapshot of the information behavior of social media users and their resulting information horizon. As a research compendium, these were only a few exemplary case studies and cannot explain all social media services and the varying contexts of users. Further, the studies in this work were conducted in English, and involving majorly English- or German-speaking participants and English literature. It was reported on cultural aspects in China (Chapters 3, 4, 10) and of asylum seekers from the Middle East (Chapters 6, 7), but analyzing the results through a Western point of view, even though native Chinese and Arabic speakers were involved in the research endeavors at varying points.

Looking at the first part of this dissertation, the pre-selection of the live streaming services and gamification elements could have influenced the results. For example, services from areas such as South America or Africa were not considered due to missing availability. The studies of the second part of this dissertation concerned a literature review and interviews. The pre-selection of the literature could have influenced the results, e.g., only papers relevant for the integration process were selected. The empirical part was conducted with a small pool of participants. Also, the asylum seekers participating in the research study possessed advanced German skills and were a certain age range (school children to middle-aged adults), resulting in an even smaller sample of asylum seekers. Coming to the third part, gender results were only analyzed for male and female participants. Note, however, that all participants stated their gender-identity themselves. YouNow served as a case study to determine the gender-dependent differences based on a survey. Other live streaming services may yield different results. Further, a small number of participants took part in the survey. Additionally, all participants are from Germany and the U.S., providing only a certain cultural sample, which was also the case for the analysis of Reddit. Consequently, the study of Chinese women on Weibo also focuses on one culture and a limited number of posts could be manually analyzed. For the analysis of both fake news studies in the fourth part, two posts and four news stories were selected as case studies and the survey distributed in Germany, which could result in a certain bias.

13.4 Future research avenues

Concentrating on additional aspects of user's context could yield interesting results considering information behavior and the information horizons framework. Looking at the results of part one, it is important to understand cultural differences in the acceptance of gamification elements – why are they successful in East-Asia and why do people not respond to them as strongly in the West? Interviews with developers could gain insights into this phenomenon. It

was observed that female users are slightly more motivated by gamification elements, even on a Western-market live streaming platform. Does this correlate with live streaming services elsewhere? Further, younger users such as generation Z seem to be the largest user base of live streaming services. Could this mean that age is dependent for the acceptance of gamification elements? The proposed information behavior model of users on live streaming services can serve as a basis for extensive empirical research, also keeping cyber social relations in mind. Coming to the second part of this dissertation, it would be interesting to analyze how much the information behavior changes the farther in the integration process asylum seekers are and if they adapt to the new home countries' information behavior (if a specific behavior can be detected). It was observed how there exist differences in the application of ICT and (social) media for different age groups and gender if asylum seekers are concerned, but how is this changing with the times? How broad is the digital divide still? For the third part, Reddit as an anonymous social media service showed interesting results in the behavior of the users depending on their gender. Further research should investigate the phenomenon of anonymous social media usage and if these results are applicable to similar anonymous services such as, e.g., the anonymous mobile app Jodel. Concerning anonymous expression through an information broker on Weibo, the comments provided on the expressed issues could serve as a basis for the information behavior analysis of readers. Comparing anonymous expressions on social media such as Reddit and Weibo, could yield interesting results as well. Further, socio-economic factors should be considered as rural and working-class women did not seem to use Weibo to express themselves. Concerning user's information behavior with fake news, it would be compelling to see if case studies from other regions would yield similar results – what are the cognitive processes and information behavior in other parts of the world when interacting with fake news? Finally, the extended information horizons framework proposed in this research compendium can serve other researchers for deepening our understanding on the interplay of information production and information search behavior as part of our information behavior and information horizons on social media. How does my information behavior on social media influence other users information horizons and their information behavior, and vice versa?

13.5 Outlook

With the advent of social media, information production became a crucial aspect of information behavior in information science research (Wilson, 2022). This dissertation displayed, for the first time, how important the consideration of user's information production in conjunction with the information horizons framework is. Social media needs to be constantly investigated to keep up with the ever-changing landscape. How does the user's behavior adapt to these changes? Sonnenwald (1999) already proposed similar questions, mirroring crucial themes in information

science research (Stock & Stock, 2013):

> "How can systems provide integrated access to the variety of information resources typically found in an information horizon? What do resources need to know about each other? What do resources need to know about the individual, social network, situation and context? How can solutions be made visible or accessible to individuals?" (Sonnenwald, 1999, p. 10)

The information horizons framework can serve to identify holes in the information exchange process and interplay of sources – what information is missing? Social media makes a lot of this (missing) information visible. While people seek for information, they may also produce information. While learning, the information horizon expands and users share the learned information, produce (mis-)information and knowledge, present-themselves or build communities by sharing knowledge.

Future research may solidify the ideas presented in this dissertation or even expand the proposed framework as new technologies such as Facebook's Meta or ChatGPT emerge – they will influence how we interact with each other online and offline and how we produce content, leading to further questions. What constitutes as "information" or "content"? As the debate on fake news showcased, credible information can be considered the basis for democracy. Does Artificial Intelligence (AI) have an information horizon and if so, what is its basis or bias? How do human and AI-generated information horizons interact and influence each other? However, for now, this dissertation highlights insights into the human information horizon and information behavior. We saw that no matter what the context or situation may be, users produce content, need information, and shape their own and others' information horizons. Indeed, reflexive interaction with and provisioning of information is considered an ideal goal (Sonnenwald, 1999, p. 9), especially when producing content – bringing the responsibility back to us as mindful producers and consumers of information in the information era.

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Workshare of co-authored publications

Chapter 2: Zimmer, F., Scheibe, S., & Stock, W. G. (2018). A model for information behavior research on social live streaming services (SLSSs). In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 10914. Social Computing and Social Media. User Experience and Behavior* (pp. 429–448). Springer.

The workshare amounted to 30% and included partially the research idea, developing of the entity-relationship-model, partially writing, partially the visualization, and review and editing.

Chapter 3: Scheibe, K. & Zimmer, F. (2019). Game mechanics on social live streaming service websites. In T. X. Bui (Ed.), *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences* (pp. 1486–1495). ScholarSpace.

The workshare amounted to 40% and included partially the research idea, partially the data collection, partially the data analysis, partially writing, partially the visualization, and review and editing.

Chapter 4: Zimmer, F., Scheibe, K., & Zhang, H. (2020). Gamification on social live streaming service mobile applications. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 12194. Social Computing and Social Media. User Experience and Behavior* (pp. 184–197). Springer.

The workshare amounted to 50% and included partially the research idea, partially the data analysis, partially writing, partially the visualization, and review and editing.

Chapter 5: Stock, W. G., Scheibe, K., Fietkiewicz, K. J., & Zimmer, F. (2022). Cyber social interactions: Information behavior in between social and parasocial interactions. *Journal of Information Science Theory and Practice, 10*(3), 15-23.

The workshare amounted to 25% and included partially the research idea, partially writing, and review and editing.

Chapter 6: Scheibe, K., &, Zimmer, F. (2022). ICT and media practices for integration – A literature review. In K. Scheibe & F. Zimmer, *Asylees' ICT and Digital Media Usage: New Life – New Information?* (pp. 85–126). DeGruyter Saur. (Knowledge & Information. Studies in Information Science).

The workshare amounted to 80% and included the research idea, partially the data collection, the data analysis, writing, the visualization, and review and editing.

Chapter 7: Zimmer, F., & Scheibe, K. (2020). Age- and gender-dependent differences of asylum seekers' information behavior and online media usage. In *Proceedings of the 53rd Hawaiian International Conference on System Sciences* (pp. 2398–2407). ScholarSpace.

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Chapter 8: Scheibe, K., & Zimmer, F. (2022). Gender differences in perception of gamification elements on social live streaming services. In M. Khosrow-Pour, S. Clarke, M. E. Jennex, & A.-V. Anttiroiko (Eds.), *Research Anthology on Feminist Studies and Gender Perceptions* (pp. 405–422). IGI Global. (Original work published 2019)

The workshare amounted to 30% and included partially the research idea, partially writing, and review and editing.

Chapter 9: Scheibe, K., & Zimmer, F. (2020). User-oriented quality estimation of social news systems and its content: Gender-dependent assessment of Reddit. In G. Meiselwitz (Ed.*), Lecture Notes in Computer Science: Vol. 12194. Social Computing and Social Media. User Experience and Behavior* (pp. 636-646). Springer.

The workshare amounted to 40% and included partially the research idea, partially the data analysis, partially writing, and review and editing.

Chapter 10: Zhou, Z., Wang, Z., & Zimmer, F. (2023). Anonymous expression in an online community for women in China. In T. X. Bui (Ed.), *Proceedings of the 56th Annual Hawaii International Conference on System Sciences* (pp. 2051–2060). ScholarSpace.

The workshare amounted to 40% and included partially writing, method overview and supervisory tasks (mentoring on methodology), and review and editing.

Chapter 11: Zimmer, F., & Reich, A. (2018). What is truth? Fake news and their uncovering by the audience. In C. V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media. ECSM 2018* (pp. 374–381). Academic Conferences and Publishing International Limited.

The workshare amounted to 60% and included partially the research idea, partially the data collection, partially the data analysis, partially writing, partially the visualization, and review and editing.

Chapter 12: Zimmer, F., Scheibe, K., Stock, M., & Stock, W. G. (2019). Echo chambers and filter bubbles of fake news in social media. Man-made or produced by algorithms? In *2019 Arts, Humanities, Social Sciences & Education* (pp. 1–22). Hawaii University International Conferences.

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