

# Information Behavior on Social Media: Services, Users, and Usage

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by  
**Katrin Scheibe**  
from Dorsten, Germany

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Supervisor:  
Prof. Dr. Wolfgang G. Stock

Department of Information Science  
Heinrich Heine University Düsseldorf  
D61

1st Supervisor: Prof. Dr. Wolfgang G. Stock  
2nd Supervisor: Prof. Dr. Ágnes Veszelszki

## Abstract

Many people around the globe use social media on a daily basis. Information shared on social media can have a great impact on society. This underlines the importance of information science, and especially of studying the information behavior of social media users in the information era. The first aim of this cumulative dissertation is to present a holistic theoretical model for researching and understanding users' information behavior on social media as well as to empirically investigate the user behavior on digital media. The model can serve as a basis for scientifically explaining the interplay between information behavior and interaction patterns of social media users in regard to different user roles (producers, participants, and consumers). The model leaves room for modifications and takes into account the variety of different social media services and their manifold components. It is not static, but rather flexible and can be adapted to studies' circumstances.

To get an impression about the applicability of the model and a more comprehensive understanding of social media, their position as information platforms, their users and the users' information behavior in relation to different services, multiple empirical studies were conducted as a second aim of this work. The multiple methods approach included interview methodology, survey methodology, content analysis, sentiment analysis, and case study research. The following research questions (RQs) are answered: *(RQ 1)* What community-driven and cognitive information behavior patterns can be observed on social media? How is the user-generated content on Reddit perceived by users and how do users perceive Reddit's quality as an information system? *(RQ 2)* What impact do context, situation, and information horizon have on users' information behavior? What (information) needs of asylum seekers are satisfied through social media usage? *(RQ 3)* What is the information behavior of live streaming service users? How can we describe information behavior of and online social relations and interactions between live streaming service users? *(RQ 4)* What impact does gamification have on social live streaming service users' motivation and (information) behavior? What gender-dependent differences can be observed?

We analyzed different user groups, including live streaming service users, asylum seekers in Germany, Reddit users, and Instagram users who comment on posts of Miley Cyrus' and her fan-based Instagram accounts. Additionally, we studied the cognitive behavior of users concerning fake news, echo chambers, and filter bubbles. Especially on live streaming services we found many approaches of gamification and investigated the differences of giving and taking gamification elements, for instance gifts and subscriptions. Men prefer monetary gifts and women prefer elements that promote social interaction.

What is new in this research compendium? We developed an applicable model about social media users and usage, that also considers the users' roles and different user groups as well as their information horizon, including context and situation. It presents some of the first empirical results on asylum seekers' information needs as well as on cyber-social interactions and the information behavior of social live streaming service users, i.e., streamers and audience members.

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## 1. Introduction to Information Behavior on Social Media

Welcome to the information age – we live in an information society in which information services and thus information and communications technologies (ICTs) are integrated in most people's daily personal, social, and business life. Massive amounts of information and data surround us and are available to us everywhere, at any time through the Internet and through our smartphone. As the growth of information and data is constantly and rapidly increasing in societies of the 21<sup>st</sup> century, information science and information studies are of great importance (Stock & Stock, 2013). Information science research focuses on the search and retrieval of relevant documents as well as the representation and storage of information, while considering the context of information. Subjects of investigation include information systems, e.g., search engines, (digital) libraries, and social media (Stock, 2007), as well as the systems' users and, furthermore, scientific output. Although information science originated in the 1950s and has transformed over time as a result of the development of the knowledge society (Webster, 1995), early definitions still apply:

“Information science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It is concerned with the body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, and utilization of information. It has both a pure science component, which inquires into the subject without regard to its application, and an applied science component, which develops services and products.”

(Borko, 1968, p. 3)

As the definition demonstrates, information science is a very manifold discipline and investigates almost everything linked to information and, moreover, to knowledge (since information is knowledge put into motion). Nowadays, due to digitalization and new technologies, information science research primarily concentrates on digital documents (as carriers of knowledge and thus of information) and digital services (for creation, storage, representation, and retrieval of documents). Whenever information is stored, processed, evaluated, shared, accessible, retrievable, or information is transmitted and used, information science researchers want to know where (information services), what (information, documents), who (authors, users), when (circumstances) as well as why and how (usage, behavior) information is processed.

Because of information science's complexity and the fact that many processes and activities involve information, it has many intersections with other disciplines: “[I]nformation science is interdisciplinary in nature” (Borko, 1968; Saracevic, 1999, p. 1052). It also has its parts in, e.g., computer science (for example building services for information retrieval and information

system evaluation), economics (for example knowledge management in companies as well as information and knowledge as monetary value), pedagogy (for example transmitting knowledge in education), and library science (e.g., how to store and represent knowledge so that it can be easily found, accessed, and used) (Saracevic, 2009; Stock & Stock, 2013). Information science research is basic research (construction of theory, testing of hypothesis, production of new knowledge) and applied research (solving problems by getting new insights, sometimes applicable beyond the initial findings) (Connaway & Radford, 2017; Stock & Stock, 2013). It “nearly always orients itself on the applicability and technological feasibility of its results. As a matter of principle, it incorporates both the users and usage of its tools, systems and services” (Stock & Stock, 2013, p. V).

The cumulative dissertation at hand does exactly what is stated: By conducting empirical research and considering established theories, it seeks to understand information behavior on social media. To do so, we take a look at the interaction of users with the information systems (here, social media) and the interaction between users by taking into account the systems’ components and the users’ characteristics. First, the concepts of information behavior and social media are presented and put into context. Based on this, a holistic and comprehensive model is proposed to illustrate the building blocks of social media users’ information behavior. This contribution also encounters other disciplines throughout attempting to understand social media as an information service, for example, computer science, human-computer-interaction, social sciences, psychology, and communication science.

## **1.1 Information Behavior and Social Media**

Just like Savolainen (2007) who defines information behavior as an “umbrella concept” (p. 109), Wilson (2000) underlines the comprehensive character of the concept “information behavior” as he states, it relates to all human behavior in relation to knowledge and information and furthermore to information sources and communication technologies: “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” (p. 49). Important to note is that not only the active need and active seeking process for information is seen as information behavior, but also passive behavior and passive information consumption in everyday situations (Wilson, 2000; Case, 2007). Pettigrew, Fidel, and Bruce (2001) give a more precise definition and describe information behavior as “how people need, seek, give, and use information in different contexts, including the workplace and everyday living” (p. 44). One can also speak of information behavior as a “term of art used in library and information science to refer to a subdiscipline that

engages in a wide range of types of research conducted in order to understand the human relationship to information” (Bates, 2018, p. 2074).

Part of human information behavior research are peoples’ *information needs*, *information production* as well as *information seeking* behavior and further *information reception* and *information use*, whereby information use does not mean the use of information sources and systems, but rather the integration of newly received information into an existing knowledge base, sometimes in order to solve a problem (Spink & Cole, 2005). Information behavior depends on context and situation as well as a person’s experiences, knowledge background, and social networks which shape a person’s “information horizon” (Sonnenwald, 1999, 2005). People can only “act” inside their information horizon (Sonnenwald, 1999, 2005), thus context and situation should be considered in information behavior research.

As also illustrated in Wilson’s (1981, p. 4) well-known and widely approved model for information behavior research, some kind of need is the starting point for any kind of information seeking process (Stock & Stock, 2013). A person perceives a need for information, if one’s knowledge background is not adequate enough to achieve or satisfy a certain goal (Spink & Cole, 2004; Case & Given, 2016). However, there are basic human needs (e.g., finding food, being sheltered and loved) which have their origin in the psychology of the individual (Maslow, 1943). Information is also required to know how to satisfy the respective fundamental human needs (Stock & Stock, 2013) and thus information behavior is part of people’s perception of everyday life situations (Savolainen, 1995). It should be added that “[i]nformation also comes through serendipity, chance encounters, or when others share information that they believe may be useful to you” (Case & Given, 2016, p. 6).

Active information seeking is performed in order to fill a knowledge gap. A person may consult different sources and channels in order to seek information, including information systems, communication technologies, and asking other people in a face-to-face conversation (Johnson, 2004; Savolainen, 2016). If other people are involved and consulted as an information source, one can speak of human interaction and a reciprocity that leads to communication and a process of “information exchange” (Wilson, 1981). During information exchange, not only the information seeking person, but also the information providing person has to be taken into account: “The communication process (...) involves an author or information producer creating information products that are used by the information seeker” (Robson & Robinson, 2013, p. 184). Information creation, also termed as “information production,” and information consumption are especially performed on social media. If users on social media post content



and upload an image or video, (sometimes new) information is created and produced, if another user receives the content, one can speak of information reception or information consumption.

Social media are increasingly used as an information source (e.g., Westerman et al., 2014). For example, in academic contexts (Kim et al., 2013), to find health-related information (e.g., Sharma et al., 2017), and timely needed information during disasters and crisis (Jin et al., 2014; Liu et al., 2016). The concept "social media" relies on users and user-generated content, i.e., the active usage of the system and its features. But what drives people to use and be actively involved in social media? To understand users' information behavior on social media, it is necessary to know why people use them and also why people avoid using them, furthermore where and when social media are used, the purpose of usage and what information is gathered from social media. Generally speaking: What information behavior of social media users can be observed? What information (user-generated content) is produced and consumed on social media? What are motives to use different social media and to produce or consume content? How and why are users participating and, thus, reacting to user-generated content? What impact do features of the service and its user base have on individual users (information) behavior?

#### ***1.1.1 Social Media: Services, Users, and Usage***

Social media are Internet-based Web 2.0 services with elements of social networking sites on which users form interactive communities and are able to participate and collaborate by creating and exchanging user-generated content (Kaplan & Haenlein, 2010; Boyd & Ellison, 2007). By actively producing and passively consuming user-generated content, users act as "prosumers" (Toffler, 1980; Linde & Stock, 2011). They can shift between different user roles within the online environment (Bechmann & Lomborg, 2013). Many people use social media on a daily basis: Communicating with friends, presenting oneself, reading the news, and getting entertained. There is no longer a strict separation between the real world and the online sphere (Kaplan & Haenlein, 2010). Considering the scope of this contribution, with focus on users' information behavior and therefore information production and consumption, the following definition for social media seems appropriate: "Social media are Internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others" (Carr & Hayes, 2015, p. 50).

### **1.1.2 Social Media Services**

Social media services are versatile and are constantly adjusted (e.g., Weller, 2016). A broad variety of different types of social media is available, for example, media-sharing services, social networking services, (micro-)blogging services (Linde & Stock, 2011; Kaplan & Haenlein, 2010), and discussion forums. Each platform has its unique features and a special user base. It can be distinguished between synchronous social media (Fietkiewicz & Stock, 2019) and asynchronous social media (Khoo, 2014). While communication on synchronous social media happens in real time and is not delayed as both parties are present at the same time (e.g., streaming live on Twitch or audio discussing on Clubhouse), communication on asynchronous social media usually still happens an unspecified time after the main post was uploaded. However, an increasing number of social media services formerly understood as being asynchronous have integrated live streaming as synchronous presentation of user-generated content into their systems (e.g., Instagram Live, Facebook Live, YouTube Live).

Social live streaming services are an exceptional kind of social media in the entire spectrum, as the communication between users primarily happens in real time. Here, a new kind of information behavior can be observed (Fietkiewicz & Scheibe, 2017). Broadcasting live provides a one-to-many communication channel. However, chat messages allow a backchannel from the viewer to the streamer and among the viewers (Zimmer et al., 2018). The audience is no longer just passively watching, but can actively engage in the stream and be a part of it (Friedländer, 2017a, 2017b). Some social media services, and especially social live streaming services, apply gamification to motivate their users (Zimmer et al., 2020; Ryan & Deci, 2000a). “‘Gamification’ is the use of game design elements in non-game contexts” (Deterding et al., 2011, p. 10), including for example levels, coins, badges, and leaderboards (Zichermann & Cunningham, 2011). The game design elements are supposed to engage users to continuous usage of the service and should further encourage a desired behavior in users (Koivisto & Hamari, 2019). What impact does gamification have on user information behavior and user motivation? Live streaming services and their manifold technical features therefore are used as case study for studying users’ information behavior. But first we need to know: What is the information behavior of social live streaming service users?

### **1.1.3 Social Media Users**

Users on social media can be divided into various groups according to their demographics, including for example their gender, age as well as socio-demographic and ethnic background (Perrin, 2015; Fietkiewicz, Lins et al., 2018), and further characteristics depending on the

context, e.g., users of a specific service (like Facebook users; Knautz & Baran, 2016), kindergarten children (Gust von Loh & Henkel, 2014), and asylum seekers (Haji et al., 2020). Some groups of people tend to prefer a certain kind of social media service and are more likely to use one social media service over another (Fietkiewicz et al., 2016). One example would be the social networking services Facebook and VKontakte. While Facebook is used by many people in various countries and has reached a critical mass there, people from Russia are more likely to use the platform VKontakte as their favored social networking service (Baran & Stock, 2015). Also, ordinary social media users need to be divided from professional users (e.g., influencers, wanghongs), as they primarily use it for monetary outcomes, fame, and image representation (Fietkiewicz, Dorsch et al., 2018). According to Shao (2009), on social media are three types of users with corresponding usage motives, namely consumers, producers, and participants. Every user of social media platforms can be assigned to at least one of the presented roles. Aspects like this should be considered when studying information behavior. As mentioned earlier, an individual's information horizon (Sonnenwald, 1999, 2005) as well as their context and situation necessarily need to be taken into account when studying information behavior (Case & Given, 2016). What impact does context, situation, and information horizon have on users' information behavior?

#### **1.1.4 Social Media Usage**

According to Katz et al. (1974), who investigated the still applicable Uses and Gratifications Theory back in the 1970s, the use of media is goal-oriented and is driven by need satisfaction. For classical media consumption, the following four motives derived: information, entertainment, social identity, and self-actualization (McQuail, 1983). In human information behavior as well as in the uses and gratifications approach, the needs of an individual display an important aspect. Needs are the starting point for information production as well as information seeking and thus reception. Based on the uses and gratifications approach, the following motives in relation to social media were determined by Whiting and Williams (2013, p. 368): social interaction, information seeking, pass time, entertainment, relaxation, communicatory utility, expression of opinions, convenience utility, information sharing, and surveillance and watching of others. However, some users are motivated by deviant behavior, e.g., cyberbullying and trolling (Veszelszki, 2017).

Certain social media services (e.g., Reddit and Jodel) enable users to remain anonymous and interact without revealing their identity (De Choudhury & De, 2014; Nowak et al., 2018; Kasakowskij et al., 2018). Especially when uploading or reacting to controversial content, staying

anonymous is favored (Zhang & Kizilcec, 2014). Furthermore, information production and information sharing sometimes result in the dissemination of misinformation, also known as fake news. Some claim about the existence of filter bubbles and echo chambers (Flaxman et al., 2016; Zimmer et al., 2019). What motivates people to use social media and to seek content on social media? What is the part of a social media system's content sorting algorithm in information behavior research? Are there indeed certain community-driven cognitive information behavior patterns? We should therefore also take into account what content is produced on social media: What is the information production behavior of social media users?

## **1.2 Information Behavior on Social Media Framework and Research Questions**

The aim of this cumulative dissertation is to present a holistic theoretical model for understanding and researching user information behavior on social media. It can serve as a basis for scientifically explaining the interplay between information behavior and interaction patterns of social media users in regard to different user roles (producers, participants, and consumers). Further, it should serve as a comprehensive guideline and framework for empirically answering all kinds of information behavior related questions about social media. The model builds on a similar research framework that was initiated by Scheibe et al. (2016) and Zimmer et al. (2018) for describing information behavior on social live streaming services. However, the authors argued the model can be applied for other social media services as well.

Why is it necessary to present a framework for information behavior on social media? Social media are part of many people's everyday life and are actively used as an information source for various subjects, purposes, and needs (e.g., Westerman et al., 2014). In already established models, researchers do not consider the manifold circumstances of an information system, but rather display the several consecutive processes by focusing on the individual "steps" of information behavior and information seeking (e.g., Wilson, 1981; Ellis, 1989; Kuhlthau, 1991), however some have considered personal characteristics of users (e.g., Johnson et al. (1995) and Sonnenwald (1999) did). As Sonnenwald (2005) highlights the information behavior of a person depends on context and situation and thus differs for each information system as well as user group, the user's characteristics and system's components are integrated. In the newly presented comprehensive holistic model, the different building blocks that are necessarily present when interacting on a social media service are displayed and can be studied (e.g., What information is produced by users?). Weller (2016) highlights the constant changes in social media user interfaces and their functionalities, which makes the development of a framework about user information behavior research on social media challenging. As a consequence, the

model leaves room for modifications and takes into account the variety of different social media services and their manifold components. The model is not static, but rather flexible and can be adapted to the study's circumstances. Additional building blocks can be integrated into the model to demonstrate the context of information behavior on social media.

A new aspect in the presented framework for information behavior on social media is the representation of user roles according to Shao (2009), speaking of producers, participants, and consumers. As users can shift between user roles, they can answer questions (as participants) but also ask questions by themselves (as producers). Social media interaction through participating users' reactions and comments results in a *backchannel* and *feedback loop*, which brings us to another novel facet of the presented model. The information seeking process of a user (as consumer or participant), but also the process of information production (as producer) can be considered as the model's starting point. Most importantly to mention, for information behavior on social media, as displayed in the model, some basic elements are always consistent:

- Social media service
- Different types of users (User X = Producer; User Y = Consumer; User Y' = Participant)
- (Information) need of users
- Demographic data of users
- Users' information horizon
- Information production resulting in a publication (with its content)
- Information reception and information use which can result in participation and reception-based information production, i.e., a comment (with its content)
- Reactions (like/share or comment)
- The constant flow of information

On social media there are always producing and consuming users who have an active need. Without them there would not be such a concept as "social media." In addition to producers and consumers, whose motives are primarily self-presentation and information, respectively, there are participating users who promote social interaction and interactive behavior in online communities (Shao, 2009). The communication process on social media is characterized by the interaction between users: Users can shift between different user roles within the online environment and can act as "prosumers" (Toffler, 1980; Linde & Stock, 2011). A user's demographic background (e.g., gender and age) as well as their information needs and information horizon, which is formed by the user's experiences and knowledge, their social network, and the information seeking situation and context (Sonnenwald, 1999), all have an effect on the information behavior and therefore should be considered when examining social media users' information behavior.

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The starting point of the model (Figure 1.1) is a (perceived) need by a user. It is either the need that led to the production of information and content (need of User X) or to information seeking and the consumption of information and content (need of User Y). This is where the Self-determination Theory (Ryan & Deci, 2017) takes hold. It is a theory which displays human motivation and their needs. Without human needs there is no motivation. The satisfaction of three needs is fundamental for motivation – Autonomy (independently managing one's own actions and experiences), competence (mastering important life contexts and acting efficiently), and relatedness (belonging to a community, feeling important to others and socially connected). Motivation is “what ‘moves’ people to action” (Ryan & Deci, 2017, p. 13) and builds the leading energy for human behavior. According to Ryan and Deci (2017), it can be distinguished between three kinds of motivation, namely: intrinsic motivation, extrinsic motivation, and amotivation. Individuals' motives can be either self-determined, meaning by the acting persons themselves (intrinsic motivation), or by other circumstances, considered as nonself-determined aspects (extrinsic motivation). The possible needs of the users can be represented in a simplified manner by integrating elements of the Uses and Gratification Theory (Katz et al., 1973). The Uses and Gratifications Theory claims that media usage is goal-oriented and motivated by the satisfaction of certain uses and gratifications (Katz et al., 1974). Just like in information science, where “[a]n individual's information need is the starting point of any search for information” (Stock & Stock, 2013, p. 469), in uses and gratifications research “the ‘needs’ of the individual form the starting point” (Rosengren, 1974; McQuail & Windahl, 1993, p. 135) as well. Four central motives for media usage derived from the Uses and Gratifications Theory: information, entertainment, socialization, and personal identity (McQuail, 1983). However, for social media users the motives also apply, but socialization should be social interaction, and personal identity should be rather understood as self-expression and self-presentation (Shao, 2009).

Active information production by a user (User X) on social media results in a publication, i.e., user-generated content, and is the process of creating (sometimes new) information. The social media platform determines the type of content that can be produced and streamed or uploaded, either images, (live) video, (live) text or a mix of them. In regard to content production the sender-centered communication theory by Lasswell (1948) should be introduced. Five simple questions display possible aspects for describing media communication: “Who? Says What? To Whom? In What Channel? With What Effect?”. Later two questions were added by Braddock (1958): Firstly, “*What circumstances*” and secondly, “*What purpose*.” With these questions facets of the message and its communicator are considered. The part *What circumstances* asks for the time and setting (environment) and *What purpose* asks for the

sender's motives and objectives (Braddock, 1958). The published content of users contains some meaning (information), but further can contain deceptive information and misinformation (truthfulness), and can also have a negative or positive expression (sentiment). It is up to the consuming user (User Y) to decide what information to draw from it, whether to perceive it as true or false, and whether to perceive it as negative or positive. Content can further have a quality, either objective quality or a subjective quality perceived by the system's users (Schumann & Stock, 2014).

Social media content is sought and consumed because of a perceived (information) need. Searching on social media services can be performed by active search (i.e., using search queries in a retrieval tool), by browsing through the social media websites (starting on one page, e.g., the main page, and clicking through posts and profiles), by actively formulating questions (writing comments or posts), and by serendipity. By using social media, there has been a need to seek for certain gratifications. If gratifications are sought through (social) media, gratifications are necessarily obtained, even if it is not the gratification that initially initiated the seeking process (Palmgreen et al., 1980). The receiving user (User Y) can feel a need to react to User X's content. On social media, there is either the option to write a comment (i.e., to produce new information as well, making User Y a participant and producer (User Y'; also understood as User X now)) and also to like or share the post, which are "pre-defined communication activities" (Veszelszki, 2018, p. 426). Some social media services apply gamification elements to offer an additional form of interaction between users (e.g., giving rewards and gifts) and to encourage continuous service usage (Wolf et al., 2018), what can also result in a feeling of flow (Csíkszentmihályi, 1990). Flow is experienced if there is an optimal balance between the challenge of an activity and the skills of the performing individual. Especially when interacting with the system's gamification elements, social media users are motivated by intrinsic and extrinsic outcomes (Ryan & Deci, 2000b).

The information behavior process on social media leads to interactive behavior (as often found on social live streaming services). Producing users (User X) publish content in a social media service and User Y, as consumer, receives it or even reacts to it becoming a participant (as User Y'). Thus, if a user is a participant (User Y'), one is also a consumer (User Y). The interaction between users can be represented as a circular framework. However, the circle can terminate nearly after any performed action (displayed as dashed arrows). This can either happen because the initial social media post is not received by another user, users receive the information and consume it, but no one responds or reacts to the posting, or if the reaction of User Y' is not received by the initially producing user (User X) or does not react to it anymore.



Considering established theoretical phenomena and integrating them into the concept of information behavior of social media users, a research model was introduced. It highlights the interrelationships of this research compendium by taking into account user's characteristics and circumstances, including context, situation, and a user's information horizon. Furthermore, aspects of different social media services are integrated (e.g., algorithm, gamification). In order to emphasize the applicability of the model for information science studies, four research questions are defined. However, they reflect only a fraction of the possibilities for application of the research model:

Unlike formally published documents such as journal articles and newspaper articles, which mostly undergo quality control before being published, user-generated content on social media (almost) does not have to meet any standards or criteria before being posted (Schumann & Stock, 2014). Publications of users therefore may be bad in quality and may contain e.g., hate and trolling content (Veszelszki, 2017) as well as misinformation and deceptive information (Shin et al., 2018). When producing information and posting on social media, users imagine their community and post to an "imagined audience" (Marwick & Boyd, 2010, p. 115). Investigating information production should therefore also take into account the community and a user's network. One social information service on which users can interact in different sub-communities (called Subreddits) about various topics and users are anonymous is Reddit. Being anonymous results in being less inhibited about posting controversial content (Zhang & Kizilcec, 2014) and means a less biased production of content:

**RQ1: a.)** What community-driven and cognitive information behavior patterns can be observed on social media? **b.)** How is the user-generated content on Reddit perceived by users and how do users perceive Reddit's quality as an information system?

When investigating information behavior, a person's context and situation need to be considered as both have an impact on the behavior (Case & Given, 2016). When asylum seekers leave their home country, they experience a rapid and unexpected change of their life. Many do not have time to prepare for the new situation, in this context their information needs and information horizon (Sonnenwald, 1999) may change according to the new circumstances. The language barrier in the country of destination leads many asylum seekers to ask their social network for assistance and help, mostly through social media (Emmer et al., 2016). Their context and situation therefore seem fitting to highlight the potential impact of context and situation on information behavior by investigating the following research questions:

**RQ2: a.)** What impact does context, situation, and information horizon have on users' information behavior? **b.)** What (information) needs of asylum seekers are satisfied through social media usage?

A relatively new kind of synchronous social media are social live streaming services. They are synchronous as the interaction between users happens in real time (Fietkiewicz & Stock, 2019). So, what is new? In classical media consumption (e.g., watching a TV show on television), audience members may develop a certain relationship towards the media person. As the media person does not know about the other person, it results in a one-sided feeling of the relationship. Therefore, it is parasocial (Horton & Wohl, 1956; Giles, 2002, 2010). However, on social live streaming services streamers can instantly react to the audience members' chat messages. That provides new possibilities of user interaction and indicates a change in social relations on social media. Its impact on social media users' information behavior needs to be examined:

**RQ3: a.)** What is the information behavior of live streaming service users? **b.)** How can information behavior of and online social relations between live streaming service users be described?

Designing information systems to support users' needs and behavior is very complex (Kusunoki & Sarcevic, 2013). It requires an understanding of the system's users and their cultural background (including language and tradition) (Stock & Stock, 2013). To encourage a desired behavior in users and affect user motivation, information system designers make use of gamification elements, which promote game-like experiences (Koivisto & Hamari, 2019). Some game design elements further support and foster user interaction on social media services. Social live streaming services in particular apply many gamification elements (Zimmer et al., 2020). Considering gamification's behavior affecting nature, the following research question is proposed:

**RQ4: a.)** What impact does gamification have on social live streaming service users' motivation and (information) behavior? **b.)** What gender-dependent differences can be observed?

### **1.3 Methodology**

In order to provide insights about users' information behavior on social media services and their position as an information system from the information science perspective, the multiple methods approach (Morse, 2003; Poteete et al., 2010) was applied. Multimethod approaches are "[q]ualitative and quantitative projects that are relatively complete, but are used together to form essential components of one research program" (Morse, 2003, p. 191). Applying

multiple methods allows us to examine the phenomenon “information behavior on social media” from different perspectives and in various contexts. Each study (*Chapters 2–13*) has played its part in this entire process: While theoretical approaches allow us to understand interrelationships between the investigated concepts, conducting empirical studies leads to new insights. The following methods were applied in this multimethod contribution:

- Literature review;
- case study;
- content analysis;
- sentiment analysis;
- survey method;
- interview method.

To get an understanding of users’ cognitive information behavior patterns concerning fake news, a case study as well as a content analysis of (presumably fake news) posts, their comments, and replies was conducted (*Chapter 2*). Researchers perform case studies “to uncover new and unusual interactions, events, explanations, interpretations, and cause-and-effect connections” (Hays, 2004, pp. 218f). The singular case study (Flyvbjerg, 2006) was performed on a post about Hilary Clinton selling weapons to the Islamic State posted in August 2016 on the weblog *The Political Insider* (N=43). The qualitative and quantitative content analysis (Krippendorff, 2018) was performed on Reddit posts found in the Subreddits *r/worldnews* about Hillary Clinton selling weapons to the Islamic State (September 2016; N=246) and in *r/The\_Donald* accusing Barack Obama to be the leader of the Islamic State (September 2016; N=177) on the social news platform Reddit. In total, 466 documents (including post, comments, and replies) were analyzed. The codebook for the content analysis arrived with the inductive (conventional) and deductive (direct) approach (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). Coders worked independently, arriving at an intercoder reliability score of Krippendorff’s  $\alpha > 0.8$ , meaning the coders worked appropriately. The few disagreements were discussed and matched (Mayring & Fenzl, 2019, p. 637), resulting in an intercoder consistency of Krippendorff’s  $\alpha = 1$  (100%). The different fake news related information behavior patterns found in literature which served as codes are: confirmation, denial, moral outrage, new rumor, satire, off-topic, insult, and “Meta.” Furthermore, the texts’ orientation was evaluated (positive = agreement, negative = disagreement, neutral = no relation to the topic of the original post).

The production of information and thus of content also includes a certain sentiment expressed by the producer. Social media posts and comments can contain text and furthermore emoticons. In *Chapter 3*, a lexicon-based sentiment analysis was used as a methodology to

identify the sentiment towards Miley Cyrus in the comment section of her Instagram posts and posts of fan-based accounts, since she was known for her scandalous performances and controversial behavior at that time. First, the comments were collected from Miley Cyrus's official Instagram account and fan-based accounts (between May 2016 and June 2016), using the Instagram API. Afterwards, the texts have been automatically preprocessed with a Python script by deleting spam (e.g., chain mails, advertisements), replacing usernames and links as well as by checking the language and automatically translating the comments to English. The sentiment analysis was performed on around 660,000 comments. For the lexicon-based Python sentiment analysis program, SentiStrength served as a model (Thelwall et al., 2010), including the emotion lexicon AFINN (Nielsen, 2011), an emoticon list, negotiation lexicon, a lexicon for booster words like "very" or "total", and a lexicon for phrases. Furthermore, the natural language processing tool kit was used to determine and avoid ambiguity problems. The sum of the polarities for each word or phrase is calculated for the polarity of the text (Kaushik & Mishra, 2014), and then combined with the sentiment for the comment's emoticons to arrive at the final sentiment of a comment. However, we normalized the final sentiment of a comment to a value between -5 to +5 (negative to positive; 0 is neutral).

Using the survey methodology, a user-based evaluation of the social news system Reddit and its content was examined in *Chapter 4*. An online survey was prepared using aspects of the Information Service Evaluation (ISE) model (Schumann & Stock, 2014), the Technology Acceptance Model (Davis, 1989), and the Uses and Gratification Theory (Katz et al., 1973) to ask for the users' acceptance of the information service Reddit. Most survey items were pre-formulated statements that should be answered on a 5-point Likert-scale (from 1 "strongly disagree" to 5 "strongly agree"; Likert, 1932). The content quality could be rated by the following aspects: freshness, believability, objectivity, readability, and understandability. Further categories regarding the content asked about were: it is up-to-date, true, credible, unbiased, unprejudiced and impartial, can be easily read, has formal structure, can be easily understood and comprehended. A total of 495 Reddit users answered the survey.

In *Chapter 5* and *Chapter 7*, the combination of different theoretical phenomena leads to the development of two frameworks in regard to information behavior. The first one (*Chapter 5*) deals with the information behavior and ICT as well as digital media usage (also including social media) of asylum seekers. Here, the concepts information horizon (Sonnenwald, 1999) as well as (new) context and situation (Case & Given, 2016) play a central role. In *Chapter 7*, the developed framework concentrates on the information behavior and information interaction of social live streaming service users. The interplay of the Lasswell's sender-centered theory

(Lasswell, 1948) as well as the audience-centered Uses and Gratifications Theory (Katz et al., 1973) and the aspect of synchronicity on social video live streaming services leads to a proposed circle of communication, also including the aspects information production, information consumption, and the respective (information) needs.

To get insights about the social media usage and the respective motives of asylum seekers, the survey methodology has been applied and furthermore interviews were performed (*Chapter 6*). Is the migrants' information behavior influenced by the new situation? Nineteen migrants from German language classes were interviewed and asked in person. The interviews took place on November 28<sup>th</sup> and November 30<sup>th</sup> as well as on December 3<sup>rd</sup> in 2018. Each interview lasted between 30 and 45 minutes and a translator for Arabic to German was present. Interviewees were asked which social media services they use, what they use them for (in regard to Uses and Gratifications Theory (Katz et al., 1973): entertainment, social interaction, information, self-presentation), and what information they look for on each service they mentioned. Additionally, interviewees were asked about demographics (e.g., home country, age, and gender).

In *Chapter 8*, an online survey with users from YouNow as well as the observation of live streams on YouNow were conducted. The online survey was distributed from June 3<sup>rd</sup> until June 28<sup>th</sup>, 2015 and a total of 123 YouNow users participated in the survey. Pre-formulated statements about YouNow's platform, the behavior of YouNow's users and about users' community engagement as well as acceptance were rated on a 7-point Likert-scale (Likert, 1932), providing the option to give a "neutral" answer (the scale was ranging from "disagree" to "neutral" until "agree"). Furthermore, survey participants were asked about their demographic data. To get an understanding of legal problems while broadcasting live programs, YouNow live streams from the USA and from Germany have been observed. The observations took place in four time slots: 12 a.m. to 6 a.m., 6 a.m. to 12 p.m., 12 p.m. to 6 p.m., and 6 p.m. to 12 a.m., whereby in each slot, four streams have been watched for 15 minutes. A total of 434 live streams were observed for the following legal concerns: copyright violations (according to German and U.S. law, respectively), youth protection, personality rights, and defamation.

To gain insights and knowledge about the concept of interpersonal relations and social action on social live streaming services, a systematic literature review was performed in *Chapter 9*. By applying the PRISMA strategy (Moher et al., 2009), guaranteed that an evidence based minimum set of items was included in the review. Literature was searched in multiple databases to enhance the overall recall (Fink, 2019). The following databases were consulted: Web of Science (WoS), Scopus, EconBiz, ACM Digital Library, IEEE Xplore, Sociological Abstracts, and PsycInfo. Additionally, the References and Citations of found literature records were analyzed

(snowball sampling). A number of 77 research articles were identified as relevant and their research findings were then synthesized.

The content analysis methodology was applied to get an overview about the game mechanics and game design elements employed on different social live streaming service websites (*Chapter 10*). At first, the conventional and deductive approach (Hsieh & Shannon, 2005; Elo & Kyngäs, 2008) by conducting a literature review was applied to arrive at the game mechanics and social live streaming service websites. A total of 21 social live streaming service websites were included in the analysis and out of more than 20 gamification elements determined by the literature review, 14 different gamification elements could be identified on social live streaming service websites and were included in the analysis. While observing the websites for gamification elements, the directed approach was used as a content analysis method (Hsieh & Shannon, 2005).

To gather data for answering the research questions in *Chapters 11–13*, the survey methodology was applied. An online questionnaire was conducted on Umfrageonline.com and distributed among YouNow users. The social live streaming service YouNow serves as a case study, as it is the most gamified social live streaming service in the Western region (Scheibe & Zimmer, 2019). Pre-formulated statements about the gamification elements on YouNow should be rated by YouNow users on a seven-point Likert-scale (Likert, 1932) ranging from “strongly disagree (1)” to “strongly agree (7),” to gain insights about gamification’s impact on user information behavior. The statements were based on the rewarding characteristics and motivating purpose of different gamification elements (Zichermann & Cunningham, 2011; Deterding et al., 2011; Ryan & Deci, 2017; Palmgreen et al., 1980). Further statements about users’ perception of the information platform were formulated according to the Technology Acceptance Model (Davis, 1989) and Flow Theory (Csíkszentmihályi, 1975). Total 211 users took part in the survey. In *Chapter 13*, the analysis focuses on gender-dependent differences and since merely 94 participants indicated their gender, only the data of these users were included in the evaluation.

## **1.4 Synopsis**

The publications included in this cumulative dissertation give insights about the different building blocks of the presented model. They further our understanding of the role of users’ information behavior on different social media services and the impact of the characteristics of the systems and their users. The following paragraphs provide a brief summary of each

publication (Chapters 2–13). Each subsection (Part 1–4) sheds light on one of the proposed research questions (RQ1–RQ4), while the boundaries between the findings of the individual parts and their assignment to the research questions may sometimes overlap and are rather open and fluid. Minor changes have been made to the publications, including corrections of grammatical errors and typing mistakes, fixing of source formatting as well as corrections of table and figure design and positioning to ensure consistency in formatting.

## **Part 1: Information and Users on Social Media**

**Chapter 2:** Zimmer, F., Scheibe, K., Stock, M., & Stock, W. G. (2019). Fake News in Social Media: Bad Algorithms or Biased Users? *Journal of Information Science Theory and Practice*, 7(2), 40–53.

Users on social media services act as prosumers (Toffler, 1980) as they may consume information but also produce information (Linde & Stock, 2011), named user-generated content. Production of deceptive information by social media users is nothing unusual, some can be claimed as fake news (Torres et al., 2018). What is fake news and what is misinformation and disinformation? Can we observe filter bubbles and echo chambers on social media? Are filter bubbles and echo chambers made by humans or made by algorithms? What cognitive patterns and information behavior patterns can be found in different communities? What role does the (information) behavior of individual users and their social relations play?

**Chapter 3:** Scheibe, K., Philipps, J., Schaffarczyk, L., Nikolic, J., & Stock, W. G. (2018). A Sentiment Analysis on Miley Cyrus' Instagram Accounts. In V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 274–282). Academic Conferences and Publishing International Limited.

On social media, user-generated content (in the form of (live) text, (live) videos, and images) can be commented on by other users, if the account is not private or comments are not turned off. Everyone can then add their two cents in the comment section. Public figures in particular have a high number of followers on social media services (Djafarova & Rushworth, 2017) and some audience members, including followers and non-followers, express their opinion. The sentiment of comments below Instagram posts of actress and singer Miley Cyrus, once known for her controversial on-stage performances and polarizing behavior, and fan-based accounts were analyzed in this study. The analysis should shed light on the information production behavior of users. When commenting on celebrities' Instagram posts, do audience members write negative comments? What information production behavior of negative and positive content by audience members toward a celebrity can we observe? Is there a difference in the sentiment of comments

below Miley Cyrus's official account and fan-based accounts? Are comments from members of the audience triggered by the celebrity's behavior?

**Chapter 4:** 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. Design, Ethics, User Behavior, and Social Network Analysis* (pp. 636–646). Springer.

Reddit is a social news service and information system that allows users to form different social communities, so-called "subreddits." Information towards various topics is uploaded and exchanged in these communities (Stoddard, 2015), whereby users on Reddit are anonymous (Leavitt & Clark, 2014). How do users perceive the quality of user-generated information on Reddit? What is the information seeking behavior of users on Reddit? How do they seek information? Does Reddit fulfill the expectations and needs of users as an information service?

## **Part 2: Information Behavior and Social Media Usage of Asylum Seekers**

**Chapter 5:** Scheibe, K. & Zimmer, F. (2022). Theoretical Foundations. In *Asylees' ICT and Digital Media Usage: New Life – New Information?* (pp. 52–64). De Gruyter Saur.

Asylum seekers are forced to leave their home country and have to integrate into a new society, therefore both, their situation and context, change. "Context and situation are important concepts for information behavior research" (Case & Given, 2016, p. 48), as various new information is needed in the host country. They face many challenges, e.g., language barriers and new administrative systems and documents (Pearlman, 2017). What impact does the information horizon as well as context and situation have on human information behavior? How do asylum seekers use information and communications technologies and social media services when living in a new country? What information needs do they have when they arrive in the host country? What is their information behavior and how does their information behavior change?

**Chapter 6:** Scheibe, K., Zimmer, F., & Stock, W. G. (2019). Social Media Usage of Asylum Seekers in Germany. In W. Popma & S. Francis (Eds.), *Proceedings of the 6th European Conference on Social Media* (pp. 263–272). Academic Conferences and Publishing International Limited.

When someone has to flee their home country, the person also leaves behind their former life and therefore their family and relatives. While fleeing, and also, after arriving and in a host country, social media platforms offer the possibility to stay in contact with them further on (Gillespie et al., 2016). What social media services do asylum seekers use when they arrive in a new country? What do they use the social media services for? Do asylum seekers satisfy their needs for information, entertainment, social interaction, and self-presentation via social media?



### Part 3: Information Behavior on Social Live Streaming Services

**Chapter 7:** Zimmer, F., Scheibe, K., & 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. Technologies and Analytics* (pp. 429–448). Springer.

Social live streaming services are a special form of social media, as streaming live allows synchronous communication. The interaction between the streamer and the viewer and among the viewers happens in real-time. How can user information behavior in social live streaming services be displayed? A holistic model is proposed, by displaying the information production and information reception behavior of social live streaming service users as a circle. The sender-centered communication theory by Lasswell (1948) serves as a starting point, while the audience-oriented Uses and Gratifications Theory (Katz et al., 1973) and the gratifying aspects of information, entertainment, social interaction, and self-presentation (McQuail, 1983) are considered for possible (information) needs and therefore motives for live streaming content consumption (and production). Users on social media behave in different roles, which also applies to social live streaming services. Consumers or lurkers just consume content for entertainment and information, participants (commentators) use it for social interaction, and producers (streamers) for self-presenting purposes (Shao, 2009).

**Chapter 8:** Scheibe, K., Fietkiewicz, K. J., & Stock, W. G. (2016). Information Behavior on Social Live Streaming Services. *Journal of Information Science Theory and Practice*, 4(2), 6–20.

Social live streaming services are an emerging kind of social media platform (Wilk et al., 2015). What distinguishes live streaming services from other social media platforms is the fact that everything happens in real-time. The live videos, audience's chat messages and performed user interactions are rarely saved by the platforms to be replayed. To study users' information behavior on live streaming services, YouNow's users were asked about their behavior. What activities are performed by streamers and viewers? What content do users prefer to watch? How do streamers prepare for a stream and how long do they stream? Do they play music or show images and videos in their streams? This question further provides information about possible legal violations.

**Chapter 9:** Scheibe, K., Zimmer, F., Fietkiewicz, K. J., & Stock, W. G. (2022). Interpersonal Relations and Social Actions on Live Streaming Services. A Systematic Review on Cyber-social Relations. In T. X. Bui (Ed.), *Proceedings of the 55th Annual Hawaii International Conference on System Sciences* (pp. 3349–3358). ScholarSpace.

On live streaming services, we have the exceptional situation that streamers and the audience are able to interact in real time, as chat messages of audience members can be answered immediately by the streamer. The interaction between the streamer and the audience is no social relation, as there is no spatial proximity. However, as on live streaming services is always temporal proximity and reciprocity, it is also no parasocial relation. Therefore, relations on social live streaming services are neither social relations nor parasocial relations, it is an interpersonal relation in its own right (Hunter, 2019). As it happens in cyberspace, we arrive at the term cyber-social relations for interactions on this kind of social media.

#### **Part 4: Gamification and Motivation on Social Media**

**Chapter 10:** Scheibe, K. (2018). The Impact of Gamification in Social Live Streaming Services. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 10914. Social Computing and Social Media. Technologies and Analytics* (pp. 99–113). Springer.

Gamification is “the use of game-design elements in non-game contexts” (Deterding et al., 2011, p. 3) and aims to encourage user engagement and motivation (Seaborn & Fels, 2005). Social live streaming services as an information platform make use of many gamification elements. In China are over 200 different video live streaming platforms available (Lu et al., 2018), which led the study’s focus on gamification elements on Chinese social live streaming systems. Further systems from Japan, Thailand, and the USA were analyzed to observe cultural differences in information system interface design. What kind of gamification elements are implemented on social live streaming service websites? How many gamification elements are found on different social live streaming service websites? Are there cultural differences between the number of and kinds of offered gamification elements per service?

**Chapter 11:** Scheibe, K., Meschede, C., Göretz, J., & Stock, W. G. (2018). Giving and Taking Gratifications in a Gamified Social Live Streaming Service. In V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 274–282). Academic Conferences and Publishing International Limited.

Gamification is used to foster user motivation and engagement and should change the user’s behavior (Hamari et al., 2014). Social live streaming services as a one-to-many information system, offer gamification elements as some kind of user interaction mechanic. For example, audience members can reward streamers with gifts or tips to promote a desired behavior. The social live streaming service YouNow serves as a case study (*Chapters 11–13*), as the platform offers many gamification elements and, according to Scheibe & Zimmer (2019), is the most gamified U.S.-American video live streaming service. What gamification elements does YouNow as an information system offer its users? What impact does gamification have on user

information behavior? What are the most motivating and most rewarding elements on YouNow (differentiated by user group (for producers, participants, and consumers))? Do users perceive flow while using social live streaming services?

**Chapter 12:** 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.

When a gratification is sought, some kind of gratification is necessarily obtained (Palmgreen et al., 1980). When users use gamification elements on social live streaming services for interaction, they can give gratifications to other users, but also receive gratifications from other users or from the system. Gamification elements have an impact on the motivation of users (Deterding, 2012). Is there a difference perceived in the action of receiving gratifications and giving gratifications in a gamified information system? What impact does gamification have on user behavior in an information system?

**Chapter 13:** Scheibe, K. & Zimmer, F. (2019). Gender Differences in Perception of Gamification Elements on Social Live Streaming Services. *International Journal on Interactive Communication Systems and Technologies (IJICST)*, 9(2), 1–15.

Gender-dependent differences in social media usage have been studied, e.g., women tend to use social media for social connections and communication purposes, while men use it for entertainment purposes (e.g., games) (Joiner et al., 2005). In gamification research, Koivisto and Hamari (2014) observed women are likely to perceive gamification elements more positively than men. How do male and female users perceive social live streaming services as an information system? How are gamification elements perceived by male and female users and which are preferred? What gamification elements motivate users to use the platform?

This dissertation provides a comprehensive framework towards information on social media, by taking into account the systems' and users' characteristics and users' information behavior. Thereby, the framework considers information behavior in relation to possible user roles on social media (producers, consumers, and participants). What makes this framework special is, the separate building blocks can be adjusted and also studied. The following *Chapters 2–13* provide insights about findings in regard to the displayed building blocks. The possible backchannel through reactions of participating users in social media is one novel aspect of information systems that facilitates a (sometimes) circular flow of information. In *Chapter 14* an overview on the main results of the studies as well as possible areas of applications of our findings will be provided. Furthermore, the limitations of this contribution and an outlook are presented.

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## **Part 1:**

### Information and Users on Social Media

## 2. Fake News in Social Media: Bad Algorithms or Biased Users?

### 2.1 Introduction

It is a truism that false propositions or even deceptions reach their recipients every day and everywhere. Fake news on online press sites and on social media is no exception. However, deceptive information “has had dramatic effect on our society in recent years” (Volkova & Jang, 2018, p. 575). Deceptions and fake news may possibly survive very well in environments of all kinds of social media, be it weblogs, microblogging services, social live streaming platforms, image and video sharing services, or social networking services. “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 21<sup>st</sup> century” (Quattrociocchi, 2017, p. 60), leading even to the “emergence of a post-truth world” (Lewandowsky, Ecker, & Cook, 2017, p. 357). Especially, such historically relevant events as the UK’s Brexit vote (Bastos, Mercea, & Baronchelli, 2018), the 2016 presidential election in the United States (Allcott & Gentskow, 2017), and the excessive use of the term “fake news” by Donald Trump has led to discussions about the role of fake news in society. The related term “post-truth” was named word of the year for 2016 by the Oxford Dictionaries (2016).

In *The Guardian*, we read “social media filter bubbles and algorithms influence the election” in Great Britain (Hern, 2017). Similarly, for the *Observer*, “the problem isn’t fake news, it’s bad algorithms” (Holmes, 2016). The University of Amsterdam’s *Master of Media* blog addresses filter bubbles as algorithms customizing our access to information (Mans, 2016). These three examples clearly demonstrate what the cause of fake news dissemination is: It is bad algorithms. Nevertheless, one may find divergent opinions in the popular press. The *New Statesman* claims, “Forget fake news of Facebook: the real filter bubble is you” (Self, 2016). Now, the cause of fake news distribution is the misleading information behavior of individual people, i.e. biased users. As filter bubbles and echo chambers are often discussed in the press, Bruns (2019) asks, “are filter bubbles real,” and are they overstated?

“Bad algorithms” are related to “filter bubbles,” being applications of personalized information retrieval as well as of recommender systems. They lead the users to receive only an excerpt of (maybe false) propositions instead of the entire spectrum of appropriate information. A source for concrete algorithmic recommendations is the user’s former information behavior, which is recognized by the machine. On the other hand, “bad user behavior” or “biased users” (Vydiswaran, Zhai, Roth, & Pirolli, 2012) refer to “echo chambers,” which are loosely connected

clusters of users with similar ideologies or interests, whose members notice and share only information appropriate to their common interests. The information behavior of the user in question in combination with other users' behaviors (e.g., commenting on posts or replying to comments) exhibits special patterns which may lead to the echo chamber effect (Bruns, 2017).

## 2.2 Research Outline

First of all, the main concepts must be defined. *Fake news* is information including "phony news stories maliciously spread by outlets that mimic legitimate news sources" (Torres, Gerhart, & Negahban, 2018, p. 3977); it is misinformation (transmitting untrue propositions, nonconsidering the cognitive state of the sender) and disinformation (again, transmitting untrue propositions, but now consciously by the sender) (Shin, Jian, Driscoll, & Bar, 2018). Deception is a kind of disinformation which brings an advantage to the sender. Other authors compare fake news to satire and parody, fabrication, manipulation, and propaganda (Tandoc Jr., Lim, & Ling, 2018). The users' appraisal 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 (Zimmer & Reich, 2018) as well as on the presentation format (Kim & Dennis, 2018).

This paper follows the well-known definition of *social media* by Kaplan and Haenlein (2010, p. 61): "Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content." Social Media includes, among other systems, weblogs, social networking services (such as Facebook), news aggregators (such as Reddit), knowledge bases (such as Wikipedia), sharing services for videos and images (such as YouTube and Instagram), social live streaming services (such as Periscope), and services for knowledge exchange (such as Twitter) (Linde & Stock, 2011, pp. 259ff.). In contrast to such media as newspapers, radio, or TV, in social media there is no formal information dissemination institution (as, say, *The New York Times*, CBS Radio, or NBC); thus, disintermediation happens. All social media are not immune from fake news (Zimmer, Scheibe, Stock, & Stock, 2019).

A *user* of Internet services acts as consumer (only receiving content), producer (producing and distributing content), and participant (liking or sharing content) on all kinds of online media (Zimmer, Scheibe, & Stock, 2018). In classical communication science one speaks 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. For Pariser (2011), a *filter bubble* is a “unique universe of information for each of us.” Pariser lists three characteristics of the relationship between users and filter bubbles, namely (1) one is alone in the bubble, (2) the bubble is invisible, and (3) the user never chose to enter the bubble. We will critically question Pariser’s characteristics. For Dubois and Blank (2018, p. 3) a filter bubble means “algorithmic filtering which personalizes content presented on social media.” Davies (2018, p. 637) defines filter bubbles as “socio-technical recursion,” i.e. as an interplay between technologies (as, for instance, search engines or social media services) and the behavior of the users and their social relations.

An *echo chamber* describes “a situation where only certain ideas, information and beliefs are shared” (Dubois & Blank, 2018, p. 1). Echo chambers 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” (Dubois & Blank, 2018, p. 3). Users in echo chambers are on a media or content “diet” (Case & Given, 2016, p. 116) or in “ideological isolation” (Flaxman, Goel, & Rao, 2016, p. 313) concerning a certain topic. Such isolation may result from *selective exposure of information* (Hyman & Sheatsley, 1947; Liao & Fu, 2013; Spohr, 2017) and a *confirmation bias* (Vydiswaran, Zhai, Roth, & Pirolli, 2015; Murungi, Yates, Purao, Yu, & Zhan, 2019). There are different manifestations of selective information exposure; its strongest form is “that people prefer exposure to communications that agree with their pre-existing opinions” (Sears & Freedman, 1967, p. 197). A special kind of selective exposure of information is “partisan selective exposure,” which is related to political affiliations and not—as general selective exposure—based on ideologies or opinions (Kearney, 2019).

Both basic concepts are closely related; however, an *echo chamber* is more related to human information behavior and a *filter bubble* is more associated with algorithmic information filtering and results’ presentation in online services.

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” (Bessi et al., 2015, p. 1). Prima facie, this sounds great. However, if we take a look at the other side of the coin, “confusion about causation may encourage speculations, rumors, and mistrust” (Bessi et al., 2015, p. 1). The disappearance of intermediation has not only “fostered a space for direct meetings in a sort

of online Habermasian public sphere” (Törnberg, 2018, p. 17), but has also fostered misuse of social media through the publication of fake news by biased users. Habermas himself was always pessimistic about social media (Linde & Stock, 2011, p. 275), as for him weblogs play “a parasitical role of online communication” (Habermas, 2006, p. 423). The disappearance of intermediation also supports the parasitical roles of fake news in social media.

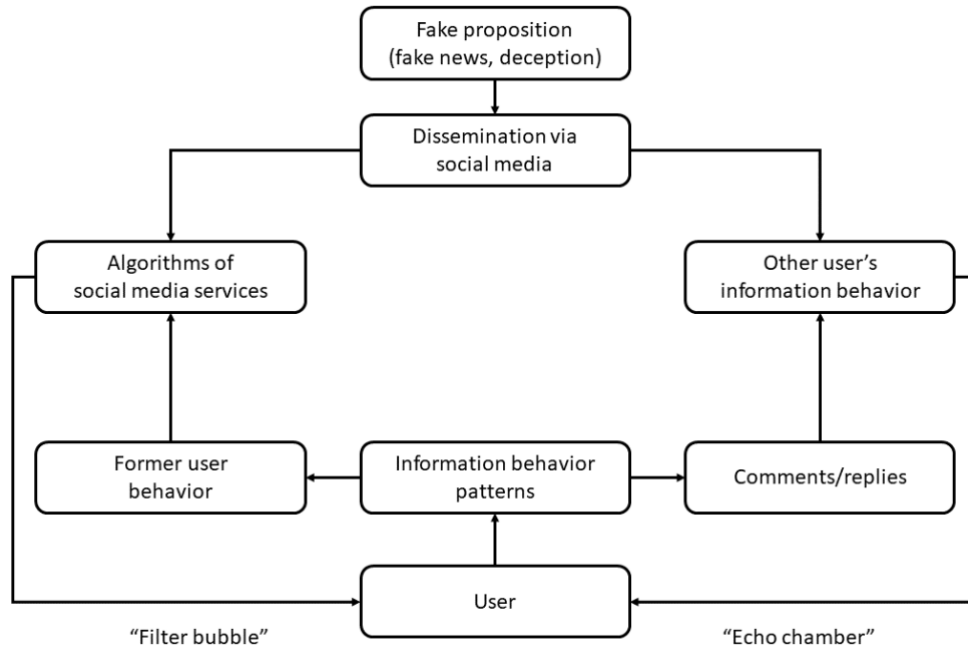
## 2.3 Research Model

The different estimations on the causes of fake news dissemination in social media directly lead to our central research question (RQ): Are echo chambers and filter bubbles of fake news man-made or produced by algorithms? To be more precise:

- **RQ1:** Is the dissemination of fake news supported by machines through the automatic construction of filter bubbles, and if yes, how do such algorithms work?
- **RQ2:** Are echo chambers of fake news man-made, and if yes, what are the information behavior patterns of those individuals reacting to fake news?

In our research model (Fig. 2.1), RQ1 is located on the left-hand side and RQ2 on the right-hand side. We start searching for false propositions, i.e. fake news, and their dissemination via social media channels. First, we are going to describe processes leading to filter bubbles. A user will be informed of the existence of the false propositions via the push service of the social media platform. The selection of the documents which are shown to the user is controlled by the service’s algorithms, which in turn are fed by the user’s information behavior patterns and their behavior on the specific service (e.g., forming friendships, giving likes, etc.). It is possible that the interaction between the algorithms and the former user behavior clips only certain aspects of information content while neglecting all other content, thus forming a filter bubble. On Facebook, it is difficult to handle a bypass of the systems’ algorithms. However, on other social media services, for instance, weblogs, there is a direct push of (fake) news to users. Following, we direct our attention to echo chambers. The same user can comment on the false propositions or reply to comments about such fake news. His or her cognitive information behavior patterns may lead to different reactions such as confirmation, denial, moral outrage, and satire. In combination with other users’ information behavior (replying to the user’s comments or replies, liking them, sharing them, and so on) echo chambers of like-minded users may appear.





**Figure 2.1:** Our research model: Filter bubble and echo chamber in social media

As there are two different research questions, this study applies different methods answering them. RQ1 will be evaluated by analyzing the sorting and presentation algorithms of social media by the example of Facebook. For RQ2 the authors performed empirical case study research applying content analysis of comments and replies on fake news distributed via social media channels. The channels disseminating the fake news were a weblog (*The Political Insider*) and two subreddits of the news aggregator Reddit, namely *r/The\_Donald* and *r/worldpolitics*. We choose the blog from *The Political Insider* as it published the fake story on our case (“Hillary Clinton sold weapons to the Islamic State”) for the first time; the subreddit *r/The\_Donald* is clearly addressed to supporters of Donald Trump, while *r/worldpolitics* is a more liberal subreddit. As a result of this selection we were able to analyze comments from different ideological orientations.

How is our article structured? In the next paragraph, we define our basic terms. As fake news disseminate false propositions, it is necessary to discuss the concept of “truth” in relation to knowledge and information as well as to mediated contexts. In order to analyze and answer RQ1 this paper introduces relevance, pertinence, and ranking algorithms and describes Facebook’s sorting algorithm in detail. To work on RQ2, we empirically studied patterns of cognitive processes of human information behavior in response to fake news. A case study provides us with empirical data of user comments and replies. Then, we describe the applied methods (case study research and content analysis), the empirical findings, and the data

analysis. The final paragraph summarizes the main results, confesses limitations, and gives an outlook on further research.

## 2.4 Knowledge, Information, and Truth

If we want to distinguish between fake (misinformation and disinformation) and non-fake (knowledge) we should know what knowledge, information, and truth are. The corresponding discipline is philosophy, more precisely epistemology. What follows is an excursus on the philosophical foundations of truth. The aim of this paragraph is to show that the definition of truth and the assignment of truth values to empirical statements are anything but easy.

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 (1977, 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*, where *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, and 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. 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 (Stock & Stock, 2013, 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 (1995, p. 41) points out. Buckland (1991, p. 50) remarks, “we are unable to say confidently of anything that it could not be information.” Maybe the proposition which is transmitted by information is true or “contingently truthful” (Floridi, 2005); and many information scientists “will generally ignore any distinction between truth or falsity of information” (Case & Given, 2016, p. 67). 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. Truth is a relation between a proposition and a reference object. There are different truth theories working with different reference objects, namely reality, praxis, other propositions in the same system, acceptance inside a community, and, finally, a person’s internal state.

The classical approach to analyze truth is the *correspondence theory* (David, 1994) theorizing the relation between a proposition and a concrete fact in space and time. Although there are similar definitions of correspondence already in Aristotle’s work, the canonical form of this truth theory originates from the early twentieth 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” (Russell, 1971, 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 and social media, the person reporting on a state of affairs 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 (Muñoz-Torres, 2012).

Accordance with objective reality and personal awareness is the key factor of the *theory of reflection*. Whether the human mind contains truth is not a question of theory, but of praxis. In praxis (working, any decision procedure), humans have to prove the truth of their thinking in their practical behavior (Pawlow, 1973). 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.

The *coherence theory* of truth declares that one statement corresponds with another statement, or with the maximal coherent sum of opinions and accepted clauses of statements (Neurath, 1931). 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 latest 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 about what they are saying to ensure everyone understands what they mean, they insinuate 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 (Habermas, 1972). 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.

Brentano (1930) describes the *evidence theory* of truth, "When I have evidence, I cannot err." A judgment is true if it expresses a simple quality of experience. Brentano adheres to the traditional view that there are two different ways for a judgment to be evident; either it is immediately, or it is evident insofar as it is inferable from evident judgments 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), the praxis (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 in stating 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 (e.g., Conroy, Rubin, & Chen, 2015) are faced with the same problems, especially when they rely on the coherence or the consensus theory of truth.

## 2.5. Fake News Dissemination Through Algorithmic Filter Bubbles (RQ1)

The concept of *relevance* is one of the basic concepts of information science (Saracevic, 1975). 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, researchers 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.

A research result can only be *pertinent* if the user has the ability to register and comprehend the knowledge in question according to his or her cognitive model. Soergel (1994, 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 personalized ranking (Stock & Stock, 2013, pp. 361ff.).

We describe only one paradigmatic example of ranking in social media, namely the algorithms of Facebook as the most common social media platform. 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 (Zuckerberg et al., 2006). Affinity is concerned with the user’s previous interactions on the posting pages, whereas different interactions are weighted variously. If a user *X* 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 for user *X*. 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.

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 (Tseng, 2015; Bakshy, Messing, & Adamic, 2015). 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)” (Haim, Graefe, & Brosius, 2018, p. 330).

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 may amplify existing behavioral patterns of the users into filter bubbles and then into echo chambers, whereby the information behavior of the users plays the important primary role. In contrast to the assumptions of Pariser (2011) on filter bubbles, (1) no one is alone in the bubble when the bubble leads to echo chambers (where other users are by definition); (2) the bubble is visible to certain users insofar as they figured out Facebook's ranking methods; for other, rather uncritical users, the bubble is indeed invisible; (3) the users' behavior feeds the pertinence ranking algorithms; therefore, the users (consciously or unintentionally) cooperate with the service entering the bubble through their own information behavior.

Here we arrive at a first partial result and are able to answer RQ1: 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. (2016, p. 554f.), 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.’” DiFranzo and Gloria-Garcia (2017, p. 33f.) 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.” 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 personalisation algorithms, our research indicates that users’ own actions also play a key role in how the site operates as a forum for debate” (Seargeant & Tagg, 2019, p. 41). Although algorithms are able to amplify human information behavior patterns, obviously, the users play the leading role concerning construction and maintenance of those bubbles of (fake) news. Indeed, there are filter bubbles; however, they are fed by users’ information behavior and—more important—they are escapable (Davies, 2018).

## **2.6 Fake News Dissemination Through Man-made Echo Chambers (RQ2)**

### **2.6.1 Our Approach**

When we want to analyze echo chambers of fake news and also believing as well as mistrusting such false propositions by individual persons, we have to study their cognitive processes in detail. In our research study, we apply case study research and content analysis. As we want to investigate which concrete cognitive information behavior patterns concerning fake news 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” (Hays, 2004, p. 218f.). Our case includes a (probably fake) post and comments as well as replies to it. It is a story on Hillary Clinton selling weapons to the Islamic State. With the help of this singular case study (Flyvbjerg, 2006) we try to find cognitive patterns and to understand users’ information behavior at the time shortly after the publication of fake news.

To analyze the cognitive patterns of the commenting users, we look upon the results of the cognitive processes, i.e. the texts (as we are not able to measure the human cognitive patterns directly) and apply quantitative and qualitative content analysis (Krippendorff, 2018) of posts in social media. In quantitative content analysis, the occurrence of the categories in the coding units is counted and, if necessary, further processed statistically; the qualitative content analysis turns to the statements within the categories, namely the “manifest content” (Berelson, 1952) and the “deeper meaning” (such as subjective senses), as well as formal textual characteristics such as style analysis (Mayring & Fenzl, 2019). In order to create the appropriate categories for the content analysis, we applied both (1) inductive (or conventional) as well as (2) deductive (or directed) measures (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). By (1) applying the conventional approach with a first and preliminary analysis of comments concerning our case, we defined the first codes; and we (2) arrived at codes while studying relevant published literature. The coding unit was the single comment or the single reply. Every coding unit was

coded with only one (the best fitting) category. The coding process was led by a short code book and conducted by two of the article's authors in August 2018, whereas all steps were performed intellectually. In a first round, the coders worked independently (resulting in Krippendorff's  $\alpha > 0.8$ , signaling the appropriateness of the code book and the coders' work); in a second round, the (few) disagreements were discussed and solved (Mayring & Fenzl, 2019, p. 637). In the end, there was an intercoder consistency of 100%, i.e., Krippendorff's  $\alpha$  was 1.

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 (Stock, 2016, 2017). Similar to our approach, Walter, Brüggemann, and Engesser (2018) studied user comments in echo chambers concerning the topic of climate change. Gilbert, Bergstrom, and Karahalos (2009) defined agreement as the 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. Murungi et al. (2019, pp. 5192f.) found that significant amounts of comments on a concrete political situation (Roy Moore's candidacy for the U.S. Senate in Alabama in 2017) were non-argumentative.

For our case study, we consulted a weblog (*The Political Insider*, a right-wing oriented web site; August 2016) (N=43) and *Reddit* as the current most popular news aggregator (Zimmer, Akyürek et al., 2018). To be more precise, we analyzed Reddit's subreddits *r/The\_Donald* (a forum "for Trump supporters only"; September 2016) (N=177) and *r/worldpolitics* (a "free speech political subreddit"; September 2016) (N=246). We checked all comments and all replies to the comments manually. All in all, we analyzed 466 documents. Studying literature and empirical material, we found different patterns of information behavior in response to fake news and applied them as codes for our content analysis:

- Confirmation: broad agreement with post, attempt of verification
- Denial: 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: non-argumentative, 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) 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.” All other texts were coded as *negative*, e.g., “What’s there to say? It’s just a vague, unfounded accusation.” We aggregated all generations of replies (replies to a comment, replies to a reply) into the code “reply.”

## 2.6.2 Results

Tables 2.1-2.3 exhibit our descriptive results for the three selected sources, namely *The Political Insider*, *r/The\_Donald*, and *r/worldpolitics*. Concerning our case study, most comments on *The Political Insider* are confirmations of the (false) proposition; likewise, the comments’ orientation is predominantly positive (Table 2.1). In both analyzed subreddits most comments (about 40% to 50%) and even more replies (about 70% to 80%) are non-argumentative or off-topic (Tables 2.2 and 2.3). In the subreddit *r/The\_Donald* we found about 40% agreement with the fake proposition for the comments; however, only 8% existed for the replies.

**Table 2.1:** Users’ cognitive patterns in reactions to fake news: *The Political Insider*

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

Post: “Wikileaks CONFIRMS Hillary Sold Weapons to ISIS... Then Drops Another BOMBSHELL! Breaking News.”

About half of the comments in *r/The\_Donald* express 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 *non-argumentative* or 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*.

**Table 2.2:** Users’ cognitive patterns in reactions to fake news: *r/The\_Donald*

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

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!”

*Confirmations* of the fake news are frequent in *The Political Insider* and *r/The\_Donald*, but not in *r/worldpolitics*. Here are some examples: “Done, done, DONE! Round up his people” — “Traitors are hanged from the highest tree!” — “His eyes were always cold to me ... soulless. It is no surprise that Obama would be the founder of ISIS, really.” Confirmations culminate in death threats: “Put him [i.e., Obama] to death. Period. Let the left cry. They will never agree that they are wrong, that he was a criminal. It doesn’t matter. He is a traitor to this country, and if these allegations are true, he needs to be appropriately punished” (all from *r/The\_Donald*).

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”; “What? Seriously you believe this?”; or “Why have you sent me an article about how George Bush, the Republican president, may have rigged the 2004 election as evidence that Hillary Clinton, the Democratic candidate, has rigged the upcoming election?” (all from *r/worldpolitics*).

**Table 2.3:** Users’ cognitive patterns in reactions to fake news: *r/worldpolitics*

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

Post: “Julian Assange: ‘1,700 emails’ proves Hillary Clinton sold weapons to ISIS in Syria.”

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 f\*\*kin’ Kenyan ‘born’ in Hawaii,

raised in Indonesia, programmed and sponsored by the Saudi Manchurian School for Gifted Leftists?” (both from *r/The\_Donald*).

Here, a further cognitive pattern comes into play: the construction of a *new rumor*, for example: “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”; or, “It will take a while before people admit that Obama and Michelle and the supported ‘daughters’ were all fake”; “Malia’s and Sasha’s biological parents have always been nearby while the girls provided a fictional family for Barack and Michelle” (all from *r/The\_Donald*).

Some comments and replies consist of satirical, ironic, or sarcastic text, as for instance: “Of course, president Hussein was the head of Isis. He’s a muzlim [sic]” (*r/The\_Donald*); “Is that really how your brain works? Or you just playin’?”; “Someone feel like pointing to some of those emails? Julian? Anybody? Like most Americans, I am too stupid and lazy to spend four years reading emails”; “This news article is great, and absolutely 100% real. I can’t wait to see this actually real story break worldwide, because Hillary absolutely sold weapons to ISIS in Syria, and this is not at all a conspiracy theory!” (all from *r/worldpolitics*). Sometimes it is problematic to identify irony; however, considering the context the pattern becomes visible.

In the subreddit *r/worldpolitics* (but with 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 was 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.”

A rather uncommon pattern in this case study is *moral outrage*, a kind of meta-comment from a moral point of view, for instance: “All of you are blaming Hillary and President Obama. They have to get approval from Congress to do this stuff” (*The Political Insider*); or, “What’s there to say? It’s just a vague, unfounded accusation” (*r/worldpolitics*).

There are different distributions of cognitive patterns regarding the level of discussion, i.e. between the first generation of texts (comments on the triggering fake news) and the next generations (replies to the comments and replies to other replies). There are much more non-argumentative and off-topic replies than off-topic comments (*The Political Insider*: 62% versus 27%; *r/The\_Donald*: 78% versus 47%; *r/worldpolitics*: 72% versus 44%). And there are less confirmative replies than confirmative comments (*The Political Insider*: 23% versus 33%; *r/The\_Donald*: 8% versus 41%; *r/worldpolitics*: 9% versus 13%). Additionally, the users’

information behavior is drifting from positive or negative orientation at the comments' level to an enhanced neutral orientation at the replies' level.

### **2.6.3 Are There Indeed Echo Chambers?**

What can we learn from our case study? Do users indeed live inside an echo chamber? The answer depends on the concrete operationalization of the "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-fifths of the commenting audience of *r/The\_Donald* seem to argue inside their echo chambers. However, we can define "echo chamber" more broadly. As we know from the texts, off-topic comments and most of the neutral-orientation texts argue in the same direction as the entire community; therefore, 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. In contrast to Bruns (2019) we found that the problems concerning filter bubbles and echo chambers are not overstated, but basic facts in our contemporary online world.

## **2.7 Conclusion**

As the correspondence theory of *truth* is not applicable in mediated contexts, 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. This annoying fact does not make research on fake news easy.

*Algorithms* (and their mechanisms to form filter bubbles) applied in social media themselves do not form communities purely on their own as they amplify users' information behavior. The crucial element of fake news and their pathways into social media is mainly the individual *users*, their cognitive patterns, and their surrounding echo chamber (Zimmer, 2019).

Reading (fake) news and eventually drafting a comment or a reply may be the result of users' selective exposure to information (Frey, 1986; Sears & Freedman, 1967) leading to preferring news (including fake news) fitting their pre-existing opinions. If users take the (false) proposition as given, discuss it uncritically, ignore other opinions, or argue further off-topic (however, always in the same direction), an echo chamber can be formed and stabilized. In contrast to some empirical findings on echo chambers (Fischer et al., 2011; Garrett, 2009; Nelson & Webster, 2017) we found clear hints for the existence of such communities. Depending on the concrete operationalization of the "echo chamber," about one third to two-fifths (a narrow definition) and more than half of all analyzed comments and replies (a broad definition) can be located inside an echo chamber of fake news. Explicitly expressed confirmation depends on the stage of discussion. In the first stage (comments), confirmative texts are more frequent than in further stages (replies).

Confirmative information behavior on fake news 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" (Bessi et al., 2015, p. 2). This behavior leads directly to a confirmation bias. Our results are partly 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 clearly outside of echo chambers as denial, moral outrage, and satire—all in all patterns of critical information behavior.

This study has (as every scientific endeavor) *limitations*. In the empirical part of the study, we analyzed comments and replies to 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 texts; all others 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.

In this article, we report about one case study only, so the extent of the empirical data is rather limited. Although we collected and intellectually coded some hundreds of texts, this 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 story and *all*

the comments and replies on the fake news, as users and website administrators often delete discriminating posts, comments, or replies. We indeed found hints for deleted posts, comments, or replies on *The Political Insider* as well as on *Reddit*. In lucky cases (as in our study: the post and the comments of *The Political Insider*), one will find some deleted data on web archives.

Here are some *recommendations* for future research. As we only analyzed texts on fake news in order to find cognitive reaction patterns, research should also study in analogous ways reactions to true propositions. Are there the same cognitive patterns? People do not only live in the online world. Of course, their lives in the physical world are influenced by family members, friends, colleagues, and other people. As there are empirical hints on the geographic embedding of online echo chambers (Bastos et al., 2018), it would be very helpful to analyze offline echo chambers and the interplay between online and offline echo chambers as well. We distinguished between comments and replies and found different cognitive patterns of the respective authors. Are there indeed different cognitive patterns while writing posts, formulating comments, and phrasing replies to the comments? How can we explain those differences?

*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 uncritically, to try to verify or to falsify them, to ignore them, to argue off-topic, to write satire, or to 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 users leading to different reactions to fake news. Living in echo chambers (namely the uncritical acceptance of the news due to the users' 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. 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 (1977) definition of knowledge—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 deciding whether it is true or false. So, finally, it is on the individual user's critical literacy, information literacy, digital literacy, and media literacy in order "to help cultivate more critical consumers of media" (Mihailidis & Viotty, 2017, p. 441) and, additionally, on libraries and information professionals to instruct their users "in the fight against fake news" (Batchelor, 2017, p. 143) and to "become more critical consumers of information products and services"

(Connaway, Julien, Seadle, & Kasprak, 2017, p. 554). Libraries, next to schools (Gust von Loh & Stock, 2013), are faced with the task to educate and instruct people to become critical users.

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### **3. A Sentiment Analysis on Miley Cyrus' Instagram Accounts**

#### **3.1 Introduction**

##### ***3.1.1 What This Investigation is About***

The multimedia sharing service Instagram grew and excelled in popularity since its launch as a free mobile application in the beginning of October 2010 (Hu, Manikonda and Kambhampati, 2014). In almost six years, Instagram got over 500 million users of which over 300 million use the app on a daily basis (Instagram Blog, 2016). Pictures and videos from the users' daily lives are shared, commented and liked by followers and other users. Some people, organizations and companies build their own fan base and start to grow a network (Alshawaf and Wen, 2015). Instagram is also used by many celebrities who mostly have a high number of followers (Djafarova and Rushworth, 2017). People are able to react to the uploaded media by writing a comment, liking a picture or video and following other users.

Celebrities may trigger positive or negative sentiments in members of the audience. Sometimes, the audience members report on their sentiments in social media via posts or comments (Hosseinmardi et al., 2015). Nowadays, the image-sharing service Instagram plays an important role in the social media landscape. As all comments on Instagram are text-based, we are able to identify, extract and analyze occurring negativity and positivity as well as neutral comments of users by a natural language-based sentiment analysis (Kaushik and Mishra, 2014).

This investigation is about the sentiment toward a polarizing celebrity – Miley Cyrus (Lam, Graling and Wheeler, 2013) in the comment section of Instagram concerning her own and various fan-based user accounts (Figure 3.1). Miley Cyrus, who was born on November 23, 1992 as a daughter of the country singer Billy Ray Cyrus, gained fame in 2006 through the popular teen show “Hannah Montana” (Kennedy, 2017). She wanted to change her image (Kennedy, 2014) and earned criticism for her performance with Robin Thicke at the MTV Video Music Awards in 2013 and her music clip of the song “Wrecking Ball” (Hann, 2013). Miley Cyrus seems to be seen as a ‘good girl’ as well as a ‘bad girl’ (Vares and Jackson, 2015) and has influence on her audience, especially on young girls (Jackson, Goddard and Cossens, 2016).

Why did we perform this study? Besides “nice” information for Miley Cyrus' fan base as a by-product, we tried to get insights in the information behavior of celebrities' fans on social media. We wanted to know how the majority of the audience of a celebrity's social media account behaves. There is a discussion about celebrity harassment in terms of cyberbullying, online insulting and threatening (Whittaker and Kowalski, 2015). Does a polarizing celebrity like Miley Cyrus get positive or negative responses on social media for her behavior? Do haters' or

admires' comments "Come in Like a Wrecking Ball"? Our study is scientifically located in social media research; however, there are close relations to information science (especially informetrics; Stock and Weber, 2006) and to celebrity studies. To our knowledge, this is the first study which systematically combines celebrity studies and informetrics with social media research. Furthermore, the applied research methods and processes should serve as a base for further studies on the sentiments of Instagram posts and comments.

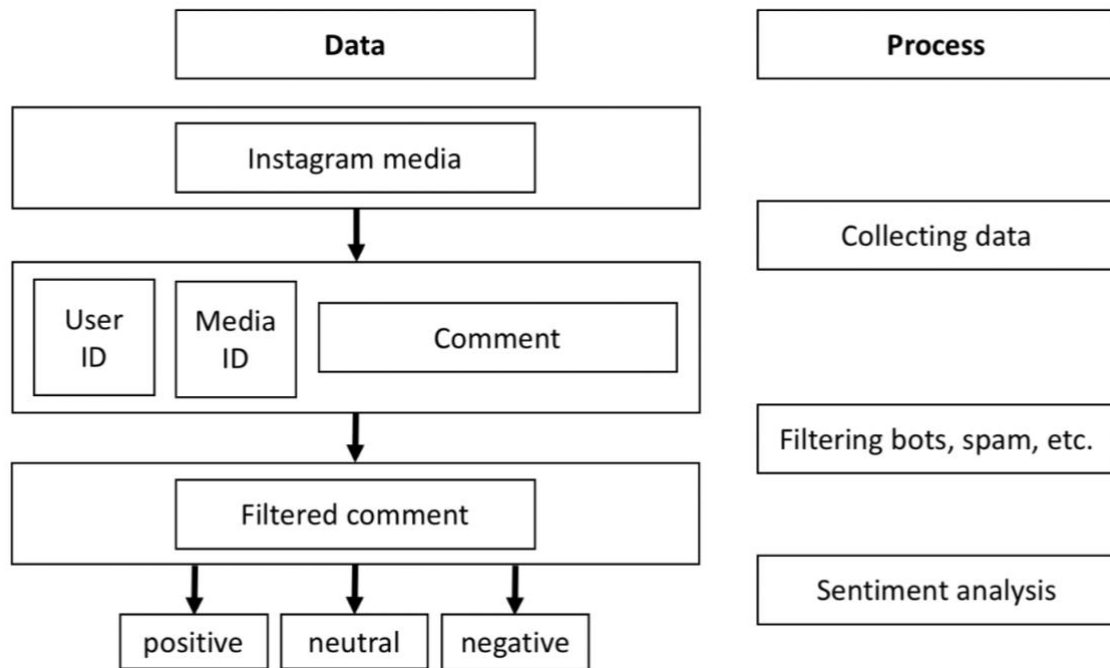


**Figure 3.1:** Prototypical Instagram post on Miley Cyrus' official account including users' comments

To determine the polarity of emotions towards a celebrity like Miley Cyrus on Instagram, a sentiment analysis was conducted in order to answer the following research questions:

- **RQ1:** Does some kind of hate or negativity exist in the comment section of celebrities? If so, to what extent are the comments negative?
- **RQ2:** Is the official account of a polarizing celebrity more prone to negative or positive sentiments than fan-based accounts?
- **RQ3:** Do certain events and scandals in a celebrity's life influence the overall sentiment on these accounts?
- **RQ4:** Is there a trend towards a specific sentiment over time?

First, comments from Instagram media of Miley Cyrus' official account as well as fan-based accounts were collected. Additionally, the user ID and the media ID were saved to track the source they belong to. Moreover, the collected comments had to be preprocessed, e.g. filtering bots and deleting spam. Finally, a dictionary-based sentiment analysis was performed (Figure 3.2).



**Figure 3.2:** Research process

### **3.1.2 Related Work**

The method of sentiment analysis can be differentiated in two main strategies: lexicon based and machine learning based technique. Before the analysis of an unknown dataset the machine learning based algorithm has to be trained by a training data set. For the lexicon based approach, the sum of the polarities for each word or phrase is the polarity of the document (Kaushik and Mishra, 2014). Khan, Atique and Thakare (2015) combine the methods of lexicon as well as machine learning based methods to improve precision and get a high recall. Kaushik and Mishra (2014) found a lexicon based approach for sentiment analysis that works fast. And, finally, Nielsen (2011) evaluated a word list for sentiment analysis in microblogs.

There are already several studies about sentiment analysis on Twitter posts (e.g. Pak and Paroubek, 2010; Kaushik and Mishra, 2014; Khan, Atique and Thakare, 2015) and product reviews (e.g. Dave, Lawrence and Pennock, 2003; Cui, Mittal and Datar, 2006; Mukherjee and Bhattacharyya, 2012). Boychuk, Sukharev, Voloshin and Karbovskii (2016) examined if the



uploaded media and comments about soccer games on social media are more negative when there is violence during a soccer match. Therefore, they analyzed the emotion of Instagram photos and videos as well as comments of posts. Unlike our approach, they worked with a machine learning based technique for the comments. Hosseinmardi et al. (2015) detected cyber hate on Instagram using a snowball method. They collected data from pictures and videos of 25,000 public Instagram accounts, including the comments of posts. Each post was manually checked for cyberbullying or cyber-aggressive behavior and labeled accordingly. As result, they found that users who get bullied in social media gain less likes for the posted media but more frequent comments.

### **3.2 Methods**

Sentiment analysis in social media (Pozzi et al., 2017) is different from “classical” sentiment analysis of newspaper articles, for instance. Here, we have text and we have additional emojis. A sentiment analysis in Instagram is virtually new scientific territory. We were only able to identify very few approaches of sentiment analysis of Instagram hashtags (Nam, Lee and Shin, 2015) and Instagram texts (Ranaweera and Rajapakse, 2016). We conducted for the first time a lexicon based sentiment analysis of Instagram post’s comments with a very large data base. First the required data (comments) have been collected and preprocessed. Afterwards, the sentiment analysis could be performed on over 660,000 comments.

#### **3.2.1 Data Collection**

The data were collected from the beginning of May 2016 until the beginning of June 2016 via the official Instagram API. It took place before the new Instagram API principles were realized (Instagram Platform Changelog, 2017). As a result of the Instagram API’s security measure, it was only possible to obtain the first 150 comments of each picture or video. The data was gathered from several Instagram accounts that upload media of Miley Cyrus. Four of the accounts (@mileycyrusrc, @mileyoffical, @mileybitch and @mileydoll) had a small number of posts (from 39 to about 250 posts). The remaining ones were @mileycyruspictures with approximately 5,000 posts and 70,000 followers and @mileysofficial with about 2,000 posts and an amount of 73,000 followers. Although these accounts have posted more media, @mileydoll (947,000 followers) and @mileyofficial (292,000 followers) have a higher number of followers. The official Miley Cyrus account (@mileycyrus) consisted of over 5,500 posts and had 52 million followers. Since the official account was the largest data source, not all comments of every

picture and video could be retrieved. Only media dating from June 2014 to June 2016 were gathered from the official Miley Cyrus account. The data of the smaller accounts were collected from the time of their creation mostly in 2012 to June 2016. All comments were saved into a database with the ID of the picture or video, as well as the ID of the account and the timestamp. The database consisted of approximately one million records after the data extraction.

### **3.2.2 Preprocessing**

Before analyzing the collected data, they had to be preprocessed by a python script. Spam such as chain mails, advertisements or comments with limited content like “first” (user expressing one is the first to comment on the picture or video) got deleted. Usernames and links in the comments were reduced to a more general term, namely “USERNAME” and “LINK”, without having an impact on the sentiment. Also, the language of the comments was checked and automatically translated to English. Replacing abbreviations with their actual term was not required in this investigation due to repeating characters having emotionality themselves. After eliminating useless comments and cleaning the data, the sentiment analysis was performed on approximately 660,000 remaining records.

### **3.2.3 Sentiment Analysis**

In our study, the sentiment analysis is used to identify, extract and analyze the opinions and feelings of the comments written under media relating to a celebrity. The following approach detects the sentiment strength (positive, neutral and negative) within an interval of -5 to +5 (from negative until positive). Sentiment strength of 0 is considered as a neutral sentiment. Using SentiStrength (Thelwall et al., 2010) as a model, the Python based sentiment analysis program consists of an emoticon list, an emotion lexicon, a negation lexicon, a lexicon for booster words like “very” or “totally” as well as a lexicon for phrases.

AFINN is a list of English words rated for valence with an integer between -5 and +5. Finn Årup Nielsen (2011) labeled the words manually in 2009 to 2011 for sentiment analysis on microblogs. An adapted version of AFINN-111 is used as the emotion lexicon in this sentiment analysis. Two words, “like” and “lie”, need a special treatment, because the lexicon itself cannot deal with ambiguity problems. As a solution, the Natural Language Toolkit (<http://www.nltk.org/>) for Python programs is used. With a POS-Tagger, the right part-of-speech is recognized, which leads to more correct sentiment word values. The sentiment analysis program operates different steps and assigns the final sentiment. Each comment gets a

sentiment for the written text as well as one for the emoticons – those were combined to the final sentiment of the comment.

First, the comment gets tokenized into sentences and next the sentences into words. To calculate the text sentiment, each word gets a sentiment value from the emotion lexicon. Words in quotation marks are considered as quotes and assessed as neutral because they often do not reflect the users' emotionality. Phrases that are present in the phrase lexicon get the sentiment value of that particular phrase. If the words of the phrase appear in the emotion lexicon as well, only the phrase value is important for the final comment sentiment. Also, the other lexicons were checked for negotiations (which can change the sentiment of a word from positive to negative, e.g. "not very happy") and booster words like "very". All those sentiment values add up to the final text sentiment of a comment. Because emoticons show a facial impression and therefore an emotion, it is important to include them into an emoticon lexicon. Further included are a few emojis that do not show a face but also express an emotion, for example a heart. The final sentiment is then calculated with all resulting values. Besides the text and emoticon sentiment values, there are also some other aspects considered in the final sentiment like repeated punctuations, repeated characters, number of emoticons and whole sentences or words in uppercase, all of them expressing emotion. After the sentiment analysis, each final sentiment of a comment is normalized to an interval of -5 to 5 (Equation 3.1).

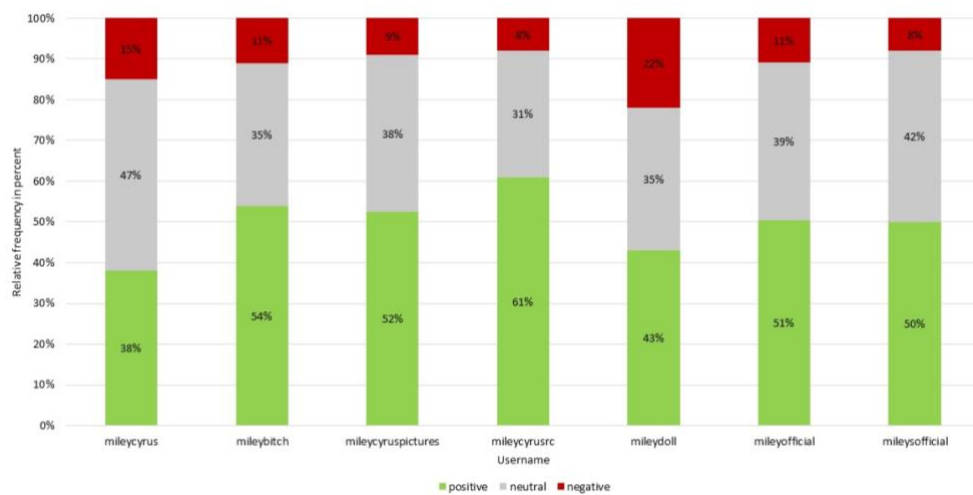
$$\text{Normalized value} = \frac{(5 * \text{sentiment})}{\max(|\text{sentiment}|)} \quad (3.1)$$

### 3.3 Results

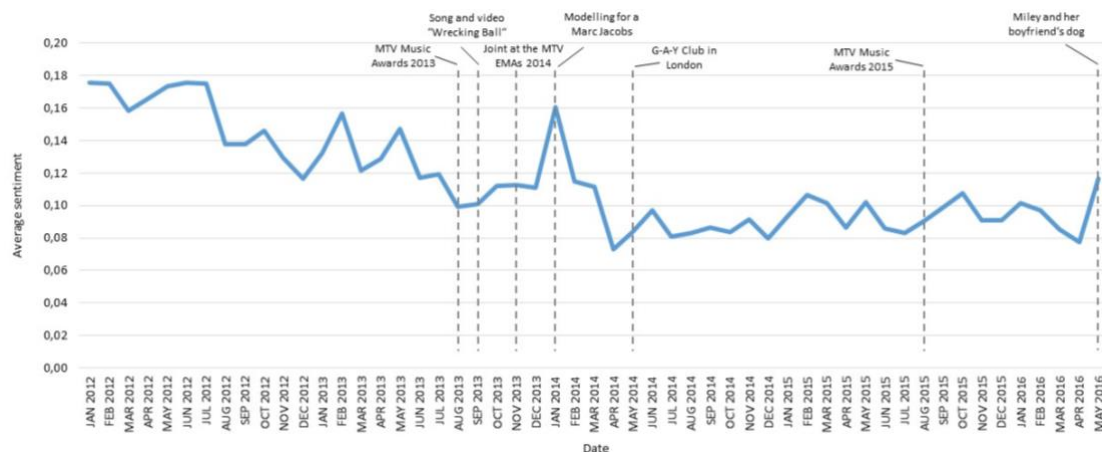
The amount of analyzed comments in the sentiment analysis is  $N = 662,883$ . In total, 46% (306,648) of them are neutral, 39% (258,320) are positive and 15% (97,914) are negative. Most of the analyzed comments (89.18%) belong to the official Miley Cyrus account (@mileycyrus). The remaining 10.82% points are spread to fan-based accounts. Total 5.85% of comments are collected from the Instagram account @mileycyruspictures. Each of the other unofficial accounts holds under 2.5% of the comments. Emoticons occur in 23.88% (158,288) of the total comments, whereas 76.12% (504,595) are without. Uppercase letters occurred in 4%, repeated characters as well as booster words in 5%, and repeated punctuations in 6% of the comments.

As shown in Figure 3.3, from all comments of the official account (@mileycyrus) 38% are positive, 47% are neutral, and 15% are negative. One of the fan-based accounts (@mileybitch) has 11% negative, 35% neutral, and 54% positive comments. There are 9% negative, 38% neutral

and 52% positive comments collected from the unofficial account named “mileycyruspictures”. The most positive comments, with 61%, were collected from the account named “mileycyrsrc”; it has 31% neutral and only 8% negative comments. The account “mileydoll” had the most negative comments with 22%, 43% positive comments, and 35% neutral comments. Another fan based account, called “mileyofficial”, has 51% positive comments, 39% neutral comments, and 11% negative comments. The last examined account (@mileysoffical) has 50% positive, 42% neutral as well as 8% negative comments. Overall, every account has more positive or neutral than negative comments. The neutral amount of comments is always smaller than the positive one except for the official Miley Cyrus account (@mileycyrus), which has more neutral than positive comments and the least positive comments (38%).



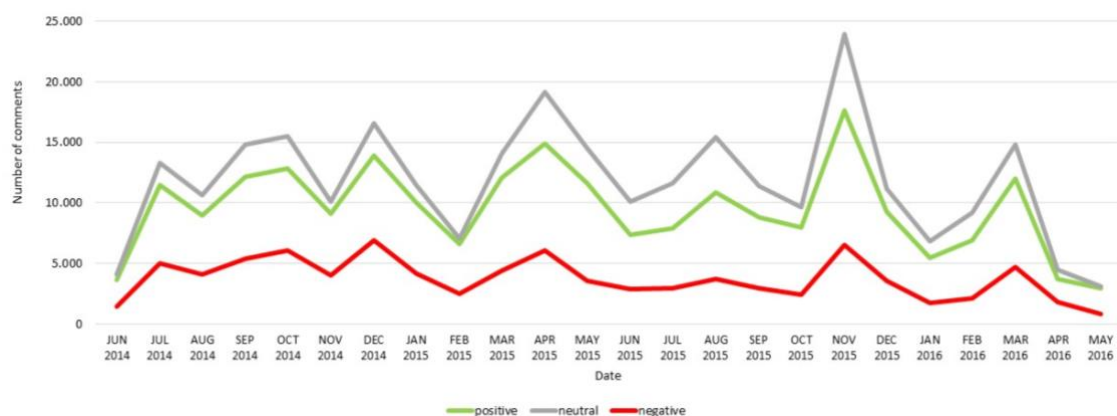
**Figure 3.3:** Relative frequency of negative, positive, and neutral comments for the analyzed accounts



**Figure 3.4:** Time series of the average sentiment for all accounts by and on Miley Cyrus

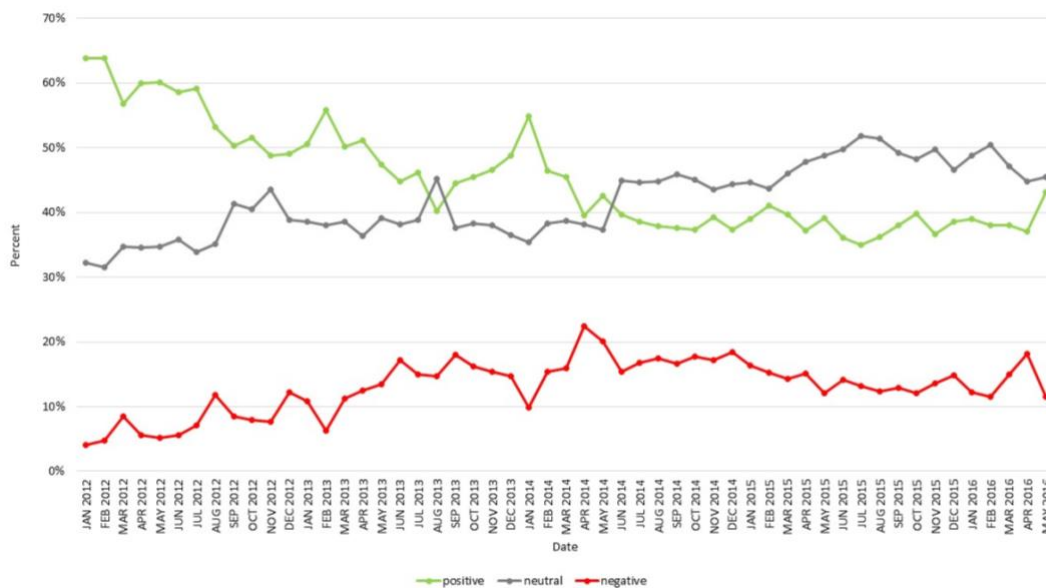
The average sentiment over time displays numerous positive and negative deflections (Figure 3.4). Over the entire time frame, the sentiment drops indicating that the comments are getting less positive over time. In August 2013, Miley Cyrus performed with Robin Thicke at the MTV Video Music Awards. Her controversial outfit and behavior received negative reviews (Mail Online, 2013). Miley's polarizing song and No. 1 hit "Wrecking Ball" and the corresponding video, published on the 9<sup>th</sup> of September in 2013 (MileyCyrusVEVO, 2013), brought a lot of attention as well. The video especially got relatively negative reviews. The diagram shows that the sentiment on Miley Cyrus decreases during that time. Despite that, the average value of the sentiment is still positive. The following increase leads to a positive peak; this might indicate the success of her fourth studio album "Bangerz" that was released in the beginning of October 2013 (RcaRecords, 2013). The album got several, but mainly positive, reviews from critics (World History Project, 2013).

The sentiment drops only a bit after November 2013 and then rises until January 2014 which contradicts with the scandal of Miley lighting a joint at the MTV Europe Music Awards (EMAs) in the same year. However, in January 2014 Miley Cyrus got positive publicity for modeling in a Marc Jacobs campaign for his Spring/Summer collection (Vogue, 2014). In May 2014 Miley took a ride on a huge phallus in the G-A-Y Club in London. She got a lot of bad publicity for her action (Albers Ben Chamo, 2014). Again, she received negative criticism for her behavior and her revealing outfit at the MTV Music Awards in August 2015 (ProSieben.de, 2016). Both actions also resulted in a drop of the sentiment after the positive feedback for the modeling campaign. In May 2016, the sentiment rises again after Miley Cyrus posted a picture of herself with her Ex-Boyfriend's dog which implied that they are dating again (Mail Online, 2017; Miley Cyrus Instagram, 2016).



**Figure 3.5:** Number of comments with sentiment over time

Figure 3.5 displays the number of comments over time by neutral, positive and negative sentiment. The number of analyzed comments rises in June 2014, only because the comments from the official Miley Cyrus account were collected from June 2014 to June 2016. It features much more media than the fan-based accounts. The amount of neutral comments is always higher than the positive or the negative ones; also the number of negative comments is always lower than the number of positive ones. The distance between negative and positive comments gets bigger at the deflections.



**Figure 3.6:** Sentiment of comments on Miley Cyrus over time in percent

In Figure 3.6 we can see the relative frequencies of positive, negative and neutral comments. The sentiment's percentage shows that positive comments (green) decrease while negative (red) and neutral comments (blue) increase. In January 2012 there are around 63% positive, 5% negative, and 32% neutral comments. At this time, the positive comments are at their highest percentage. In August 2012 the lines show about 53% positive, 12% negative, and 35% neutral comments. One year later, in August 2013, we can detect 40% positive, 15% negative, and 45% neutral comments. In April 2014 the percentage of negative comments is at the highest point with around 22%. The neutral comments are at around 38% and the positive ones at 40%. In June 2014 the percentage of neutral comments gets higher than the percentage of positive comments. At this time, the comments from the official Miley account were collected. Coming to July 2015, with the highest peak of the neutral comments, they are at around 52 percent. The positive comments have a lowest point in July 2015, with 35%, and the

negative ones are at 13%. In April 2016, the positive comments are at 38%, the negative ones are at 18%, and the neutral ones are at 44%.

### **3.4 Discussion**

This investigation displays if there is negative response to uploaded images and videos on the social media account from a polarizing celebrity and, additionally, from fan-based accounts. Furthermore, the differences between the official account of Miley Cyrus as well as fan-based accounts are shown. Finally, the sentiment regarding certain events was detected. Our study also discovered a huge amount of spam as well as chain mails in the comment section of a celebrity's uploaded media. Conclusively, the large fan base of a celebrity attracts many spammers.

The text-based sentiment analysis on data of different social media services has become an interesting and comprehensive research subject. There are already several studies about sentiment analysis, but none about a sentiment analysis on the reaction of a celebrity's audience. Our study should serve as a model and example for using the described dictionary based method for sentiment analysis, especially for Instagram comments. However, the used method can be applied to other text-based data as well.

#### ***3.4.1 RQ1: Does some kind of hate or negativity exist in the comment section of celebrities? If so, to what extent are the comments negative?***

The overall sentiment is always slightly positive. Although the negative and hate comments are not predominating in the comment section of Instagram pictures related to Miley Cyrus, some negativity was found. Around 15% from over 660,000 comments was detected as negative, what makes an amount of nearly 100,000 negative comments.

#### ***3.4.2 RQ2: Is the official account of a polarizing celebrity more prone to negative or positive sentiment than fan-based accounts?***

The official Miley Cyrus account (@mileycyrus) has the least positive and the most neutral comments. There is also only one of the six unofficial accounts having more negative comments than the official Miley account. Overall, fan-based accounts get more positive feedback for the pictures and less hate than the proofed Miley account. Haters seem to turn their negative comments directly against Miley Cyrus.

### ***3.4.3 RQ3: Do certain events and scandals in a celebrity's life influence the overall sentiment on these accounts?***

There are several events that are decisive factors for the rise of the number of comments, as well as for the downs of the negative decreases and the peaks of positive increases (e.g. release of a new album). Furthermore, modeling campaigns as well as relationship-based pictures attracted the attention of users to comment on the media of Miley Cyrus. Pictures with attention-gaining events are getting even more comments.

### ***3.4.4 RQ4: Is there a trend towards a specific sentiment over time?***

When the audience is going to comment more on the media, the users are posting more positive and neutral comments than negative comments. The negative line does not have such swings as the ones from the positive and neutral comments. The average sentiment over time has many ups and downs – but generally decreases in the reported time span.

The method of using sentiment analysis has some limitations. Because of the automated method for filtering spam and bots, there might be some of the spam comments left. Moreover, ironic sentences and comments including sarcasm may not be recognized by the script. Another difficulty appears at the misspelling of words. And even when translating one language into another, there could be some mistranslated words. Another limitation is bound to the Instagram APIs conditions. One is only able to collect the latest 150 comments of a medium. Maybe, there will be more positive or even negative feedback in the first comments of the media from the official account, which had more than 3,000 comments under most pictures and videos. Further research may include a comparison between emoticon sentiment and text sentiment of each comment as well as research of comments towards further celebrities. Also, a comparison about the sentiment of comments from different social media services would be interesting. Conclusively, the sentiment analysis of Miley Cyrus' Instagram posts displays that hater comments do not “come in like a wrecking ball” and are obviously outnumbered.

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## 4. User-oriented Quality Estimation of Social News Systems and its Content: A Gender-dependent Assessment of Reddit

### 4.1 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 (Fig. 4.1). 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 14<sup>th</sup> position and therefore the most popular social news service, next to e.g., Digg and HackerNews.

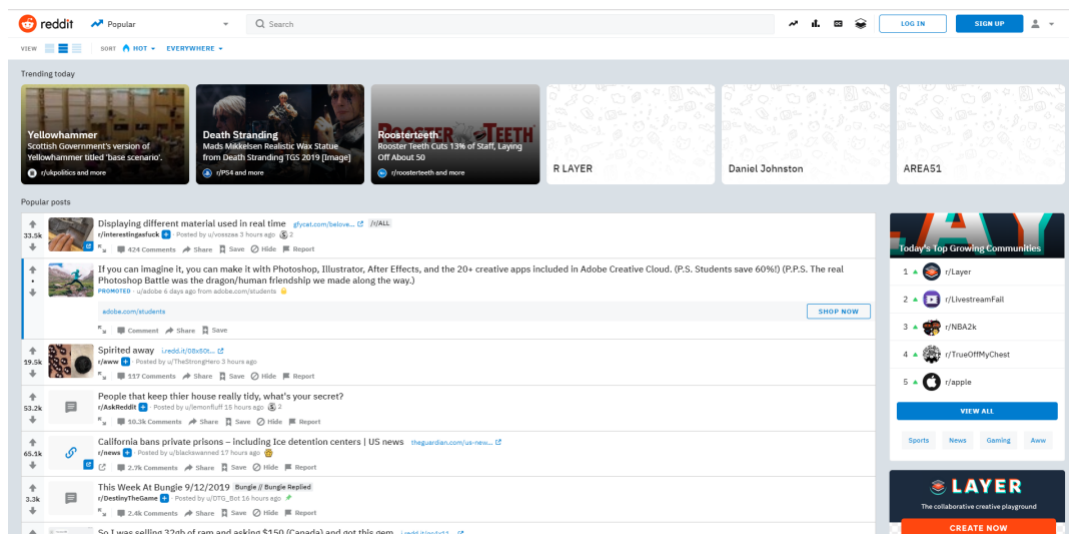


Figure 4.1: The frontpage of Reddit

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 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 used 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 analyzed 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 information on Reddit?

## **4.2 Related Work**

When looking at the aspects 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 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 the quality of it. 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, be 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 thread 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.

### **4.3 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 modeled 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 modeled. 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 Chi<sup>2</sup> was 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).

#### 4.4 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.

**Table 4.1:** Motives of users to apply Reddit differentiated by gender

<b>Motives</b>	<b>All users (N=495)</b>	<b>Male users (N=296)</b>	<b>Female users (N=199)</b>	<b>Sig.</b>
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

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 4.1). 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 use 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 use 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.

For the perceived service quality differentiated by gender (RQ2), participants should rate statements about Reddit being enjoyable, useful, trustable, or easy to use (Table 4.2). 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 4.2:** 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 4.3. 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.

**Table 4.3:** 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

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 4.4:** 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

Table 4.4 shows how users of Reddit are seeking 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%).

#### 4.5 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 use 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 4.1) 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 Reddit's 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 using 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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## **Part 2:**

### Information Behavior and Social Media Usage of Asylum Seekers



## **5. Theoretical Foundations, In: Asylees' ICT and Digital Media Usage: New Life – New Information?**

As the analysis of asylum seekers' information behavior is a very current and highly topical research area, there is no established theory to explain and to understand the interrelationships between asylum seekers (including the aspects of gender and generation), their information behavior, information needs, their level of information literacy, and their usage of information and communications technology (ICT) as well as of offline and online media. Due to prevailing circumstances, the asylum seekers were forced to leave their home country and thus had to move to a new country and environment – making it important to study their information horizons in the old and novel situation, while concentrating not only on information sources like social media, other online and offline media, and ICT, but also on offline and online information exchange with other people to satisfy newly occurring and targeting information needs. As theoretical foundations, mainly two approaches were applied, namely Information Behavior Research (with a research tradition especially in information science) and the Uses and Gratifications Theory (with a long research tradition in media and communications science). Additionally, it needs to be addressed what “media” or information channels are.

In line with the subtitle of this monograph, “New Life – New Information?”, the primary purpose of this research is to investigate the information behavior as well as the social media, offline and online media, and ICT usage of asylum seekers and refugees in a new country. As the researchers are from Germany and there was a massive migration flow from countries of the Asian Middle East around 2015, this study comprises Syria, Iraq, Afghanistan, and Iran as asylees' former home countries and Germany as the target country, but – of course – for comparison also other parts of the world have been considered. The asylees' information behavior and applied social media, offline and online media, and ICT usage prior to forced migration, and therefore, in their home country and furthermore their practices in the target country are represented. Further, the differences between the homeland and Germany will be highlighted. For ICT and media usage, also gender-dependent and age-dependent differences and similarities for asylum seekers will be displayed. Other aspects investigated and studied are the information needs of asylum seekers and refugees as well as experiences of experts regarding the information behavior and ICT, online and offline media, and social media usage of asylum seekers.

The goal of this chapter is the development of a theoretical framework establishing a set of research questions as well as a research model. Anfara Jr. and Mertz (2015, p. 15) define

theoretical frameworks “as any empirical or quasi-empirical theory of social and/or psychological processes, at a variety of levels (e.g., grand, midrange, explanatory), that can be applied to the understanding of phenomena.” Following, theoretical phenomena and concepts are combined as a theoretical framework and are further transformed into a research model. Furthermore, theoretical frameworks serve to present phenomena and interrelationships in an understandable and illustrative way.

For the theoretical framework of this research, firstly the concept of “information behavior” will be described. In this context, information needs, information production, information seeking and consumption as well as information horizons will be elaborated on. Furthermore, theories of media usage as the Uses and Gratifications Theory (Katz et al., 1973; Blumler & Katz, 1974) are consulted to describe the motives of media and ICT users for using certain media. Information (in the sense of knowledge) is one of the four fundamental aspects of the Uses and Gratifications Theory, along with entertainment, socialization, and self-actualization. Then, the used classification of media, which are used as information channels by asylees, will be introduced. The core part of the theoretical foundation is a model by Zimmer, Scheibe, and Stock (2018), which initially represents the information behavior of users on a synchronous social media service, i.e. social live streaming services. But the model “is (with small changes) suitable for all kinds of social media” (Zimmer et al., 2018, p. 444). This model is modified for this study’s aim to represent and to understand the phenomenon of asylees’ information behavior and their social media, online media, offline media, and ICT usage.

## **5.1 Information Behavior Research**

Analyzing the information behavior and thereby the information needs as well as the information production, the information seeking and the information reception behavior as well as, additionally, the information horizons of people is an important aspect in information science studies. As the present research aims to investigate the information behavior as well as information needs of refugees and asylum seekers prior to escaping from their home country as well as after arriving in the new country and thereby integrating into and adapting to an unfamiliar society, the concepts of information behavior need to be elaborated on.

*Information production* is the process of creating and communicating parts of information by individual persons. With *information seeking*, such activities which contain the active search for information, e.g., by asking other people, to use a search engine or to consult a social media channel can be considered. *Information reception* may be active or passive. Active information

reception is the application of actively sought information. In many situations, information is consumed passively (Bates, 2002; Wilson, 1997; Wilson, 2000). For example, the passive consumption of information happens during human interaction, resulting in information exchange (Wilson, 1981). Information behavior depends on context and situation and on one's personal information horizon (Sonnenwald, 1999; Sonnenwald & Iivonen, 1999).

In 1968, Paisley (1968) already mentioned how information science can meet behavioral science when studying information needs and information uses. The term *information behavior* is defined as an "umbrella concept" for describing the "ways that people generally deal with information" (Savolainen, 2007, p. 109). Wilson (2000) defines information behavior in a rather broad way with attention to information seeking and information use: "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. Thus, it includes face-to-face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given" (p. 49). According to this definition, all activities related to information are included in the concept of information behavior. People are searching for information although and while they do not actively perceive their acting as information seeking. Further support is provided by a statement from Bates (2002), she also mentioned that information seeking includes "all the information that comes to a human being during a lifetime, not just in those moments when a person actively seeks information" (p. 3). Spink and Cole (2004) define information seeking as a subset of information behavior that includes the purposive seeking of information in relation to reaching a goal and therefore satisfying a need. Although information seeking appears to be intentional, a person does not necessarily perceive an information need as active (Wilson, 2000). Case (2007) illustrates the context of information seeking and information needs in the following way: "Every day of our lives we engage in some activity that might be called information seeking, though we may not think of it that way at the time. From the moment of our birth we are prompted by our environment and our motivations to seek out information that will help us meet our needs" (p. 18). Stock and Stock (2013) write about the process of seeking information for all basic human needs: "However, many fundamental human needs require information in order to be satisfied. This begins with information seeking in order to locate food, water, and sex, and ends with problem-solving, which can only be achieved via knowledge (to be sought and retrieved)" (p. 469). The fundamental and basic human needs are coming from a person's psychological nature. Other needs people may recognize are safety needs, love and belonging needs, esteem needs and, finally, self-actualization (Maslow, 1954).

In 1981, Wilson (1981) investigated a model to display the interdependencies between the various concepts as well as different constituents of the information behavior area; the model was updated in 1999 (Wilson, 1999). According to the model, the information user is looking for some information because of a certain (information) need. As Stock and Stock (2013) also state, “[a]n individual’s information need is the starting point of any search for information” (p. 469). The information seeking behavior results from using distinct techniques: Making demands on an information system (e.g., retrieval systems, online services, libraries) or other information sources as well as information exchange with other people. This process can result in success or failure for the relevance of the sought information. Afterwards, the information use may lead to information transfer, if exchanging information with other people, or the use of an information system, if successful, will satisfy or will not satisfy the information need of the user. As the model shows, information behavior is a collective term, including information need, information production, information seeking, information use, and further elements.

Hence, this approach does not only consider information seeking and consumption behavior (as often found in information science, e.g., Cole, 2012; Fisher & Julien, 2009) but information production and dissemination behavior as well. The definition by Pettigrew, Fidel, and Bruce (2001, p. 44) who describe “information behavior” as “how people need, seek, give, and use information in different contexts, including the workplace and everyday living” are used for this study.

Case and Given (2016) state, “context and situation are important concepts for information behavior research” (p. 48). Human information behavior is embedded in one’s “*information horizon*” (Sonnenwald, 1999, p. 8) including social contacts and networks (their social capital) as well as their concrete contexts and situations. Sonnenwald (1999) defines *context* as “the quintessence of a set (or group) of past, present and future situations” (p. 3). Contexts are, for instance, academia, family life, citizenship, clubs, etc. Following Sonnenwald (1999), contexts have boundaries, constraints, and privileges which are perceived differently by participants and outsiders. A *situation* is characterized as “a set of related activities, or a set of related stories, that occur over time” (Sonnenwald, 1999, p. 3). *Social networks* “help construct situations and contexts, and are constructed by situations and contexts” (Sonnenwald, 1999, p. 4). They refer to communication among people, to patterns of connection, and to human interaction. Within the context and the situation there is an information horizon in which people act. When a person has decided to produce, to look for, or to receive information, there is an information horizon in which she or he realizes her or his information behavior. Sonnenwald (1999) only considers

information seeking behavior, while we broaden this approach to all aspects of information behavior.

The success (or failure) of one's information behavior depends on her or his level of *information literacy* (Stock & Stock, 2013, chapt. A.5). According to UNESCO and the IFLA (2005), information literacy "empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals." Information literacy includes two aspects. The first building block deals with practical competences for information retrieval starting with the recognition of an information need, proceeding via the search, retrieval and evaluation of information, and leading finally to the application of found and evaluated information (ACRL, 2000). The second building block summarizes practical competences for information production and knowledge representation. Apart from the creation of information (texts, images, audio files, and videos), it emphasizes their uploading, indexing, and storage in digital information services (e.g., on a social media channel), if necessary (Stock & Stock, 2013, p. 80). For both of these building blocks, it is of great use to possess basic knowledge of information law and information ethics.

Multiple aspects shape the information horizon of a user which results in human information behavior. As both, context and situation in which asylum applicants behave changed due to the escape of their home country and the re-settling into the new country with a foreign language and a different culture, it is necessary to study their information literacy, the information needs, and the information horizons. Furthermore, how the asylum applicants satisfy their needs and therefore seek information is another aspect that should be considered in this research. On social media and messaging services both, information production as well as information seeking and information reception behavior, is always given. Besides social media, face-to-face communication as well as ICT devices and other media serve as information exchange sources and are considered in this study as well. But why are people using certain kinds of media? What are their motives?

## **5.2 Uses and Gratifications Theory**

One of the classical sender-centered models in communication and media science is the theory of Lasswell (1948, p. 37), introducing the following questions: Who? Says What? In Which Channel? To Whom? With What Effect? Braddock (1958) adds two further questions: What circumstances? and 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” (Braddock, 1958, p. 88). In terms of Braddock, the *Who* is the communicator, the *What* is the message with the two inseparable aspects of content and presentation, *To Whom* asks for the audience and its characteristics, *What Circumstances* analyzes the environment of the information behavior in terms of time and setting, *What Medium* includes questions on the information channel (online or offline), *What Purpose* means the communicator’s motives to communicate, and, finally, *What Effect* analyzes the outcomes of the entire communication process for the audience. Interestingly, Braddock only makes mention of the motives of the communicator, but not of the audience.

Here, another theoretical framework, now audience-oriented, enters the stage. The Uses and Gratifications approach had its beginnings in 1962 when Katz and Foulkes (1962) started to ask what people do with the media instead of the question what media does with the people as Lasswell and Braddock asked. To understand why people use media and what they use the media for, Katz, Blumler, and Gurevitch (1973) summarized findings and described fundamental objectives of uses and gratifications research in media consumption, which resulted in the Uses and Gratifications Theory (U&GT). It is a popular method in mass communication studies to explain motives for media use and to identify what needs are satisfied. There are five fundamental assumptions for the uses and gratifications model (Katz et al., 1973):

1. The audience engages actively while dealing with media; the usage is goal-orientated as media consumption is shaped by expectations towards the media’s content.
2. The recipient uses the media to satisfy his or her needs and decides actively whether to apply a specific medium or not.
3. There is a competition between the media and other sources, which are not media-based. Those alternatives may lead to need satisfaction as well.
4. Goals of media consumption can be derived by simply asking the users or confronting them, as they are aware of their motives.
5. Suspension of judgements about the value of the cultural significance of media while discovering audience orientations solely.

During the process of studying uses and gratifications, researchers “are concerned with: (1) the social and psychological origins of (2) needs, which generate (3) expectations of (4) the mass media or other sources, which lead to (5) differential patterns of media exposure (or engagement in other activities), resulting in (6) need gratifications and (7) other consequences, perhaps mostly unintended ones” (Katz et al., 1973, p. 510). Research has shown that three sources for need gratification and need satisfaction are given – those are media content, media exposure, and the social context as well as the situation of the media exposure (Katz et al., 1973).

McQuail, Blumler, and Brown (1972) identified four basic needs that are satisfied through media consumption – diversion (escaping reality, responsibilities, and problems as well as for relaxation); personal relationships (social contacts and substitute companionship); personal identity (self-realization), and surveillance. Furthermore, 35 more detailed needs have been defined and identified by Katz, Gurevitch, and Haas (1973). Later, McQuail (1983) summarizes four central motives for media use of the 35 needs, which are: information, entertainment, social interaction, and self-identity.

For user-generated content, mostly on social media, Shao (2009) differentiates between three different user roles, which are consumers, participants, and producers. Users of social media, who are consuming, use it mostly for information and entertainment purposes, whereby participating users, those who are, for example, writing comments, have the goal to interact with others and to get integrated into the community. Finally, the users who are actively producing their own content and sharing it online, are using the media mainly for self-expression and self-actualization.

Palmgreen, Wenner, and Rayburn (1980) address the gap between “gratifications sought” and “gratifications obtained” in uses and gratifications research, as most studies are not differentiating between these two concepts. Earlier, in 1974, Greenberg (1974) described the phenomenon as “gratifications sought” and “gratifications received.” It is the distinction between expectations of the audience on the media and its content (gratifications sought) and the need for satisfaction achieved by media consumption (gratifications obtained or gratification received). Also, there is a feedback loop, the media user may seek information, but will receive entertainment from the media (Palmgreen et al., 1980).

Latest research about uses and gratifications in social media usage claim that uses and gratifications have been shifted and changed for “new” (i.e., social) media types (e.g., Sundar & Limperos, 2013). In order to be able to compare the motives of using certain ICT or online, and offline as well as social or traditional media, the four central motives (information, entertainment, social interaction, and self-presentation) are applied in this study. Thereby, it was distinguished between socializing via communication channels and socializing in order to be able to speak about the received information. Furthermore, it was also differentiated between self-presentation by producing content or playing digital (online) games and personal identity, meaning to work on and build one’s own personal identity, resulting in information (knowledge), entertainment, socializing or socializing: communicating, and self-presentation or personal identity.

### 5.3 ICT, Online and Traditional Media

People may communicate face-to-face or through different media channels. Media are formal information channels and may be divided into offline media (without the application of the Internet and its services) and online media (provided by the Internet). Some media exist in both media types, e.g., television. Offline media are mass media (books, newspaper, and magazines) and means for individual information transmission (landline telephone, SMS, letters, and postcards). To use online media presupposes the application of a device of information and communications technology. Such ICT devices are personal computers, notebooks, laptops, tablets, and smartphones.

Three kinds of online media, namely instant messaging services (messengers like WhatsApp and Skype), social media, and other online media are distinguished. Instant messaging services enable “near-synchronous computer-based one-on-one communication” (Nardi et al., 2000, p. 80). In addition to transmissions of text and image messages, there are also offers that provide video calling functions. Social media are “a group of Internet-based applications which are built on the ideological and technological foundations of Web 2.0 and enable the creation and exchange of user-generated content” (Kaplan & Haenlein, 2010, p. 61). Social media can be categorized by functionality (Fischer et al., 2020) into social network services (e.g., Facebook, LinkedIn), self-presentation services (e.g., Instagram, TikTok, Snapchat), micro-blogging services (e.g., Twitter), live streaming services (e.g., YouNow, Twitch), and entertainment services (e.g., Pinterest, YouTube).

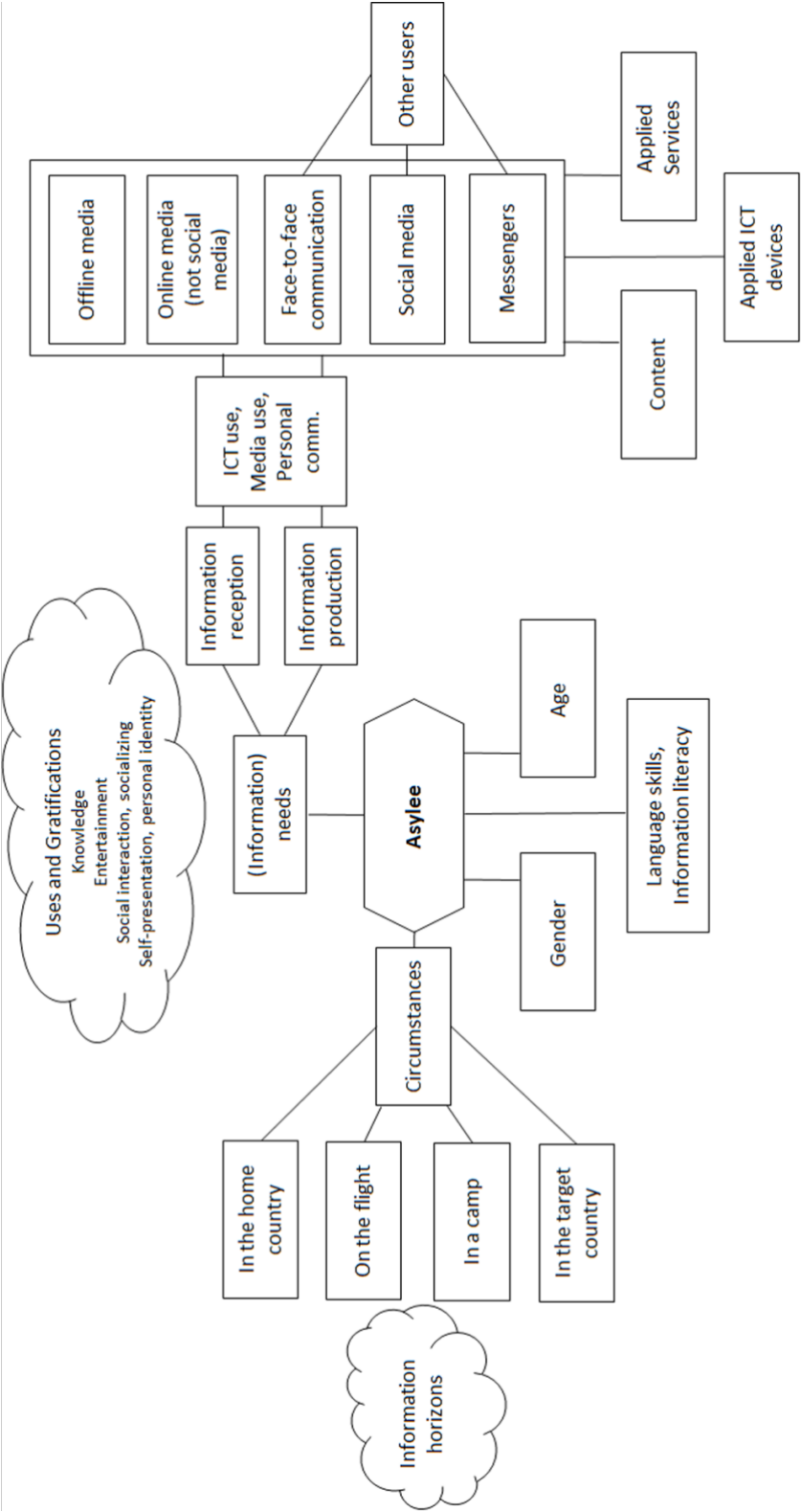
Other online services with interest for our study are e-mails, translation services, search engines, encyclopedias, learning services, news websites, digital games, podcasts, dating services, and, finally, streaming services (e.g., Netflix).

### 5.4 Intuitive Research Model

Asylum seekers are at the center of this study. The research model integrates the role of asylum seekers and combines it with the present concept of information behavior, the media, and the Uses and Gratifications approach (Figure 5.1). The asylees’ information behavior and their media usage for all participants and, additionally, their gender, age (Haji et al., 2020; Zimmer & Scheibe, 2020), language skills, and information literacy skills are described. As learnt from the extended Lasswell formula, the circumstances of media use are important. So, the focus is on the asylees’ situation and their information horizons in the former home country and the target country (i.e.,



Germany). The aspects of the situations during forced migration or in a refugee camp are more on the margins of the investigation and were only considered as part of the literature review.



**Figure 5.1:** Information behavior and media use of asylum seekers

If there is an information need – and it can be assumed that there are lots of situations in a new country asking for information – it will be satisfied by information production and information reception. For all information needs, analyzed are the motives for producing or receiving information, which are given by the Uses and Gratifications Theory, namely looking for or giving knowledge, seeking entertainment, finding social interaction and socializing with other people, and, finally, trying to present oneself or to establish one's personal identity.

Satisfying an information need means to use media or to talk face-to-face to other people. Concerning the media, it is distinguished between offline media, social media (Scheibe et al., 2019), messengers, and other online media. As the ICT use is a presupposition of the application of digital media, described are the ICT devices applied by asylum seekers. Additionally, they were asked about the concrete applied services and the specific content. For every applied service (e.g., Facebook, search engines, or Twitter), the intensity of usage (e.g., daily, weekly) for the satisfaction of the motives defined by the U&GT are analyzed. In the same way, the content (e.g., news on the home country, news on Germany, jobs, law, health, education) for every motive and every information service was asked about. Concerning the information horizons, this was asked about twice, for the asylees' information horizon in the former home country and their horizon in the target country. [...]¹

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¹The following text refers to chapters of the book. To avoid confusion this part was removed.

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## 6. Social Media Usage of Asylum Seekers in Germany

### 6.1. Introduction

#### 6.1.1 *Migrants, Asylum Seekers, and Refugees*

In 2015 and the following years, some millions of migrants illegally crossed the borders into the countries of the European Union leading to a “refugee crisis” in Europe (Krzyżanowski, Triandafyllidou and Wodak, 2018). Those migrants may be called *temporally illegal*, because indeed the people entered the European Union without permission (e.g., a visa); this status is only a temporary one as they may apply (and get) asylum in European countries (Lafazani, 2018). The migrants’ home countries were partially destroyed by war or civil war. Most of the migrated people have a Syrian, Iraqi, Kurdish, or Afghan nationality. In our research study we want to understand the information and communication behavior of those migrants especially regarding their use of social media and messaging services. There are many studies on people’s information behavior; however, the crucial aspect in information behavior research is the context (Courtright, 2007).

We were able to identify some recent studies on migrants’ and refugees’ information behavior, e.g., the communication behavior of Syrians in the Za’atari camp in Jordan (Xu and Maitland, 2016), the information seeking behavior of Syrian refugees in Egypt (Manour, 2018), the role of social capital (family, friends, friends of friends) on refugees’ information behavior during the integration process (Oduntan, 2016), refugees’ library service needs (Eskola et al., 2017), academic libraries’ services for asylum seekers (Taylor Bowdoin et al., 2017), and on refugees’ digital skills during job orientation in Germany (Stiller and Trkulja, 2018). Concerning social media, Ahmed and Veronis (2017) studied gendered practices in social media usage among Syrian refugee youth in Ottawa, Canada; Ramadan (2017) questioned the role of Facebook in the communication processes among Syrians inside and outside their country; finally, Dekker et al. (2018) analyzed how Syrian asylum migrants in the Netherlands use social media information.

It is this special context that makes our study new and interesting, as it is the first empirical study of social media usage behavior in the context of the situation of asylum applicants in Germany.

For clarity, we should define some basic terms. A “migrant” is a person who voluntarily left his or her home country. “Refugee” is a narrower term of “migrant”, meaning a person who is afraid to be persecuted in their home country. Migrants or refugees are called “illegal”, if they entered the destination country without valid official permission. An “applicant for asylum” is a

migrant who requests an official approval of the status of a refugee. All our interviewees were illegal migrants and asylum applicants.

**Table 6.1:** Number of asylum applications in Germany (2017) by migrants' home country

Country	Number
Syria	50,422
Iraq	23,605
Afghanistan*	18,282
Eritrea	10,582
Iran*	9,186
Turkey	8,483
Nigeria	8,261
Somalia	7,561
Russia	6,227
Albania	6,089

\* : Middle East Country. *Source:* BaMF (2018); all home countries with more than 6,000 migrants.

In 2017, the countries of the European Union with the highest numbers of asylum applications were Germany (222,683 applications), Italy (128,855), France (99,330), Greece (58,660), and the United Kingdom (33,850) (BaMF, 2018, p. 30). It seems natural to study the situation in Germany as there are by far the most illegal migrants in Europe. In 2015, Germany received 476,649 asylum applications; in 2016, the number grew up to 745,545 applications, while in 2017 the number decreased to 222,683 cases (BaMF, 2018, p. 15). We decided to study mainly those migrants coming from home countries with the most asylum applications. The overwhelming majority of illegal immigrants originate from Middle Eastern countries, namely Syria (rank 1), Iraq (rank 2), Afghanistan (rank 3), and Iran (rank 5) (Table 6.1). We have to mention the large number of people from Kurdistan, who have the nationality of Iraq, Iran, Syria, or Turkey; however, there are no exact figures on their concrete numbers. Among the German *Bundesländer*, North Rhine-Westphalia hosts most illegal migrants. In 2017, 53,343 asylum applications were administered in North Rhine-Westphalia, followed by Bavaria with 24,243 (BaMF, 2018, p. 18). That is the reason why we conducted our interviews in this *Bundesland*.

There are almost equally as many female and male asylum seekers from Syria and Iran; more males than females are coming from Iraq and from Afghanistan (Table 6.2). The most frequent age group of all adult migrants in Germany (not only from the Middle East) are people aged 18 to 24 years (18.9% in 2017), followed by 25 to 30 year olds (11.4%). However, the most frequent age group of all illegal migrants includes children aged 0 to 4 (23.2%) (BaMF, 2018, p. 24). Mostly young families with their (partly very young) children came to Germany.

**Table 6.2:** Middle Eastern migrants in Germany by gender

Country	Male / Female
Syria	51.0% / 49.0%
Iraq	53.2% / 46.8%
Afghanistan	66.1% / 33.9%
Iran	58.2% / 41.8%

Source: BaMF (2018).

### **6.1.2 Information Behavior**

This research study is on the illegal migrants' information behavior. In line with Pettigrew, Fidel, and Bruce (2001, p. 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., Cole, 2012; Fisher and Julien, 2009), but information production and dissemination behavior as well. Wilson (2000, p. 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. Thus, it includes face-to-face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given". Human information behavior is embedded in the users' "information horizons" (Sonnenwald, 2005) 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 (Scheibe, Fietkiewicz and Stock, 2016; Zimmer, Scheibe and Stock, 2018).

In line with the Uses and Gratifications Theory, researchers may study the users' needs and then uncover how they are gratified by the media – in our case, by social media and messaging services. 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 (Katz, Blumler and Gurevitch, 1973, p. 510). Blumler and Katz (1975) and later MacQuail (1983) found four basic dimensions of gratifications, namely information, personal identity, entertainment as well as integration and social interaction. Information means the motive of giving or finding knowledge (including everyday information behavior) (Ocepek, 2018); 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, filling time, or sexual arousal; social interaction is the motive to interact with other people and to maintain social capital (for details, see Zimmer, Scheibe and Stock, 2018).

### **6.1.3 Our Research**

In this article, we restrict our scope only to information behavior on social media and messaging services (and ignore other online services, printed services, and face-to-face contacts). We follow the well-known definition of "Social Media" by Kaplan and Haenlein (2010, p. 61): "Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content". Social Media includes, among others, social networking services (as Facebook), sharing services for videos and images (as YouTube and Instagram), social live streaming services (as Periscope) and services for knowledge exchange (as Twitter) (Linde and Stock, 2011, pp. 259 ff.). Messaging services "allow mobile users to send real-time text messages to individuals or groups of friends at no cost" (Church and de Oliveira, 2013, p. 2013). Nowadays, WhatsApp is the most prominent messaging service. Additionally, we asked for VoIP services (Voice on Internet Protocol as Skype).

Now we would like to introduce our research model (Figure 6.1). Starting with the migrants in Germany, we are interested in their gender, age, and nationality as well as in their language skills and their competencies to master digital devices. If there is an information need, e.g. for social interaction, i.e. to send and to receive information (for instance, "I want to speak to my mother in Aleppo, Syria") an information demand will be triggered (continuing the example, "I would like to use a device for a video call"). This demand matches (in positive cases) a service supply of a social media platform or a messaging service (i.e., our user applies WhatsApp's video call functionality). Reading our research model from the bottom to the top, we have to identify



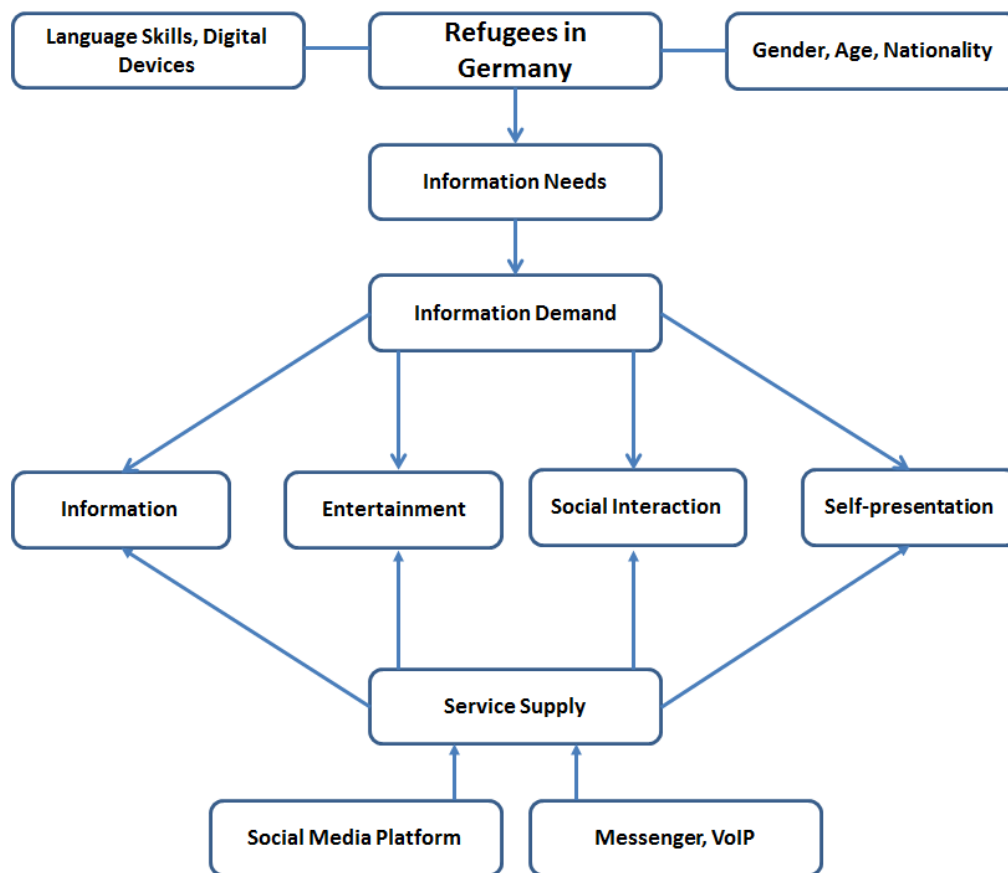


Figure 6.1: Our research model

all social media platforms and messaging services as well as their supplies. Information demand will match (or maybe not) the supplies concerning the four gratification types of information, entertainment, social interaction, and self-presentation. We try to find answers to the following research questions (RQs):

- **RQ1:** How good are the asylum seekers' digital literacy skills?
- **RQ2 to RQ5:** How do asylum seekers satisfy their needs for information (**RQ2**) / entertainment (**RQ3**) / social interaction (**RQ4**) / self-presentation (**RQ5**)? What social media and messaging services do they apply for the given situation?

## 6.2 Methods

We are going to analyze the information and communication behavior of asylum seekers. Therefore, the gratifications sought and obtained have to be considered as embedded in a special context (being a migrant in a strange country) and a very special situation (arriving illegally in the country, being not allowed to work in Germany for the first time after arrival, and

not always speaking the German language fluently). Indeed, as Case and Given (2016, p. 48) state, “context and situation are important concepts for information behavior research”. We can assume that the migrants’ information horizons are very special and are influenced by the situation in their home country, the migration from their home country to Germany, and the unfamiliar circumstances along with new social contacts in Germany.

To gather data, we employed the survey methodology, i.e. “a sample of individuals is asked to respond to questions” (Case and Given, 2016, p. 236). The authors spoke to the interview partners in person. While visiting German language courses at an adult education center, the teachers selected students for our interviews. Each interview lasted between 30 and 45 minutes. We applied a combined quantitative and qualitative approach (Sonnenwald and Iivonen, 1999, p. 430) and interviewed 19 refugees from Syria, Iraq, Afghanistan, and Iran in the town Dorsten face-to-face with the help of a questionnaire (leading to quantitative data) and a semi-structured interview guide (leading to qualitative data) on Nov 28 and 30 as well as Dec 3, 2018. At the last two dates, a translator for Arabic to German was present. Dorsten is a town with about 75,000 inhabitants, located between the Southern Münsterland and the Northern Ruhr area. It is part of North Rhine-Westphalia’s metropolitan region Rhine-Ruhr.

We asked for specific social media and messaging service usage for each of the (four) main gratification types (entertainment, social interaction, information, self-presentation) including Facebook, Instagram, Live Streaming (e.g., Periscope), Pinterest, Reddit, SMS, Skype, Snapchat, WhatsApp, YouTube, and 9gag. There was always the option to name another service. Concerning the information content, we asked for news, documentary materials, on Germany, on the home country, jobs, education, law, health, and religion, family/friends in their home country, family/friends in Germany, other migrants from the same country and from other countries, and other Germans such as neighbors (social contacts); establishment of social contacts, reports on their own situation, reports on Germany, and “it’s fun” (self-presentation). In each case we provided a category “other”.

## **6.3 Results**

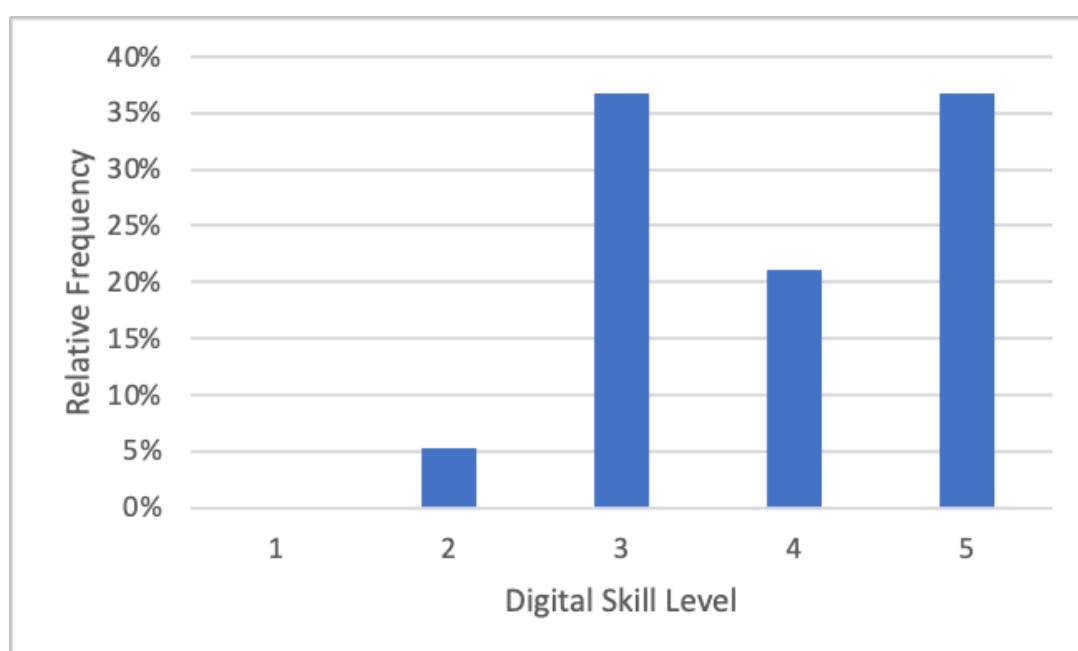
### *Demographics*

In Dorsten, we interviewed 19 persons who were from Syria (12), Afghanistan (3), Iran (2), Iraq (1), and Morocco (1). Their age varies from 21 to 55 years; the mode is at 34, the median at 30, and the mean at 32.6 years. Ten asylum applicants were male and nine were female. All persons were attending German language courses; three persons at A1 level, nine at A2 level, and seven

at B1 level. At the date of the interview, they stayed in Germany from 12 to 48 months, but most of them (mode) 36 months.

A few (21%) only have a *minijob* (part-time job) in Germany, because they need to pass the language class for level B1 if they want to work in a full-time job. All of them were employed in their home country, for example as police officer, car mechanic, electronics technician, bricklayer, teacher, hairdresser, and agricultural engineer.

All interviewed migrants use social media. However, some asylum seekers do not have enough time for social media application, because of housekeeping, caring for their family and children as well as learning the German language. Some interviewees told us that a short time is spent on social media in bed before sleeping.



**Figure 6.2:** The migrants' digital literacy skills (Likert scale: 1 very low; 5 very high; self-estimation; N=19)

*RQ1: How good are the asylum seekers' digital literacy skills?*

The researchers asked the interviewees to estimate their digital literacy skills on a 5-point Likert scale. All in all, the asylum seekers' digital literacy varies between the mediocre (3) and the very high (5) level. There was no single interviewee with a very low self-estimation of his or her digital literacy (Figure 6.2).

All asked migrants own a smartphone and use internet services. Also, nearly all watch TV (Table 6.3). Only a few asylum seekers have their own tablet, laptop, or computer. Just a minority applies land-line telephony in order to contact other people.

**Table 6.3:** Migrants' devices used for information and communication (N=19)

Device	Amount (Percent)
Smartphone	19 (100%)
Internet	19 (100%)
Television	18 (94.7%)
Radio	8 (42.1%)
Tablet	4 (21.0%)
Laptop	3 (15.8%)
Land-line telephone	3 (15.8%)
Computer	2 (10.5%)

*RQ2: How do the asylum seekers satisfy their information needs?*

Nearly all interviewed migrants apply Facebook, WhatsApp, and YouTube in order to satisfy their information needs (Table 6.4). In addition to WhatsApp, two migrants mentioned that they are using Telegram to receive information. Other services that have also been used were Instagram (63.1%) and Twitter (31.6%). Surprisingly, no single asylum seeker works with Reddit, which is the world-leading news aggregator (Zimmer et al., 2018).

**Table 6.4:** Applied social media services for the satisfaction of their needs on information (N=19)

Information	
<i>Social Media</i>	<i>Amount (Percent)</i>
Twitter	6 (31.6%)
Facebook	18 (94.7%)
WhatsApp	17 (89.5%)
Reddit	0 (0%)
YouTube	17 (89.5%)
Instagram	12 (63.1%)
Live Streaming	0 (0%)
Telegram	2 (10.5%)

The asylum applicants told us about their needs for news (17 persons); they prefer to receive news in the language of their home country (13) as well as in German (9), but hardly in English (only 1 interviewee) (Table 6.5). When it comes to documentary reports (10 people have

this information need), the migrants prefer German language reports (5) and information in their home language (4), but only 2 interviewees articulate needs for English language reports. Nearly all migrants are interested in information concerning Germany (15) and their home country (13).

**Table 6.5:** Asylum applicants' information needs (N=19)

<b>Information</b>	
<i>Information need</i>	<i>Amount (Percent)</i>
News	17 (89.5%)
Thereof: in German language	9 (47.4%)
... in language of home country	13 (68.4%)
... in English	1 (5.3%)
Documentary reports	10 (52.6%)
Thereof: in German language	5 (26.3%)
... in language of home country	4 (21.1%)
... in English	2 (10.5%)
On Germany	15 (78.9%)
On home country	13 (68.4%)
Jobs	11 (57.9%)
Education	14 (73.7%)
Law	12 (63.2%)
Health	17 (89.5%)
Religion	7 (36.9%)
Driver licence	2 (10.5%)
Children (e.g., education)	2 (10.5%)

However, there are exceptions. Some migrants do not want to know the latest information about their home country “because there is always bad news”, as one of the interviewees told us. The issue “health” dominates (with 17 persons) the topical orientation of the information, followed by education (14), law (12), and jobs (11). Only 7 persons have information needs for religion.

*RQ3: How do the asylum seekers satisfy their needs for entertainment?*

For entertainment, our interviewees prefer YouTube (17 persons), followed by Facebook (14), WhatsApp (11), and Instagram (7) (Table 6.6). All other social media services only play a minor role in the gratification of this need. It is rather surprising that a typical entertainment service such as 9gag is not used by the migrants.

**Table 6.6:** Applied social media services for the satisfaction of their entertainment needs (N=19)

<b>Entertainment</b>	
<i>Social Media</i>	<i>Amount (Percent)</i>
Twitter	1 (5.3%)
Facebook	14 (73.7%)
WhatsApp	11 (57.9%)
Reddit	1 (5.3%)
YouTube	17 (89.5%)
Instagram	7 (36.8%)
Live Streaming	0 (0%)
TikTok	2 (10.5%)
Snapchat	1 (5.3%)
9gag	0 (0%)

*RQ4: How do the asylum seekers satisfy their needs for social interaction?*

All of the interviewed asylum seekers (19 persons) are communicating and interacting with social contacts through WhatsApp. The second most used social media service was Facebook (14). For VoIP only two respondents apply Skype (Table 6.7) as WhatsApp is more popular and contains more similar functions with easier access than Skype.

Although with live streaming there were ideal channels to interact synchronously, i.e. in real-time (as, for instance, YouNow or Periscope) (Scheibe, Fietkiewicz and Stock 2016; Zimmer 2018), no interviewee seems to know that this option exists.

Let us have a look at the asylum applicants' needs for social interaction (Table 6.8). Of course, all of them are cultivating contacts with their family in their home country. But, additionally, most of them interact with friends in Germany (18), other migrants from their home countries (18), and friends from the home country (16). 14 people like to contact their family members in Germany and other migrants in Germany. Nearly all migrants (17) are going

to expand or cultivate social contacts with German people. Surprisingly, only three asylum seekers are having social contacts with a German official advisor. Upon request, our interviewees told us that not every migrant in Dorsten has an advisor.

**Table 6.7:** Applied social media services for the satisfaction of their needs for social interaction (N=19)

<b>Social Interaction</b>	
<i>Social Media</i>	<i>Amount (Percent)</i>
Twitter	1 (5.3%)
Facebook	14 (73.7%)
WhatsApp	19 (100%)
Reddit	0 (0%)
YouTube	0 (0%)
Instagram	5 (26.3%)
Live Streaming	0 (0%)
TikTok	2 (10.5%)
Snapchat	3 (15.8%)
Skype	2 (10.5%)

**Table 6.8:** Asylum applicants' needs for social interaction (N=19)

<b>Social Interaction</b>	
<i>Information need</i>	<i>Amount (Percent)</i>
Family in home country	19 (100%)
Friends in home country	16 (84.2%)
Family in Germany	14 (73.7%)
Friends in Germany	18 (94.7%)
Other migrants from home country	18 (94.7%)
Other migrants in Germany (not from home country)	14 (73.7%)
Advisor	3 (15.8%)
With Germans	17 (89.5%)

Indeed, migrants apply further offline and online services for social interaction, for instance, e-mail (14 interviewees), SMS (11), land-line telephone (3), and – only for official documents – letters (8).

*RQ5: How do the asylum seekers satisfy their needs for self-presentation (RQ5)?*

As four persons do not present themselves on social media, we have only data for 15 interviewees (Table 6.9). They mainly apply Facebook (14), the Status functionality of WhatsApp (8), and the image sharing service Instagram (8).

**Table 6.9:** Applied social media services for the satisfaction of their needs on self-presentation (N=15)

<b>Self-presentation</b>	
<i>Social Media</i>	<i>Amount (Percent)</i>
Twitter	0 (0%)
Facebook	14 (93.3%)
WhatsApp (Status)	8 (53.3%)
Reddit	0 (0%)
YouTube	0 (0%)
Instagram	6 (40.0%)
Live Streaming	0 (0%)
TikTok	2 (13.3%)
Snapchat	1 (6.7%)

The concrete needs of the migrants' self-presentation on social media are to show their own situation (8 interviewees), simply for fun (7), and to tell others about their life in Germany (3).

## 6.4 Discussion

While Dekker et al. (2018) analyzed the asylum applicants' social media usage before migration and during migration we concentrate on the social media application after migration. Asylum seekers in Germany clearly make use of social media, most notably Facebook, WhatsApp, and YouTube.



The migrants' self-estimation of their digital literacy varies between the mediocre and the very high level. All interviewees possess smartphones and have connection to the internet, 18 of the 19 interviewed persons watch TV.

In order to give or to receive information via social media and messaging services, nearly all interviewees apply Facebook, WhatsApp, and YouTube. Even Instagram is more often considered as an information source than Twitter. What information is looked for? Asylum applicants articulate information needs especially for news and documentary reports, both in German language and in the language of their own home country. Many migrants are searching for information on news about Germany and a little bit less on the situation in their home country. They want to be informed about health, education, jobs, and the law as well.

For entertainment, they mainly use YouTube and Facebook. When it comes to social interaction, all persons utilize WhatsApp, some additionally Facebook. There is a broad spectrum of social contacts, for instance, the family in their home country, friends and other migrants in Germany, and German people.

Only 78.9% of the interviewed migrants work with social media for purposes of self-presentation; they mostly apply (like always) Facebook, but also to a minor extent WhatsApp (Status) and Instagram.

Our study has some limitations. Our sample size is very small (19) and there were no children or seniors involved. Also, the interview partners are based in only one town in North Rhine-Westphalia. Furthermore, all interview partners are students of German language courses in Dorsten. In this article we concentrated on social media usage and ignored the gathered data for all other online services.

Although we have conducted qualitative interviews, in this article we are mainly presenting the quantitative data. We have already planned to perform further interviews with children and young adults and to broaden the geographical area as interviews in other cities are planned as well. Of course, the qualitative data of all interviews should and will be evaluated by a content analysis. Furthermore, we will be able to formulate and study new research questions with the knowledge gained through our interviews. Are there any practical consequences from our study? Many social media systems such as, for instance, social live streaming services or news aggregators are more or less unknown. It would be an interesting aspect of the migrants' instruction to deepen the knowledge on the functionality of a broad range of social media as well as the services' strengths and weaknesses.

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## **Part 3:**

Information Behavior

on Social Live Streaming Services

## 7. A Model for Information Behavior Research on Social Live Streaming Services (SLSSs)

### 7.1 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]. Producers [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<sup>2</sup> and Vkontakte<sup>3</sup> (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<sup>4</sup>, Ustream<sup>5</sup>, YouNow<sup>6</sup>, YouTube Live<sup>7</sup>, Facebook Live<sup>8</sup>, Instagram Live<sup>9</sup>, niconico<sup>10</sup> (in Japan), Yi-ZhiBo<sup>11</sup>, Xiandanjia<sup>12</sup>, Yingke<sup>13</sup>, YY Live<sup>14</sup> (all in China) or – for broadcasting esports resp. drawing – Twitch<sup>15</sup> and Picarto<sup>16</sup> 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 (especially YouNow; Fig. 7.1) to motivate their users to

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<sup>2</sup> <https://www.facebook.com/>

<sup>3</sup> <https://vk.com/>

<sup>4</sup> <https://www.pscp.tv/>

<sup>5</sup> <http://www.ustream.tv/>

<sup>6</sup> <https://www.younow.com/>

<sup>7</sup> [https://www.youtube.com/channel/UC4R8DWoMol7CAwX8\\_LjQHig](https://www.youtube.com/channel/UC4R8DWoMol7CAwX8_LjQHig)

<sup>8</sup> <https://live.fb.com/>

<sup>9</sup> <https://help.instagram.com/292478487812558>

<sup>10</sup> <http://www.nicovideo.jp/>

<sup>11</sup> <https://www.yizhibo.com/>

<sup>12</sup> <http://www.xiandanjia.com/>

<sup>13</sup> <https://www.inke.cn/>

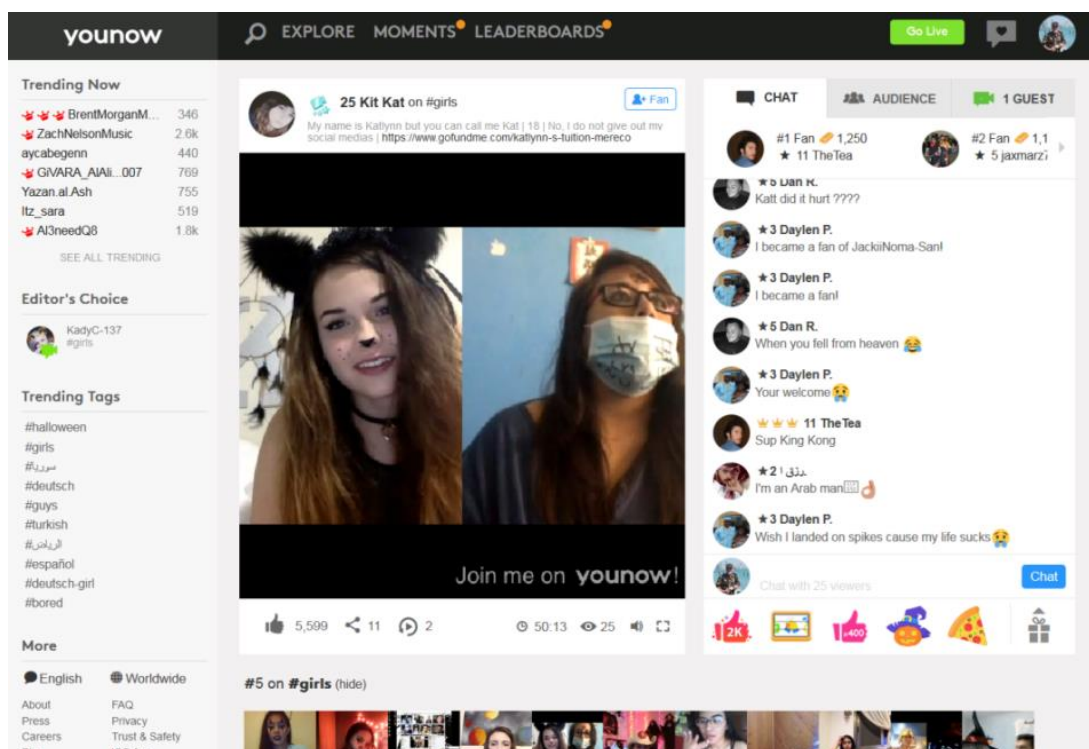
<sup>14</sup> <http://www.yy.com/>

<sup>15</sup> <https://www.twitch.tv/>

<sup>16</sup> <https://picarto.tv/>

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 7.1:** 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 the 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 to 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.

## 7.2 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 the audience, the problem is *effect analysis*" [12, p. 37]. Braddock [13] adds two further questions:

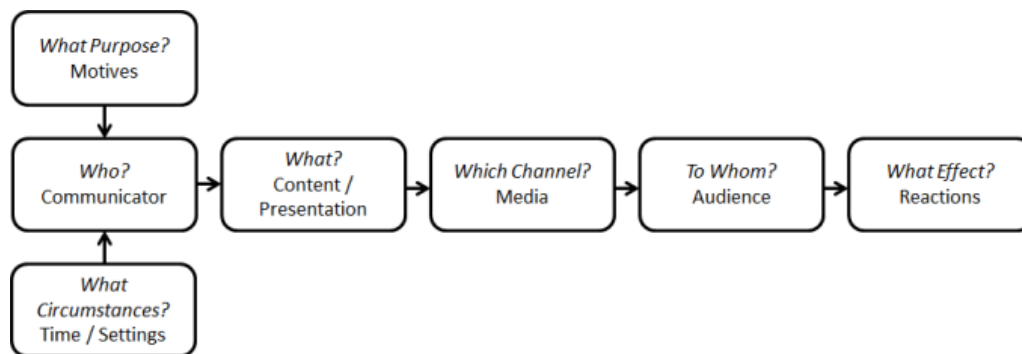
- What circumstances?
- What purpose?

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] (Fig. 7.2). 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].

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.



**Figure 7.2:** The communication process according to Lasswell and Braddock

### 7.3 Uses and Gratifications

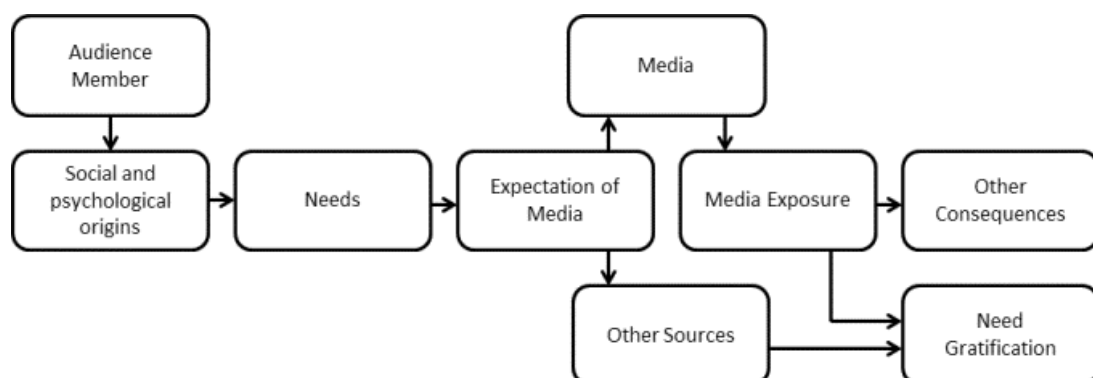
In sender-centered communication models, the starting point is the active communicator, and the audience remains more or less passive. By contrast, audience-centered models place special emphasis on the receivers. In the Uses and Gratifications approach by Elihu Katz and colleagues [20, 21] “the ‘needs’ 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 asks, 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 [25–27].

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

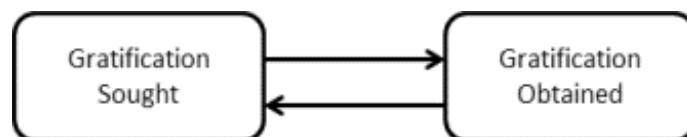
- the social and psychological origins of
- needs, which generate
- expectations of
- the mass media or other sources, which lead to
- different patterns of media exposure, resulting in
- need gratifications and
- other consequences (including unintended ones).

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 hypotheses 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 Fig. 7.3.



**Figure 7.3:** The communication process according to Katz, Blumler, and Gurevitch

We have to distinguish between two aspects of gratification. 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 (Fig. 7.4). “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 7.4:** 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].

## 7.4 Self-determination: Needs, Motivations and (Maybe) Flow

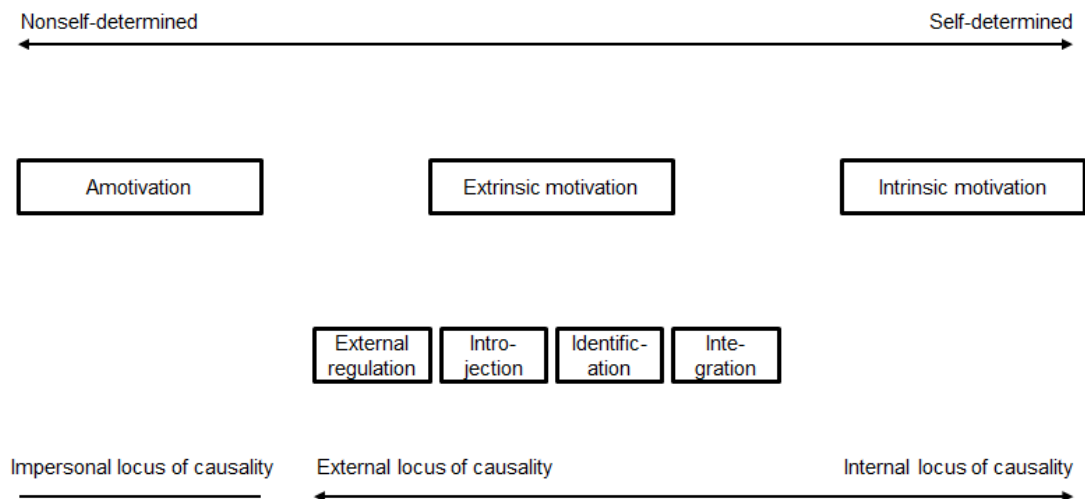
In the Uses and Gratifications theory, there is an important building block of the model called “needs.” Without human needs there will be no media production or media reception. To clarify the function of needs, we turn towards Self-Determination theory, originated by Ryan and Deci [47–49]. Self-Determination 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 (Fig. 7.5).

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).



**Figure 7.5:** Human motivations in the self-determination continuum following Ryan and Deci

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 to 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 a 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 it [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. Csikszentmihalyi [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].



## 7.5 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 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.

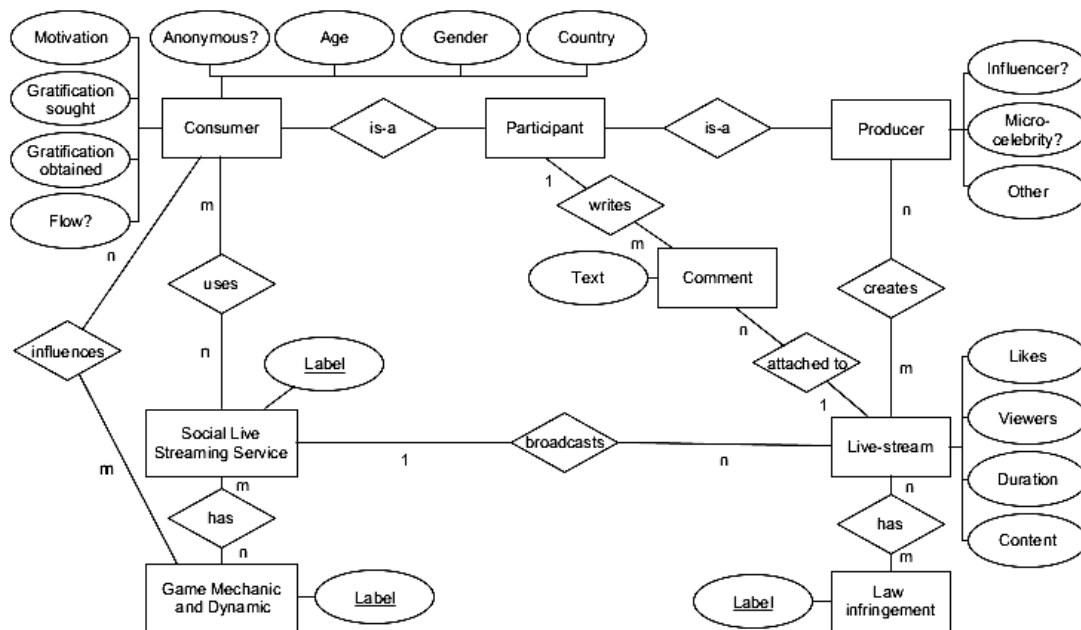
**Table 7.1:** Forms of interactions

	<b>Reciprocity</b>	<b>Spatial proximity</b>	<b>Temporal proximity</b>	<b>Bodily contact</b>
<b>Social interaction</b>	Yes	Yes	Yes	Yes
<b>Parasocial interaction</b>	Sometimes	No	No	No
<b>SLSS-mediated interaction</b>	Yes	No	Yes	No

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 all happens real-time (Table 7.1). So, SLSS-mediated interaction is closer to “normal” social interaction than to parasocial interaction.

In Fig. 7.6 (flowchart) and Fig. 7.7 (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.





**Figure 7.7:** Information behavior on SLSSs as entity-relationship model

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 Fig. 7.1), to write chat messages and to reward the streamer (as 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.

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<sup>17</sup> or the closed down service Yik Yak, users are always anonymous. As anonymity has an 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 (Fig. 7.7). 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, 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.

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<sup>17</sup> <https://jodel.com/de/>

## 7.6 Measuring Information Behavior on SLSSs

All building blocks depicted in Fig. 7.6 and Fig. 7.7 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 (1<sup>st</sup>) log files of the information systems, (2<sup>nd</sup>) performing experiments with probands in controlled test situations, (3<sup>rd</sup>) asking the users (by quantitative surveys and qualitative interviews), and, finally, (4<sup>th</sup>) 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 researchers 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 [66–69] 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 amount 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].

**Table 7.2:** Theoretical foundations of SLSS studies

	Examples
Lasswell Formula	[83]
Uses and Gratifications Theory	[66–68]
Self-Determination Theory	[69]
Theory of Flow	[74]
Information Service Evaluation Model	[11, 70]

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 identify 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].

## 7.7 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 7.2); however, in most cases only one of the theories.

The combined model of information behavior on SLSSs (as shown in Fig. 7.6 and Fig. 7.7), 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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## **8. Information Behavior on Social Live Streaming Services**

### **8.1 Introduction**

In the last few years, a new type of social media has emerged: social live streaming services (SLSSs). Here, every user has the opportunity to produce and to broadcast his or her program in real time. In contrast to other social media, social live streaming services are synchronous, which means that all user activities happen at the same time.

When the social live streaming service YouNow became more popular during the last year, negative publicity about the “dangerous” behavior of teenagers appeared on the news. Possible violations of personality rights and especially of privacy were reported. To get a more comprehensive and broader view of the information behavior on live streaming services and to start a new point for further research, this investigation focuses on the information behavior on YouNow. It is the first empirical analysis of information behavior concerning general live streaming platforms.

Describing and analyzing SLSSs and their users is a new and exciting research field in information science. What information production behaviors do users of live streaming platforms exhibit? And what information reception behaviors can we observe? What are the motives of using social live streaming services? In line with these questions we have prepared an online survey with YouNow users as participants. For studying the legal aspects of information production behavior an analysis of potential law infringements on YouNow streams from Germany and the U.S. by Honka et al. (2015) was added to the study.

### **8.2 Research Background**

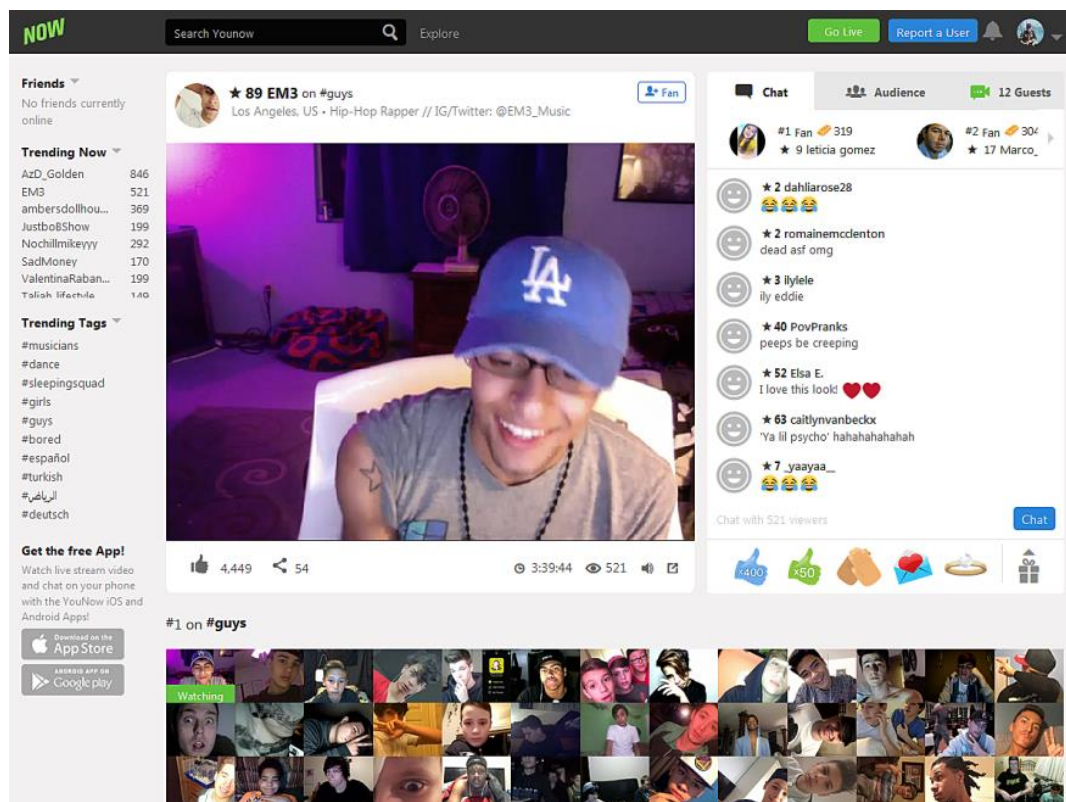
SLSSs are social media platforms with the following characteristics:

- they are synchronous,
- they allow users to broadcast their own program in real-time,
- 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 via chats, and
- the audience may reward the performers with, e.g., points, badges, or money.

We differentiate between two kinds of social live streaming services:

- general live streaming services (without any thematic limitation), e.g. YouNow, Twitter’s Periscope, Meerkat Streams, YouTube live, or IBM’s Ustream, and
- topic-specific live streaming services, e.g. Twitch (games), or Picarto (art).

One of the most widely used social live streaming services is the topic-specific streaming service Twitch (Gandolfi, 2016), which is mainly used for streaming video games and electronic sports (e-sports) events (Burroughs & Rama, 2015). There are already several investigations and studies about this platform, but only few scientific studies on general live streaming services. We could identify a general paper on YouNow (Stohr, Li, Wilk, Santini, & Effelsberg, 2015), an article on technical issues of such services (LeSure, 2015), one about ethical problems (Henning, 2015) and a study on possible law infringements of YouNow users while streaming (Honka, Frommelius, Mehlem, Tolles, & Fietkiewicz, 2015). Fietkiewicz, Lins, Baran, and Stock (2016) found out that especially users from Generation Y (“Millennials,” born between 1980 and 1996) and from Generation Z (born 1996 and later) utilize YouNow. Wilk, Wulffert, and Effelsberg (2015) analyzed the improving of video contributions; and, finally, Wilk, Zimmermann, and Effelsberg (2016) studied video upload protocols.



**Figure 8.1:** Live stream on YouNow. *Source:* YouNow.com

In this article, we apply research about information behavior on social media to general social live streaming services, using the example of YouNow as a case study (Fig. 8.1). YouNow’s mission statement highlights the convergence of social media and television as well as user interactions through real-time videos (YouNow, 2016). According to Adi Sideman, founder and

CEO of YouNow, this information service broadcasts about 150,000 unique live streams daily (2015). Following Alexa, most users of YouNow come from the United States (24.3%), followed by people from Turkey (12.1%), Germany (8.4%), Mexico (7.6%), and Saudi Arabia (5.6%) (Monthly unique visitors in February, 2016). The average quota of viewers per broadcaster was (midyear 2015) 11 (Wilk, Zimmermann, & Effelsberg, 2016, p. 1), but in our experience the distribution of viewers is skewed: Few live streams have hundreds of viewers, while many streams were watched by less than ten people.

### **8.3 Information Behavior on Social Networking Services**

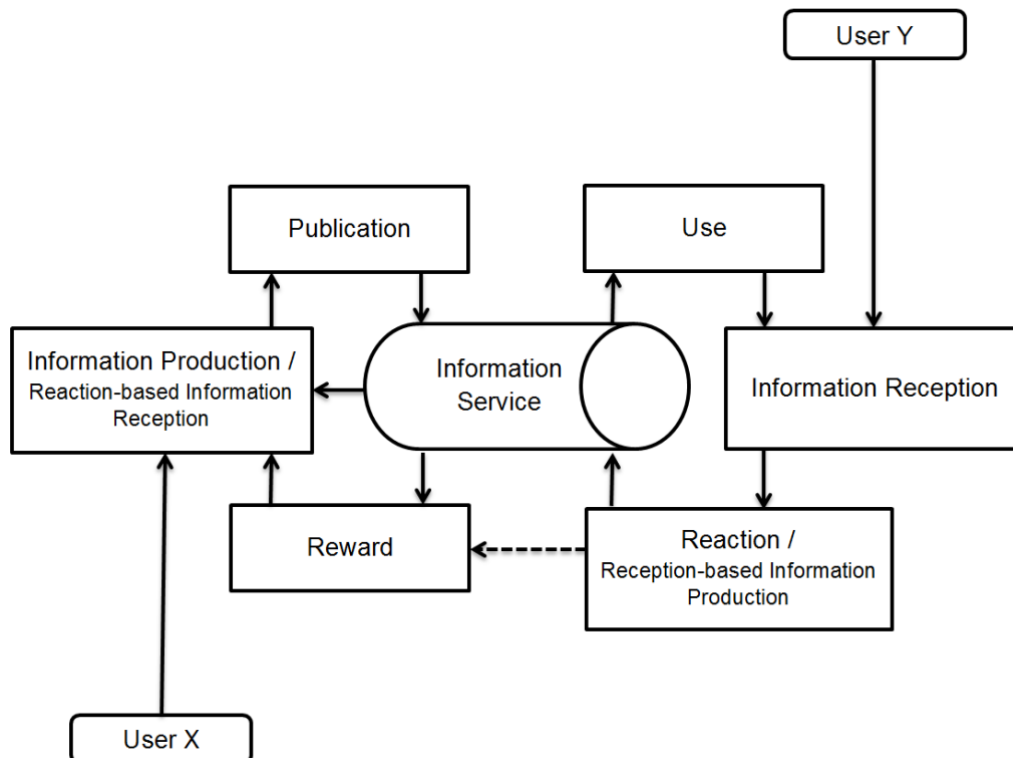
Following Savolainen (2007, p. 109), “information behavior” as well as “information practice” are “umbrella concepts” in information science. In contrast to Savolainen (2007), Case (2012), and other researchers, who link information behavior and information practice mainly to information seeking (e.g., Kumar & Rai, 2013; Majid & Rahmat, 2013), it is possible to broaden these concepts to all information-related human activities. Here, we are in line with Bates (2009) who defines “information behavior” as every human interaction with information. “Information behavior is ... the term of art used in library and information science to refer to a sub-discipline that engages in a wide range of types of research conducted in order to understand the human relationship to information,” Bates (2009, p. 2381) concludes. Wilson (2000, p. 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. Thus, it includes face-to-face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given.”*

Fisher, Erdelez, and McKechnie (2005, p. xix) conceptualize information behavior “as including how people need, seek, manage, give, and use information in different contexts.” Robson and Robinson (2013, p. 169) propose an information behavior model that “takes into account not just the information seeker but also the communicator or information provider.” For Spink (2010, p. 4), information behavior is “a behavior that evolved in humans through adaption over a long millennium into a human ability, while also developing over a human lifetime.” The phylogeny of information behavior is the evolution of this behavior of the whole human tribe until today; the ontogeny is the development of the information behavior of an

individual person (Stock & Stock, 2013, p. 465). We will work with this broad concept of “information behavior,” which covers all human information-related activities.

Information behavior depends on the context. For our case study, the context is found in social media or, to define more precisely, in social networking services (SNSs). Social media (or Web 2.0 media) allow users to act both as producers and as consumers (“prosumers”). Prosumers in social media are characterized by shared goals. They form virtual communities (Linde & Stock, 2011, pp. 259 ff.). One kind of social media are social networking services, which are platforms for self-presentation and communication with other members of the community (Boyd & Ellison, 2007). SNSs are either asynchronous (as for instance Facebook; Khoo, 2014, p. 81) or synchronous (as the social live streaming services). The main feature of social live streaming SNSs is the simultaneity of the communication, as all happens in real time.



**Figure 8.2:** Information behavior on social networking services

The broadest term is “social media”; one of its narrower terms is (besides other social media as sharing services or weblogs) “social network services” (SNSs). “SNS” has two narrower terms: “asynchronous SNSs” (e.g., Facebook) and “synchronous SNSs.” Nowadays, social live streaming services (SLSSs) are the only kind of synchronous SNSs.

Social media has found its way into everyday life as well as into working life. It is clear that information behavior research addresses social media as a research object (Meier, 2015, p. 23). Khoo (2014, p. 90) concludes,

“The rise of social media should herald a new era in information behavior research. Just as the rise of online databases and digital libraries sparked off a generation of research in online searching, so too social media should stimulate a new wave of research and theories focusing on other types of information behavior such as asking, answering and information integration. Research on information behavior on social media can be said to be in a nascent stage.”

In line with Khoo (2014, p. 90), information behavior on social media includes information production and information reception behavior. In our study we emphasize information behavior on SLSSs.

What are the differences in information behavior concerning synchronous and asynchronous SNSs? In contrast to other social media, information behavior on SNSs in general configures a complete cycle (Fig. 8.2). One user (in our figure it is user X) produces information and publishes it. In an asynchronous SNS like Facebook such a publication is a textual post, an image, or a video; in a synchronous SNS like YouNow it is a broadcast (Table 8.1). The information service is the platform that enables the communication between the information producer and the information recipient. Another user (user Y) utilizes the information service, searches for information, and receives the post or the broadcast. Information reception behavior in an asynchronous SNS will be reading the published posts; in a synchronous SNS this means watching broadcasts in real time. All SNSs allow the recipients to react to a published source, be it by a like, share, or comment on Facebook, or by chat, emoticons, and gifts on YouNow. One can consider the comments of user Y as a kind of information production, but (in contrast to the information production of user X) it is information production as a consequence of information reception. Of course user X can or will realize the reactions of the audience. So she or he exhibits information reception behavior in consequence of her/his former information production behavior. Her or his further production behavior can depend on such reactions. The last step in the cycle is the reward for the information producer. This rewarding function is not adequately developed in asynchronous SNSs (although there are user levels on Facebook), but much elaborated in synchronous SNSs. On YouNow, the level of a performer plays an important role for her or his reputation in the community. The user earns virtual currency (“coins” on YouNow) by broadcasting and by receiving presents from other users. Such coins are needed to endow other performers. Additionally, YouNow offers the currency of “bars” to be bought with real money. The boundaries between reactions and rewards are sometimes blurred. For instance, a



receiver, say user Y, “likes” a post on Facebook or presents a “heart” on YouNow, so this is Y’s reaction to X’s post or broadcast, but Y can think of it as a reward as well, and X can perceive it as a reward. From these theoretical considerations we derived the framework shown in Figure 8.2 and Table 8.1.

**Table 8.1:** Information behavior categories on synchronous and asynchronous social networking services (SNSs)

<b>SNS information behavior</b>	<b>Synchronous SNS information behavior (e.g., YouNow)</b>	<b>Asynchronous SNS information behavior (e.g., Facebook)</b>
Publication	Broadcasting	Posting
Use / Reception	Watching broadcasts	Reading posts
Reaction	Chatting, gifts	Likes, shares, comments
Reward	Level, reputation in community	(Level)

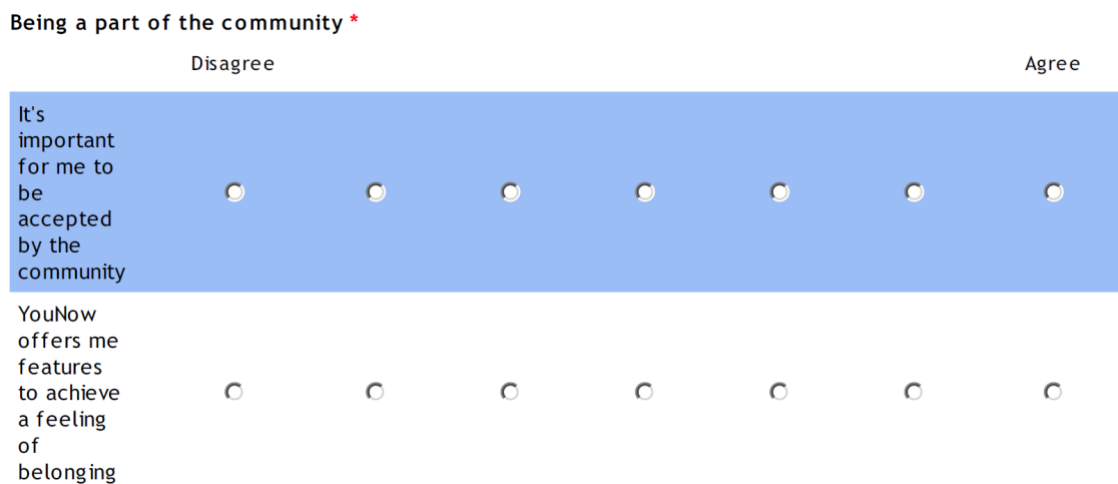
Here, our research questions arise. Using the example of YouNow, we want to know users’ information behaviors on social live streaming services. In this study, we are going to answer empirically three research questions (RQs), which all consist of three sub-questions:

- **RQ1:** What information behavior do users of social live streaming services exhibit?
  - RQ1a:** What activities do users practice on such information services?
  - RQ1b:** What are the motives for this information behavior?
  - RQ1c:** What influence does rewarding have on users’ motivation?
- **RQ2:** What information production behavior can we observe on SLSSs?
  - RQ2a:** Do performers prepare for their live streams?
  - RQ2b:** How long are the live streams?
  - RQ2c:** Do performers work with external music, images, and videos? Are there any legal concerns?
- **RQ3:** What information reception behavior can we observe on SLSSs?
  - RQ3a:** What kinds of broadcasts do users view?
  - RQ3b:** Which age of performers do they prefer to view?
  - RQ3c:** Do users link their live streaming accounts to other information services?

All research questions are focused on the current usage status of YouNow.

## 8.4 Methods

To answer the research questions, we conducted two empirical investigations, namely an online survey and observations of live streams. Our first investigation is survey-based. It took place from June 3 until June 28, 2015 on Umfrageonline.com and had 123 YouNow users as participants. In the survey, the users were asked questions about YouNow, their behavior concerning YouNow, and the acceptance of the service in the community.



**Figure 8.3:** Measuring the attitude of being part of the community

For the majority of the items we pre-formulated answers and defined a 7-point Likert-scale (from “disagree” via “neutral” to “agree”) (Likert, 1932). For instance, in order to answer RQ1b (on motivations) we prepared for the item of “being part of the community” two statements (Fig. 8.3). The participants marked their attitude for every statement in one of the seven boxes. We consciously worked with an uneven number of attitudes, which includes a value for “neutral” in the middle. In our analysis, we summarized the values 1 to 3 as “disagree,” 4 as “neutral,” and 5 to 7 as “agree.” Questions about usage frequencies could be answered with one out of four values, namely “never,” “rarely,” “sometimes,” and “often.” Additionally, for some items (e.g., for answering RQ3c on links between YouNow and other services) we pre-formulated answers for several questions and the users had the opportunity to add their own entries (Fig. 8.4). Finally, we asked for personal information (demographics).

Do you refer from YouNow to other social media platforms? \*

☐ Facebook

☐ Instagram

☐ Twitter

☐ YouTube

☐ Other

**Figure 8.4:** Measuring references between YouNow and other social media services

In order to answer RQ2c on legal concerns while broadcasting, we did not prefer to bank on user statements. Users, especially young users on YouNow, do not and maybe cannot know such legal problems. Therefore, in addition to the survey, we performed a second attempt of data collection and observed streams. This second empirical study concerns potential law violations by YouNow users (Honka et al., 2015). Here, the data set was obtained through an observation of a significant amount of streams (N = 434). A similar approach was applied by Casselman and Heinrich (2011), who analyzed YouTube videos and the behavior of their participants. The streams were observed during June 2015 and were limited to ones from Germany and the USA. The socio-demographic data was obtained either from the streamer's profile or by asking the streamer during his or her broadcast. The observation period was divided into four parts, where different groups of streamers were in focus – females from Germany, males from Germany, females from the USA, and males from the USA. Each group was observed for an entire week. Each day of the observation was divided into four time slots (12 a.m. to 6 a.m., 6 a.m. to 12 p.m., 12 p.m. to 6 p.m., and 6 p.m. to 12 a.m.). In each slot, four streams have been investigated for 15 minutes respectively (i.e., total 16 streams or 4 hours per day).

The streams were studied for legally concerning actions. The points of reference were law infringements frequently observed in SLSSs according to German law, which is stricter than U.S. law regarding, for example, copyrights or personal rights. This way we gain a broader range of possible legally concerning actions. Demeanors in the focus of this observation were copyright infringements (concerning music pieces protected by intellectual property rights), youth protection (regarding sexual content or underage use of alcohol or drugs), personality rights (rights in one's own picture, spoken, or written word), and defamation. The classification of a stream as one with potential law infringements was based on a rough assessment by the observer (is music being played in the background, or, are other people being filmed without their explicit consent?) and did not include a complex legal examination or consideration of exception regulations. Therefore, it is essential to emphasize that the results include only

potential legally relevant actions. We analyzed the observational data quantitatively, i.e. we counted the different types of potential law infringements. All empirical data from both the survey as well as the observations became processed by Microsoft Excel.

## 8.5 Information Behavior of YouNow Users

For all empirical data from our online survey, the number of respondents is  $N = 123$ . All in all, 60.6% of the survey participants were male and 39.4% were female. According to Alexa, the amount of male visitors to YouNow is higher than the Internet average, which is confirmed by our sample. The median age of our participants was 20 years, and the most frequent age group were 16 year-old adolescents. 51.6% of our sample uses YouNow often, 11.5% sometimes, and 36.9% only rarely. As this analysis is the first step into empirical investigations on SLSS we have to confine ourselves to descriptive statistics.

What information behaviors do users of SLSS exhibit? There are four main activities on synchronous social networking services, namely publishing information (i.e., performing real-time), using information (i.e., watching live streams), reacting on performances (mainly by chatting), and, finally, giving rewards (e.g., by emoticons) (Fig. 8.2).

YouNow users like to watch streams (59.5% approval), to chat while watching (58.4%), and to reward performers by using emoticons (60.6%). Less than half of our respondents (45.0%) like to stream actively as well (Table 8.2).

**Table 8.2:** Motives for using YouNow ( $N=122$ ) / RQ1a

Main activities on YouNow	Disagree (1 – 3)	Neutral (4)	Agree (4 – 7)
Streaming	49.2 %	5.8 %	45.0 %
Watching	31.4 %	9.1 %	59.5 %
Chatting	30.8 %	10.8 %	58.4 %
Rewarding	24.5 %	14.9 %	60.6 %

Items: “I like streaming / watching streams / chatting / using emoticons”

What are the motives (Lin & Lu, 2011) for using YouNow? In order to formulate adequate questions and to create accurate items on motivations for using SLSSs we consulted the literature on motives on SNSs. Following Nadkarni and Hofmann (2012), there are two main motives for using asynchronous SNSs, namely the need to belong and the need for self-presentation. We want to analyze both motives in more detail. Concerning the need to belong,

Brandtzæg and Heim (2009) found a related motivation, namely to find new friends on SNSs. Additionally, we wanted to know whether it is important for a YouNow user to be accepted by the community. Is there a thing like a “we-intention” (Cheung, Chiu, & Lee, 2011) on YouNow? YouNow gives easy access to publish a stream. Is this a motive to use this service? As the Technology Acceptance Model (TAM) (Davis, 1989) emphasizes the perceived ease of use, a motive for users to use YouNow could be that the system provides an easy opportunity to stream. Greenwald (2013) discusses the motive of fame when using Facebook and Twitter. Are performers going to gain fame on YouNow or at least become a “microcelebrity” (Marwick & Boyd, 2011) in their community? If a user is indeed a celebrity (or believes that she/he is), is it a motive for such a user to keep contact with the fan base? Or are YouNow’s users simply bored and searching for fun?

**Table 8.3:** Motives for using YouNow (N=122) / RQ1b

<b>Motives for using YouNow</b>	<b>Disagree (1 – 3)</b>	<b>Neutral (4)</b>	<b>Agree (4 – 7)</b>
Need to belong	36.5 %	15.1 %	48.4 %
Looking for new friends	44.1 %	16.1 %	39.8 %
Acceptance by the community	33.3 %	14.0 %	52.7 %
Need for self-presentation	19.2 %	15.9 %	64.9 %
Easy to stream	18.1 %	9.6 %	72.3 %
Becoming a (micro)celebrity	67.8 %	10.7 %	21.5 %
Contacting fans	59.2 %	10.8 %	30,0 %
Boredom	34.0 %	9.9 %	56.1 %

Items:

Need to belong: “YouNow offers me features to achieve a feeling of belonging”

Looking for new friends: “I was looking for new friends on YouNow”

Acceptance by the community: “It’s important for me to be accepted by the community”

Need for self-presentation: “I feel better when the number of my spectators increases”

Easy to stream: “YouNow gives me easy access to streaming”

Becoming a (micro)celebrity: “It’s important for me to become famous”

Contacting the fans: “Contact with the fans”

Boredom: “I’m bored and it’s fun”

The main motive for using YouNow is the fact that this system is easy to use (72.3% of our respondents agreed with this proposition). Next is the satisfaction of the need for self-presentation (64.9%), followed by boredom (56.1%) and acceptance by the community (52.9%). Around 50% of the test persons use YouNow because of their need to belong (48.4%) and two-fifths because they are looking for new friends (39.8%). Every fifth of our sample (21.5%) wants

to become a (micro)celebrity, and 30.0% are motivated by the contacts with their fan base (Table 8.3).

In contrast to asynchronous SNSs, YouNow is highly gamified and applies features to reward performers (Wilk, Wulffert, & Effelsberg, 2015). Gamification means the use of game mechanics in non-game contexts, to motivate users to continue using the system (Zichermann & Cunningham, 2011). Game mechanics consist, e.g., of point systems, levels, virtual goods, leaderboards, and gifts. Under certain conditions, the user has the experience of “flow” (Czikszentmihályi, 1975), which means that one is engrossed with the system and loses awareness of other things (e.g. time). Do such game mechanics indeed motivate users to apply social live streaming services? And do they experience flow?

**Table 8.4:** Influences of rewarding and gamification elements (N=94) / RQ1c

<b>Rewarding / Gamification</b>	<b>Disagree (1 – 3)</b>	<b>Neutral (4)</b>	<b>Agree (4 – 7)</b>
Reaching the next level	46.8 %	14.9 %	38.3 %
Moving up in ranking	37.2 %	12.8 %	50.0 %
Achieving all virtual presents	52.2 %	12.8 %	34.0 %
Enjoying presents	24.5 %	17.0 %	58.5 %
Flow	27.7 %	13.8 %	58.5 %

Items:

Reaching the next level: “I spend more time on YouNow in order to reach the next level”

Moving up in ranking: “It is my aim to move up on the streamer’s ranking list”

All virtual presents: “It is my aim to achieve all virtual presents”

Enjoying presents: “I enjoy receiving presents”

Flow: “I forget my time while being online on YouNow”

The majority of YouNow users (58.5%) enjoys receiving digital presents; for about a third (34.0%) it is an important goal to collect all kinds of presents. Moving up in the ranking of the current streamers’ playlist is important for 50.0%; and reaching the next level is essential for 38.3% of our sample. For most of our participants, gamification elements like virtual presents or levels are important motivational factors. And 58.5% had experiences of flow while using YouNow (Table 8.4).

## 8.6 Information Production Behavior of YouNow Users

When speaking about Information production on YouNow, it means broadcasting real-time. When it comes to a performance, do users prepare themselves for the live stream? In Table 8.5,

we only considered such test persons who had experiences with streaming. Nearly all (80.0%) checked their equipment (adjusting camera and checking microphone) before broadcasting. More than 60% of the users inform their friends or fans before the performance starts. For about 42%, styling themselves (clothes, hair, etc.) was self-evident. Some performers (30.0%) prepare their topics to talk about; and a few do vocal exercises (11.7%).

**Table 8.5:** Preparation for the live stream (N=63) / RQ2a

<b>Activities before streaming</b>	<b>Relative frequency</b>
Checking equipment	80.0 %
Informing friends or fans	63.3 %
Styling	41.7 %
Preparing topics	30.0 %
Vocal exercise	11.7 %

How long are the live performances (RQ2b)? The median of all broadcasts is about one hour; however, there are streams lasting several days including periods of eating and sleeping.

Do performers use copyrighted material? The survey participants indeed play music in the background “often” or “sometimes” (47.7%); they show, albeit to a much lesser extent, images (26.1%) and videos (21.6%) (Table 8.6).

**Table 8.6:** Usage of music, images and videos (N=111) / RQ2c

<b>Usage of copyrighted material</b>	<b>Relative frequency</b>
Music	47.7 %
Images	26.1 %
Videos	21.6 %

Materials used “often” and “sometimes.”

Do performers violate the law while using copyrighted material? Is there any other problematic behavior? In our second empirical study we observed streams. We found possible law infringements for both users from Germany and from the U.S. (Table 8.7), but there are only minor differences between streamers from Germany and the U.S. In both countries, the most

common potential violation was the copyright infringement of music: a total of 37.0% of German and 44.3% of U.S. streams. The second most observed potential illegal behavior concerned possible violation of personality rights. The actions chosen for this category were filming third parties, showing pictures of third parties, reading aloud chat-conversations (or similar) with third parties, or putting phone conversations with third parties on speaker during a stream, all without consent of these parties or even their awareness that their picture or their words are being brought to the public. Here, a total 11.9% of German streams and 8.7% of the U.S. streams included potential violations of personality rights. The category of defamation includes insulting remarks made by the streamer or by the audience, and were observed in 5.7% of German and 1.4% of U.S. streams. Regarding youth protection, two aspects were elaborated, the underage use of alcohol or drugs, and sexual content (revealing appearance of the streamer, or pressuring requests from viewers to the streamer to undress etc.). A total of 3.3% of German and 2.3% of U.S. streams included underage drinking or drug use, whereas 0.9% of German and 4.1% of U.S. streams had sexual content.

**Table 8.7:** Observed potential law infringements (N=434 streams) / RQ2c

Potential law infringements	Relative frequency U.S.	Relative frequency Germany
Copyright (music)	44.3 %	37.0 %
Personality rights	8.7 %	11.9 %
Defamation	1.4 %	5.7 %
Underage drug or alcohol consumption	2.3 %	3.3 %
Sexual content	4.1 %	0.9 %

N (U.S.) = 223; N (Germany) = 211. *Source:* Honka et al. (2015)

## 8.7 Information Reception Behavior of YouNow Users

Users like to watch streams (59.6% approval; Table 8.2), to chat with the performer as well as with other viewers (58.4%), and to reward the performer (60.6%). What do they mainly watch? Many recipients prefer to watch streams of their friends (58.2%); more than a third of all participants (37.7%) view streams by known YouTubers as well; and also 37.7% are open to attending streams published by new broadcasters (Table 8.8).



**Table 8.8:** Watched streams by performer types (N=122) / RQ3a

<b>Watched streams by performers</b>	<b>Relative frequency</b>
Friends	58.2 %
YouTubers	37.7 %
New broadcasters	37.7 %

There is only a minority of users who chose streams because of similarities between themselves and the performer (Table 8.9). About a third of our test persons watch streams by performers with the same age or shared interests, or who come from the same country. The same school diploma or degree does not play any noticeable role (7.4%).

**Table 8.9:** Watched streams by similarity to the receiver (N=122) / RQ3a

<b>Watched streams by similarities</b>	<b>Relative frequency</b>
Same age	34.4 %
Same interests	33.6 %
Same country	30.3 %
Same school degree	7.4 %

About two out of three users of our sample prefer to watch streams by adolescents between the ages of 13 and 20 (Table 8.10). So YouNow is a service with content mainly made by teenagers for teenagers.

**Table 8.10:** Watched streams by the age of performers (N=122) / RQ3b

<b>Watched streams by performers' age</b>	<b>Relative frequency</b>
13 – 15 years old	20.5 %
16 – 20 years old	42.6 %
Older than 20 years	37.7 %

To create an account on YouNow, one has to be a Facebook, Twitter, Instagram, or Google+ user; there is no option to register by email address. Do YouNow users also apply these social media to establish links between their YouNow account and their accounts on other information services? As Table 8.11 shows, about half of the sample indeed works with links between

YouNow and their sites on Facebook, Twitter, and Instagram. A third of the respondents link to their YouTube channel, while Tumblr, Google+, and Snapchat only play minor roles. We can state that there is a distinct multi-channel behavior of YouNow users.

**Table 8.11:** Multi-channel behavior (N=111) / RQ3c

Link to other service	Relative frequency
Facebook	55 %
Twitter	55 %
Instagram	46 %
YouTube	33 %
Tumblr	2 %
Google+	1 %
Snapchat	1 %

## 8.8 Discussion

What lessons do we learn from our studies about the information behavior on general social live streaming services? Our case study, YouNow, is a service with streams by adolescents for adolescents. YouNow users like to watch streams, to chat while watching, and to reward performers by using emoticons. 45% of our participants like to stream actively as well. The main motive for using YouNow is the simple fact that this system is easily utilized. Next is the satisfaction of the need of self-presentation, followed by boredom and intended acceptance by the community. For many YouNow users, gamification elements like virtual presents or levels are important motivational factors. Many users even report about experiences of flow while using this service. Information production on YouNow means broadcasting real-time. The median length of all broadcasts is about one hour, but we found streams lasting several days. We could observe potential law infringements while streaming, first of all copyright and personality rights violations. Many recipients prefer to watch streams of their friends and of people aged between 13 and 20 years. There is a distinct multi-channel behavior of YouNow users, as they link their YouNow accounts to other social media platforms such as Facebook, Twitter, Instagram, and YouTube.

There are some limitations of our empirical study. The number of respondents of the online survey is rather small (123 respondents completed the survey). The results of the investigation

would be more accurate and would better represent the whole population if there were a higher number of participants. Furthermore, most of the survey participants were from Germany, the United States, and the United Kingdom, and none from Turkey, Saudi Arabia, or Mexico, where – according to data from Alexa – a high number of site visitors originate. To get a better understanding of social live streaming services, there is need for further investigations of other live streaming platforms as well as more extensive ones about YouNow itself. Also, the legal aspects of live streaming should be analyzed in more detail. Are there indeed consequences for law infringements (e.g., after defamation or violation of personality rights)? Is the use of music really a violation of copyright or is it, especially in the United States, subject to fair use?

Information behavior on synchronous SNSs like YouNow shows some similarities to information behavior on asynchronous social media, but also major differences in some aspects. On asynchronous social media, information seeking is an essential type of information behavior (Kim & Sin, 2014). There are many hints that people use social media for seeking topic-related information, e.g. health information (Oh & Kim, 2014; Pálsdóttir, 2014; Zhang, 2013). On synchronous SNSs, there is no information seeking behavior beside the selection of the performer or the genre (via hashtags).

We find similar motives for using synchronous SNSs in comparison to asynchronous social media. Nadkarni and Hofmann (2012) reported about the need to belong and the need for self-presentation. Hsu, Chang, Lin, and Lin (2015) identified four motives which affect interactivity and in turn satisfaction and continued use, namely entertainment, socialization, information seeking, and self-presentation. Apart from information seeking, all other motives can be found on synchronous SNSs as well. The very important entertainment motives on YouNow consist of several components such as relieving one's boredom, becoming a (micro)celebrity, and staying in contact with fans.

On asynchronous social media (as in many other regions of the World Wide Web), it is possible to create fake accounts or other selves (Bronstein, 2014). Here, the adage "On the Internet, nobody knows you're a dog" (Steiner, 1993) is a truism. It is true for the reception side of synchronous SNSs, but definitely not for the production side. The performer may use a nickname, but you see him or her in full attire. If the performer on YouNow is a dog, everyone will realize this fact.

As a first step into the new research area of general live streaming services, this study is limited to descriptive statistics of basic empirical data on YouNow. Necessary next steps include the elaboration of a theory of information behavior on social live broadcasting services and the integration of our empirical as well as (future) theoretical results into known approaches in

social media research. As research on SLSSs shows, it is important for information science to broaden its sometimes limited view only on information seeking behavior towards an entire view on users' information-related activities, including all aspects of information production and information reception behavior.

Synchronous SNSs remind us of *The Truman Show*, which is an American film from 1998 presenting the life of its protagonist, Truman Burbank (played by Jim Carrey), in a constructed television reality show, which is live broadcasted to its audience. Truman's life is monitored 24/7 from his birth until his escape from the studio, when he was 30 years old. However, there is a great difference: In contrast to Truman, broadcasters on YouNow are well aware of their actions. Applying YouNow, users can stream wherever they want to without any time limit – and produce their own Truman Show.

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## **9. Interpersonal Relations and Social Actions on Live Streaming Services. A Systematic Review on Cyber-social Relations**

### **9.1 Introduction**

There are millions of user-generated videos on streaming services, distributed asynchronously through sharing platforms or synchronously via live streaming services [1], mostly for entertainment, but also for information, education, or shopping. Does the production of live streaming content and its consumption lead to interpersonal relations between the producers, consumers, and other participants? If yes, is it a social relation? Is it a parasocial relation? Or is it another variant of interpersonal interaction? Are there special interaction roles of micro-celebrities and influencers?

Social relations are one of the fundamental connections in every social unit, be it in the family, the peer group, at school, or at work; indeed, in the entire society. Without relations to other humans we are merely able to survive. Social relations are well-studied in the social sciences; however, social interactions on live streaming services with user-generated content are very special. Even though we were able to identify several research studies on interpersonal interactions on video streaming services, we miss a clear, summarizing, synthetic, and comprehensive picture on all the single scattered research results. There is a clear research gap calling for an overview enabled through a literature review.

What is new in this article? It is a systematic review of the research literature on human-human interaction on/via live streaming services, i.e. synchronous services as, for instance, *Twitch*, *Chaturbate*, *YouNow*, or *Taobao Live*. We focused on services, which provide user-generated content as here the personal human aspect is always present. Our research question is: What is the international scientific evidence about interpersonal relations and social actions on live video streaming services?

### **9.2 Methods**

The reasons for providing our literature review are — following Aromataris and Pearson [2, p. 53] — to present the state of knowledge about interpersonal relations on live video streaming services, to identify where evidence may be lacking, contradictory, or inconclusive, to establish whether there is consensus or debate on our topic, to identify characteristics or relationships between key concepts, and, finally, to justify why this research area is worthy of further studies. A systematic review is defined as “research synthesis” in order to “identify and retrieve

international evidence that is relevant to a particular question ... and to appraise and synthesize the results of this search to inform practice, policy and in some cases, further research” [3, p. 2].

The basic method of our systematic review is PRISMA, which defines an evidence-based minimum set of items which should be considered in the review process [4].

We searched literature applying Web of Science (WoS), Scopus, EconBiz, ACM Digital Library, IEEE Xplore, Sociological Abstracts, and PsycInfo as well as additionally snowball sampling by analyzing the References and Citations sections of found literature records.

Due to limited institutional access, we could only work on WoS with the Science Citation Index Expanded, the Social Sciences Citation Index, the Arts & Humanities Citation Index, the Emerging Sources Citation Index, the Korean Journal Database, the Russian Science Citation Index, and the SciELO Citation Index.

Literature was retrieved in the first weeks of April, 2021. We considered the items published and indexed in information services until March, 2021. The search argument was constructed in English, but we considered all found documents in all languages and all publication years. The search argument for all scientific information services was:

(“para social” OR parasocial OR influencer\* OR celebrit\* OR microcelebrit\*) AND (“live streaming” OR YouNow OR Twitch OR Chaturbate OR Periscope OR Taobao OR “facebook live” OR “instagram live” OR “qq.live” or nicovideo OR “panda.tv” OR “yy.com”) in the TITLE field.

For scientific search engines, the search strategy was modified as there is no option to search with Boolean operators. For Google Scholar, we formulated a search with the two phrases *“live streaming”* *“social relation;”* in Microsoft Academic we worked with the topics *“social relation”* and *“live streaming;”* and, finally, in Dimensions, the search argument was *social AND relation AND “live streaming”* in title and abstract.

For found records by the search argument, we additionally checked the citing and the cited papers; in the references, we additionally checked their citations. We always marked articles as relevant, if the title or the abstract suggest that the paper is on human-human relations. In WoS, we opened every record found, and scrolled through the citations and the references (in the Cited References page), we marked relevant items and stored them in the Marked List. As there were records found in the references and the citations which we had found previously through the search argument, we skipped those duplicates. In Table 9.1, the column (1) exhibits the number of all documents found in the database, followed by the number of documents found directly through the search argument in column (2), then (3) the number of documents additionally found by citations of documents in (2), and, finally, in (4), the number of additionally



to (2) and (3) found documents in the References sections of (2) including pertinent citations of these papers.

**Table 9.1:** Number of records by information service and snowball sampling from references and citations

Service	Number of Records			
	(1)	(2)	(3)	(4)
	All	Search argument	Citations	References
WoS	24	6	11	7
Scopus	23	6	2	15
Google Scho.	31	11	20	--
Microsoft Ac.	27	4	4	19
Dimensions	24	2	18	4
EconBiz	1	1	--	--
ACM DL	3	3	--	--
IEEE Xplore	0	0	--	--
Soc Abstracts	0	0	--	--
PsycInfo	1	1	--	--
All hits	134			
Hits without duplicates	77			

All in all, we intellectually selected 77 publications from all applied information services (Table 9.1). The multidisciplinary commercial services WoS and Scopus returned more than 20 hits each; similarly, large hit sets were found on the free search engines Google Scholar, Microsoft Academic, and Dimensions. In all five systems, the consideration of citations of and references in the found documents was successful. Specialized databases such as EconBiz, ACM Digital Library, IEEE Xplore, Sociological Abstracts, and PsycInfo yielded very few hits. Due to only few hits on WoS (24 in contrast to 77 in the complete set) it seems to be very problematic to rely exclusively on WoS as, for instance [5] did.

### 9.3 Basic Terms

Many human actions are social actions. 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” [6, p. 4].

Information behavior on live streaming services is mostly oriented on the behavior of others, be it streamers (or broadcasters) or other users. So it is social action. If there are concrete interactions between two or more persons, we speak of “social interaction.” In contrast to some “classical” literature [e.g., 7 or 8], we use the term “social interaction” as a broader term for “social relation,” “parasocial relation,” and other forms of human-human interaction. If two or more people have contact and acknowledge that they are connected, it is “social relation” [7, p. 6]. Basic elements of social relations are bodily contact, proximity, orientation, gesture, facial expression, eye-movement as well as verbal and non-verbal aspects of speech [8]. In mediated contexts—for instance, a TV show, a movie, or on social media—an audience member does sometimes not only passively consume the content, but he or she builds up a kind of relationship to an actor, streamer, presenter, or celebrity. The “media figure” is not (or not always) aware of a relationship, but the spectator. Horton and Wohl [9] named 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” [9, p. 215] as bodily contact is not given as well. In media and communication science, “parasocial relationship” is an established concept to name the relations between media users and media figures [10]. Nowadays, parasocial relations are seen as an extension of social relations rather than a substitution [11]. There are scales for measuring the extent of parasocial interactions [12]. We differentiate between active social behavior (here: streaming and participating) and passive behavior (here: watching streams without further actions).

Following Shao [13], there are three user types on social media, namely actors (on live streaming services the streamers with active social behavior), consumers (on live streaming services the purely passive viewers), and, finally, participants (on live streaming services, consumers with active social behavior). Special groups of streamers are micro-celebrities, influencers, and *wanghongs*; however, these groups partly overlap. A micro-celebrity is a star on social media or on a specific service [14]; influencers are endorser shaping audience attitudes through the use of social media [15]. In China, *wanghongs* are influencers or micro-celebrities acting as social media entrepreneurs [16]. As some influencers and *wanghongs* make money with both, the actual number of viewers of a post as well as the number of their followers, fan loyalty acts as currency for them [17].

#### 9.4 Short Bibliometric Overview

Now we are arriving at the systematic review. Our research subject is highly topical. In the first quarter of 2021, 13.2% of the 77 papers were published. In 2020 and 2019, there were 26.3%

each year, in 2018 21.1%, in 2017 7.9%, and before 2017 only 5.3% of the found articles were published. Nearly all papers are in English; we found only three non-English articles, namely two papers in Korean and one in German. 36.8% of the papers appeared in conference proceedings, 1.3% as a book chapter, and 61.8% as journal articles. The most preferred journals are *Computers in Human Behavior* (6 articles), *Telematics and Informatics* (5 articles), and *Social Media + Society* (3 articles). Conferences most connected to the subject are *Human-Computer Interaction International* and its sub-conferences (6 articles), *Hawaii International Conference on System Sciences* (5 articles), and *Pacific Asia Conference on Information Systems* (3 articles). *Twitch* is mentioned most frequently in the article titles (15 times); followed by *Chaturbate* (2 times) and *YouNow* (1 time).

### **9.5 Interactions on Live Streaming Services**

Live streaming services enable real-time interaction between streamers and viewers and, additionally, among viewers. The streamers run their performances; the audience is able to interact with the broadcasting users via chats (partly also via camera), and the viewers may reward the performers with, e.g., points, badges, or money [18]. Next to boredom, socializing, and with this the human-human interaction, is a frequently found motivation to use live streaming services for both, streamers [19] as well as viewers [18]. Viewers' intentions to continue watching are led by their experience of the interaction, mainly the social identification with the streamer and the co-experience with other viewers [20]. The ties between a streamer and his or her audience form the performer's social capital. The more interaction ties a streamer has, the higher is his or her intention to continue contributing content [21].

Interaction on live streaming services is by no means a social relation, as there is no spatial proximity between the participants. However, it is also no parasocial relation, as there is always temporal proximity and reciprocity. Hence, live streaming-mediated interaction is an interpersonal relation in its own right [22] and has a middle position between social and parasocial relations [23] (Table 9.2). This kind of social interaction is, next to searching for knowledge, entertainment, and self-presentation, nearly always found on live streaming services as sought gratification, be it theoretically based upon the Uses & Gratifications Theory [24], or be it by means of clustering empirical data [25]. As all those human-human interactions happen online in the digital world, i.e. in "cyberspace," we name live streaming-mediated interaction "cyber-social relations."

On live streaming services, there are different forms of interaction, namely the broadcaster's stream, the viewers' and streamers' chat messages, the viewers' gifts or tips, and, finally, large amounts of text messages floating across the screen, a technique called *danmaku* in China [26]. All these techniques allow for highly interactive communications on those services [27].

Live streams (here, on *Twitch*) may act as virtual so-called “third places” (next to home and workplace), in which informal communities emerge and users socialize and participate [28]. Interpersonal interaction on live streaming services is highly correlated with the sense of community, and the affective interactions are highly connected with comfort and emotional connection [29]. The strengths of the relations between viewers and streamers and among viewers are different as streamer-targeted messages score higher in verbal immediacy than viewer-targeted messages [30]. It is possible to apply the approach of center-peripheral attention to study the interplays between streamers and viewers, where the producers occupy the center and the consumers as well as participants the periphery [31]. Frequently reported interactive features are the communication between broadcasters and audience members as well as giving and receiving gifts [32]. Social affordances may lead to perceived flow as well as to active and passive user engagement [33]. Information behavior on live streaming services supports new shopping relations [34] —in the very middle between physical event shopping and anonymous selling and buying on e-commerce platforms.

**Table 9.2:** Elements of social, parasocial, and cyber-social interactions

	<b>Reciprocity</b>	<b>Spatial Prox.</b>	<b>Temporal Proximity</b>	<b>Bodily Contact</b>
<b>Social Relation</b>	Yes	Yes	Yes	Yes
<b>Parasocial Relation</b>	Sometimes	No	No	No
<b>Cyber-social Relation</b>	Yes	No	Yes	No

Source: [23, p. 439; modified].

## 9.6 Streamers' Social Actions

Social actions of the broadcasters are dependent on the applied service. Streamers behave differently on, for instance, *Twitch*, *Chaturbate*, *YouNow*, or *Taobao Live*. Therefore, streamers on different platforms perform different social actions and have—if any—different influences on their audiences.

On *Twitch* (owned by Amazon), broadcasters comment on video game play, e-sports events (for instance, *League of Legends* or *FIFA 21*), or just chat, using a microphone and a camera and presenting the stream on a screen (or sometimes, using an overlay). On a further screen, viewers see the recently commented game. *Twitch* presents several notifications across the presentation, as, among others, chats, top donators, subscriber and donator notifications, and sometimes sponsor banners [35].

Streamers on *Chaturbate* are webcam models broadcasting sexual performances from flirting via striptease to pornographic shows in the categories women, men, couples, and trans. Models may use a professional studio for their broadcasting. Sometimes, there is a moderator for the chat [36]. Viewers and streamers may interact through chats and remote-controlled vibrators [37].

On general live streaming services as *YouNow*, *Twitter's Periscope* (discontinued in March 2021), or *IBM's Ustream* broadcasters stream a variety of different content including chatting, sharing information, presenting entertainment media, or making music [25].

Streamers on shopping-related live streaming services as, for instance, *Taobao Live* (owned by *Alibaba*), promote customers' purchase intentions and actions on e-commerce [38].

Streamers are both, content-focused as well as community-focused; and they are interested in non-monetary and monetary outcomes [39]. On *Twitch*, community-focused communication is associated with higher non-monetary outcome (how often users engage with the stream) and with lower monetary outcome (donated money) [39, p. 174]. On *Chaturbate*, the production of authenticity is essential [37, p. 3], i.e. the authentic interplay between content (say, striptease) and the model's shown personality. On general live streaming platforms as, for instance, *YouNow*, up to 10% of all streamers are hoping to become a micro-celebrity or an influencer [40]; the majority of streamers broadcast motivated by overcoming boredom, having fun, and socializing [19]. Streamers on e-commerce environments (as *Taobao Live*) are mainly interested in making money as digital entrepreneurs or *wanghongs*; here it is important to create social attraction and live streaming mediated interaction [38].

Many streamers are amateurs and broadcasting is a hobby. Some of them are able to develop a fan base and own social capital, leading to a hybrid form of work and play [41], being now micro-celebrities on a live streaming service [40]. And, in turn, some of them are able to monetarize their actions [42]. For early professional video game streamers, the situation was "like a gold rush" [43]. Some professional streamers make their money through donations or tips (many broadcasters on *Twitch* and nearly all on *Chaturbate*); others cooperate with companies and other institutions and act as influencers [44]. We may distinguish between

unpaid influencers, influencing their audience, e.g., in the sense of environmental protection, or in online tutoring [45], and paid influencers cooperating with a company in order to influence the viewers' attention to a certain good, many of them found as *wanghongs* on live streaming services which are connected with e-commerce as *Taobao Live* [38]. However, independent from streamers' concrete motives to stream, all their social actions are also targeted at the interactions with their audience [46].

## 9.7 Viewers' Social Actions

How do viewers perceive the interpersonal relations on live streaming services? What are their main motivations to watch and spend time on such services? At a first glance, live streams make people happy and relieve stress. Additionally, people are attracted by the charm of the streamers [47]. Indeed, there are emotional attachments to micro-celebrities [48, 49]. Viewers' identification with the streamer, liking the streamer combined with interactivity predicts the use of game related live streaming services [50]. Main motive for viewers' social actions on live streaming services is their enjoyment [51, 52]. Live streams may even help viewers to cope during difficult periods in life as, e.g., problems with their mental health or at work or in school [53]. Besides social interaction, sense of community, meeting new people, and a lack of external support in real life motivate viewers to engage on live streaming services (here, *Twitch*) [54]. Sometimes, it comes to deviant relationships due to deviant behavior of viewers (or also streamers), e.g. abusive behavior or the request for unwanted sexual actions leading to ban of the deviant viewers [55].

Some viewers like to participate actively during the broadcast [56, 57]. They cooperate with the broadcaster as a guest on a split screen [58], they write comments [59], or they interact with both, the streamer and other viewers [60].

For broadcasters, it is essential to get rewards, be it via likes or be it with money. However, what motivates viewers to present such rewards? For viewers (here, on *Twitch*) with social integrative motivations, supporting a streamer is an important factor in fulfilling their needs [61]. For *Twitch* viewers, the type of streamed content (for instance, competitive esports matches or lessons on how to play) is more important than the genre of games [62].

Supporting a broadcaster can mean to present (non-monetary) gifts (e.g., likes, hearts), to gift money (donation or subscription), or to pay ("tip") streamers for desired actions (e.g., undress a bra on Chaturbate). On general social live streaming services it is desired by nearly all viewers to reward the streamers with special emoticons [24]. Viewers motivated by socialization

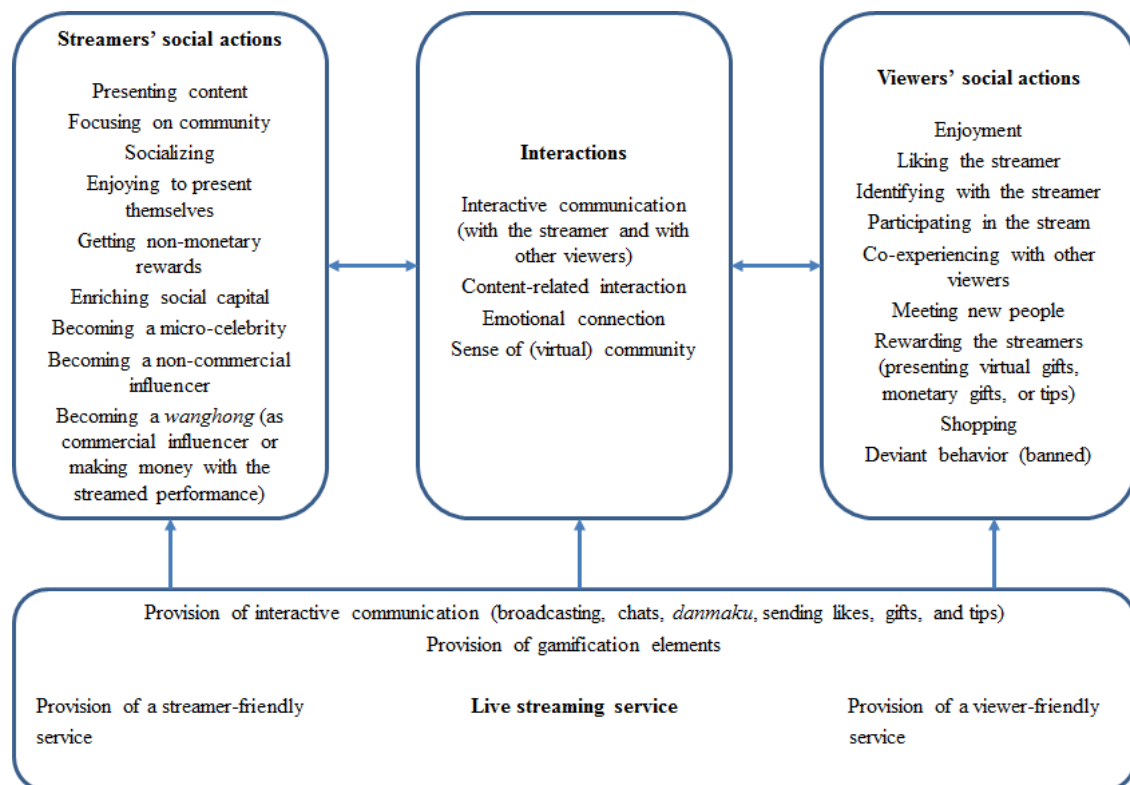
and having spent money (on *Twitch*) use the service to communicate with others, be part of the community and support the streamer [63]. Cognitive absorption (being deeply involved in using the service), virtual crowd experience, and viewer-streamer interactivity influence the purchase of virtual gifts [64]. Similar effects as cognitive absorption have the experience of flow [65] and the viewer's emotional attachment [66]. In another article, "virtual crowd experience" is called "sense of virtual community" [67]. This sense of belonging is a main motivation to send virtual gifts [67]. There seem to be connections between *danmaku* (if it is realized in the system) and gift sending [27, 67]. In addition, viewers are motivated by reciprocal acts of broadcasters [68]. They spend (partly huge) gifts to attract attention from the crowd or to promote preferred content [69]. So gift donation is dependent on both, the viewers' relation towards the broadcaster as well as towards other viewers [70]. The more viewers are engaged in the stream or in the service, the more likely they are to donate gifts [71]. And, not to forget, viewers' experienced happiness influences donating to the broadcaster [72]; viewers are paying for entertainment [73].

Virtual gifting is one option for streamers to make money on live streaming services (thus forming the online gift economy) [74]; the other is working as an influencer (and thus being part of the influencer economy) [17]. From the viewers' perspective, the relation to influencers is connected to their shopping behavior.

Especially in China, shopping via live streaming services is very popular [75]. At first sight, it is similar to TV shopping channels; however, it is much more interactive [76]. There are two groups of motivations for customers to view live streaming services for shopping, namely product-related and streamer-related motives [77]. There seems to be broad evidence that the mediating role of the broadcasters as micro-celebrities is essential for viewers' purchase intentions [75] thus forming a web celebrity economy especially on the market leader *Taobao Live* [78, 79]. Viewers' trust in the streamer also transfers to trust in the advertised products [80]. The immediate interpersonal interactions between viewer and broadcaster, but also between viewers are vital features of this kind of shopping [81] with "celebrity endorsement" [82]. Social and structural bonds between viewers and broadcasters positively affect consumer engagement [83]. The tie's strength plays an intermediary role between interactivity and customer engagement [84]. Besides the important interactions, additionally streamer attractiveness and information quality drive viewers' shopping behavior [85]. However, impulsive consumption is only determined by "emotional energy" [86]. Following [87, p. 11], live stream marketing is a "sustainable strategy to realize corporate growth."

Users' continuous viewing intentions lead to their "stickiness" on a specific show, an individual performer, or a service. What drives viewers' stickiness? Users' loyalty to streamers presupposes broadcasters' loyalty to the service [88]. Gratifications as entertainment and sociability are necessary for viewers' loyalty, and immediate feedback is important for the perception of media richness [89]. Emotional attachment to streamers and platform attachment foster user stickiness [90]. Identification with the broadcaster and emotional engagement have indirect effects on behavioral loyalty; however, moderated through the strength of interpersonal relations [91].

Gamification elements support viewers' motivation to watch live streaming continuously [58, 92]. Applied game mechanics both on live streaming websites [93] as well as mobile apps [94] include—besides monetary and non-monetary gifts (i.e., likes)—leaderboards, badges, points, levels, and progress bars. Especially live streaming services from China apply many game mechanics [93, 94].



**Figure 9.1:** Streamers' and viewers' social actions and their interactions on live streaming services

## 9.8 Conclusion

Interpersonal relations on live streaming services are neither social relations (there are no spatial proximity and no bodily contact) nor parasocial relations (as there is reciprocity and



temporal proximity), but cyber-social relations. Cyber-social relations occupy a position in between social and parasocial relations, giving live streaming an exceptional position in the entire landscape of social media. In some articles, the interpersonal relations on live streaming services are called “parasocial.” Due to our results, this terminology is not suitable and should be avoided as live streaming mediated relations are a relation in its own rights. It is a task for the future to develop a scale for the determination of the extent of the respective live streaming mediated interpersonal relation.

Our main results are graphically presented in Figure 9.1. While the live streaming service’s provisions enable the actions of broadcasters and viewers, the social interests of both actor groups are very different. Streamers’ social actions include, besides the necessary presentation of content, their focus on the virtual community also in order to enrich their social capital by enlarging the fan base, the joy of presenting themselves, and to get non-monetary or monetary rewards. For some broadcasters, these actions are part of their jobs as digital entrepreneurs (wanghongs). Viewers’ social actions show their enjoyment; they like the streamers they watch, identify with them, and reward them. Some like to participate in the stream; many like the co-experience with other users and the ability to meet new people in the online world. Most important are the interactions between streamers and viewers and among the viewers leading to highly interactive communication, emotional and content-related connections between all participating players, and their sense of (virtual) community. That is what makes interpersonal relations on live streaming services unique in all social media.

Research on live streaming services and their actors’ information behavior is a fast-growing “hot” topic. Although this review is based upon 77 articles, there could be more papers on special aspects of interpersonal relations, especially studying online shopping. Some articles do not only describe interpersonal interactions, but apply theories or models to structure their study or to explain their observations (e.g., Uses and Gratifications Theory, Self-determination Theory, Affective Disposition Theory, Social Cognitive Theory, or Social Identification Theory). As we have skipped these theories, it should be investigated in further research. Besides this study, there are two systematic reviews on our topic (however, only on information behavior concerning esports services [5 and 46]); but we miss a review on all aspects of information behavior (by streamers and by viewers) on all kinds of live streaming services in all countries and cultures. The next step in our research program is to produce a meta-analysis which includes all aspects of cyber-social relations and social actions on live streaming services.

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## **Part 4:**

### **Gamification and Motivation on Social Media**

## 10. Game Mechanics on Social Live Streaming Service Websites

### 10.1 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 function of live streaming to 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 migrated 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 in 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 a separable outcome" [23, p. 55]. 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?

## **10.2 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, a 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 extent 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 if 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 in 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 on 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 out 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 for what game design elements are implemented.

### **10.3 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 mechanics were not considered in 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.

**Table 10.1:** 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)		

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 a few differences we showed no differentiation in the results section.

As an 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.

### ***10.3.1 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 visited. 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 best websites. Also, we searched for the phrase “live stream” or hashtag “#livestream” on social media (e.g. Instagram, YouTube, Facebook, and Twitter) and got 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 10.1). The table displays all relevant SLSSs for our investigation which were examined for the implemented game mechanics.

### ***10.3.2 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. Those 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

was added (capturing moments). The remaining 14 game design elements and a short definition of each one are listed in Table 10.2.

### 10.3.3 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.

**Table 10.2:** 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]

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 10.2).

**Table 10.3:** No. of game mechanics per SLSS (N=14)

<b>SLSSs ordered by No. of Game Mechanics and Country's Ranking</b>	<b>No. of Game Mechanic Elements</b>
<i>China</i>	
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
<i>Japan</i>	
Nicovideo.jp (9)	6
<i>Thailand</i>	
Bigo.tv (706)	6
<i>U.S.</i>	
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

## 10.4 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 10.3). 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



**Table 10.4:** Overview of all applied game mechanics on SLSSs

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

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).

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 10.4). All SLSSs implemented the option to connect with other users via following or befriending them, except for Ustream.

**Table 10.5:** Number of SLSS websites having game elements (N=21)

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

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.

In Table 10.5 the amount of SLSS websites having the respective gamification element is 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 common features. 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 SLSSs 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.



Figure 10.1: Screenshot of one of the SLSS websites with the most gamification elements (Longzhu.com)

## 10.5 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 in 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 is expectable. “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 the 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-orientated 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 is the goal 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 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 its own backpack to collect different gifts.

*Points* are a unit that increases by accomplishing particular actions and certain site-activities [42]. They motivate users through feedback function as well as through 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 methods.

*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 10.1), 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 for a stream.

*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 a 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 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 leads the player to 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 site activities, for instance when the streamer is broadcasting live.

But, what strikes, 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 by 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 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. Also, 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.

## 10.6 Limitations and Outlook

Some limitations of this study were recognized and need to be acknowledged. Since just in China there 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 tests. 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 made.

This research presents a detailed overview about 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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## **11. The Impact of Gamification in Social Live Streaming Services**

### **11.1 Introduction**

Games have always been a fundamental part of our society. Even our everyday life is influenced by games. Who does not know the “airplane landing” method, used by many desperate parents to lead their children to eat unwanted food by making it fun. Adding the promise to give the child a treat (reward) after finishing the meal makes the perfect combination to achieve the influence and change of the child’s behavior [1]. This phenomenon called “gamification” is already applied in various situations, be it in school, or at work, in how we stay fit, or the way we travel. The implementation of game mechanics and dynamics in non-game contexts is used to increase one’s engagement, motivation and activity. Therefore, it is no surprise that social media services and mobile applications already utilize it [2].

Social media, also known as “Web 2.0” [3], are web based open access services “which are predicated upon the active participation of broad masses of users” [4, p. 259]. Users generate a large amount of data while using such services [5], thereby a user may produce information, as a producer, as well as consume the published information, as a consumer. Toffler [6] named these shared characteristics and behavior of users as “prosumers.”

One arising kind of social media are social live streaming services (SLSSs). Live streaming is described as a synchronous function – users are producing live videos and viewers are able to interact in real-time with a broadcaster. This happens via chat messages or likes, rewards, or other gratifications, e.g. becoming a fan. The person being live is able to react immediately. Some SLSSs are known for being topic-specific, like Twitch for virtual games and electronic sports events, or Picarto for art, but most of them do not have any thematic context and are considered as general SLSSs, e.g. YouNow, Periscope, Ustream [7]. On YouNow, most of the users are highly motivated by the applied gamification elements [8, 9]. Therefore, YouNow was used as a case study in this paper.

To describe the impact of gamification and motivating elements in an SLSS like YouNow, this investigation refers to the model of users’ information behavior on a gamified social live streaming service [10]. The model applies various theoretical aspects, such as the sender-centered Communication Formula by Lasswell [11] as well as the audience-centered Uses and Gratifications Theory by Blumler and Katz [12] with the differentiation between Gratifications Sought and Gratifications Obtained from Palmgreen et al. [13] as well as, additionally, the Self-Determination Theory of human motivation [14].

Users apply a certain service, because they are searching for gratifications [12] and to satisfy certain needs [14]. Palmgreen et al. [13] discuss the aspects of gratifications sought and gratifications obtained in relation to the uses and gratification theory – “since a gratification is sought it must necessarily be obtained” [13, p. 183]. Additionally, uses and gratifications are related to different information production, as well as reception behaviors. Users have a certain motivation and therefore are searching for gratifications. When users are getting a reward, certain gratifications are obtained. Gamification is considered as rewarding as well as motivating factor, regarding to Deterding’s explanation: “gamification’s guiding idea is to use elements of game design in non-game contexts, products, and services to motivate desired behaviors” [15, p. 14].

Users of social network services, respectively SLSSs, can be divided into three different user groups, namely producers, participants, and consumers [16]. Producers are users who are streaming live. They are producing content in a live stream. Participants are watching and are taking part by commenting, liking, or rewarding. Finally, consumers are users who are watching streams and reading comments, but are not producing any content and are not participating at all. Each user group has different motives for the usage of a social live streaming service. Consumers are using a service for entertainment as well as for information. Participants have the same motives as consumers and, additionally, the aim of social interaction. And finally, producers have additionally the goal to achieve self-realization and self-presentation.

With the theoretical backgrounds on uses and gratifications, the three user groups, and the difference between sought and obtained gratifications in mind, there are occurring three research questions about gamification on YouNow:

- **RQ1:** What gamification elements does YouNow offer its users?
- **RQ2:** To what extent are YouNow’s user groups motivated by the game mechanics (gratifications sought)?
- **RQ3:** To what extent are the game elements on YouNow perceived as a reward (gratifications obtained) by the special user groups?

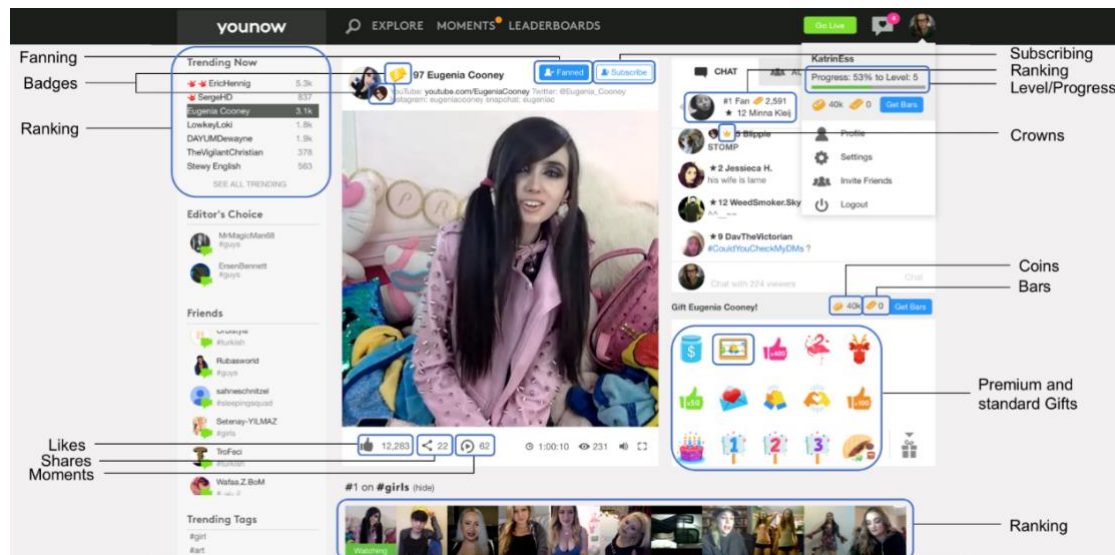
There are already several studies about live streaming services, about YouNow [17–20] as well as on gamification in social media, and gamification in general. Also, the worldwide popular video game live streaming platform Twitch.tv earns lots of attention from researchers [21]. Actually one investigation about giving and taking gratifications on YouNow [22] as well as another by Wilk et al. [23] about gamification on live streaming services, in particular, about

gamification influencing the user behavior of mobile live video broadcasting users could be found. The researchers developed a mobile live broadcasting application in three different versions. The first version (A) was applied as base version. It consists of a simple overview page, as well as a view for watching the live video, and one for recording a live broadcast. The second version (B) includes the opportunity of leveling and the overview of one's process to the next level. The last version (C) applies all functions of version B as well as the performance of challenges and the chance of receiving badges. Each version was evaluated by different users. Some users have streamed over a longer duration with the implementation of levels, and users are significantly more motivated by the challenges and rewards, than using the base version.

### **11.2 YouNow and Its Gamification Elements as a Case Study**

As YouNow is an SLSS which is mostly applied by teenagers and young adults between the age of 13 and 22 who are bored and want to have fun [8], it strikes that YouNow offers many gamification features as motivating factors. All gamification elements that are shown by the action of viewing a stream as a recipient are highlighted and listed in Fig. 11.1.

On Facebook there are friends, on Twitter as well as on Instagram there are followers, and on YouNow there are fans. Users connect with other users and stay up-to-date by following them via a so-called fanning function (blue button above the live stream). There is also the opportunity to become a subscriber (white button above the live stream) of selected broadcasters, if you are willing to pay a monthly fee. Subscribers have special and additional functions: "Subscription entitles you to Super Chat privileges [...], you will have access to a Super Gift" and one will receive a "special" and "unique badge" that will "identify you as a subscriber" as well [24]. Speaking about badges, there are three different types on YouNow. The first one, the "Subscription Badge", was already mentioned. The second one is the "Broadcast Badge". Only producers (streamers) are able to get this badge. It represents the users' broadcasting skills. There are nine different levels of this badge; each can be reached by different challenges. The levels are, namely and by order: Novice, Rookie, Junior, Captain, Rising Star, Boss, Ace, Superstar, Pro and finally, Partner. Users are moving up to a next status, if they reach certain goals (e.g. getting a determined number of fans or likes). Coming to the last badge which is called "Crowns", those badges are symbolizing top fans, who are supporting a streamer with bars. The more bars a user spends, the higher is his or her "Crown level". The "Crown level" is represented by one to five red or golden crowns. Those are shown on the user's profile, as well as beside one's username by commenting in the chat.



































**Figure 11.1:** YouNow live stream with marked gamification elements

The virtual currencies on YouNow are coins as well as bars. Bars have to be bought with real money. They make it possible for users to bestow a broadcaster with so-called premium gifts. The other virtual currency (coins) may be collected during certain activities on YouNow (e.g. broadcasting live). Coins are needed for site actions, such as bestowing a broadcaster with gifts. A user even needs coins for the action of liking a stream. Likes can be considered as some kind of feedback function by users or some kind of reward. Besides likes, there are also shares and captured moments, which are presented below the live video (Fig. 11.1). YouNow live streams can be mentioned on other social media sites by sharing it. There is the opportunity to share it on Facebook, Twitter, or Tumblr. One may even invite fans to a live stream to support the broadcaster. By capturing a moment, the previous 15 s of a live stream will be saved to one's profile as well as to the "Moments Feed", and may be shared on social media platforms as well. Another function of YouNow is to be a guest in a live broadcast of another streamer (there is normally a tab in the chat box, it is covered by the level, as well as level progress bar).

The host has to accept the guest request first. This feature offers the opportunity to collaborate with other streamers. Returning to gifts as well as premium gifts (below the chat box), most of them are like stickers or icons in the chat, but some of them even have an influence on the stream (e.g. applause). They have varying prices, serve as a reward for streamers, and "they are a symbol of your dedication and appreciation" [25]. Furthermore, levels show the user's experience on YouNow and the level progress bar should motivate one to reach the next level. YouNow offers its users many leaderboards to compare their performance and accomplishment to that of other users. The most utilized one is the "Trending Now" ranking (top left corner). The list displays the broadcasters being live and having the most viewers. The

greater the audience of a broadcaster at the moment, the better he is ranked. Consequently, the one with the most viewers is ranked on top. While watching a stream, there is also the “Top Fans by Streamer” ranking (above the chat) as well as the “Trending by Hashtag” ranking (below the stream). The “Top Fans by Streamer” ranking shows which fan spent the most bars regarding one streamer. The other ranking shows other streams with the same hashtags, regarding to the number of audience. Furthermore, other rankings are displayed on a special leaderboard site (Fig. 11.2).

 <b>Editor's Choice</b> Latest Picks	 <b>Top Broadcasters</b> 24 Hours ▾	 <b>Top Fans</b> 24 Hours	 <b>Top Moment Creators</b> 24 Hours ▾
★  <b>AmazingPhil</b> 1.7M Fans	1  <b>BrentMorg...</b> 872,158 Likes	1  <b>lio...</b> Sachi_V + 23	1  <b>Berblan</b> 1,481 Likes
★  <b>de...</b> 64.9k Fans	2  <b>ItsNickHorton</b> 544,065 Likes	2  <b>de...</b> BrentMorgan...	2  <b>RENE.GONGORA</b> 836 Likes
★  <b>whoi...</b> 13.3k Fans	3  <b>ItsConnorWade</b> 522,451 Likes	3  <b>nicho...</b> ItsNickHorton	3  <b>JaySandler</b> 429 Likes
★  <b>JaclynGlenn</b> 56.5k Fans	4  <b>WoohooitsEthan</b> 501,288 Likes	4  <b>Bl...</b> ItsPaxx + 7	4  <b>RolaBishimi_sy</b> 257 Likes
★  <b>OfficialOcean</b> 55.3k Fans	5  <b>AlexSilenceSings</b> 447,509 Likes	5  <b>Michael_825</b> yourgirlmeliiy	5  <b>Scooby.Doo.PaPa</b> 160 Likes
★  <b>danielhowell</b> 2.2M Fans	6  <b>EricHennig</b> 380,540 Likes	6  <b>whoi...</b> BrentMorgan...	6  <b>onelovoflife</b> 135 Likes
★  <b>TheDapperRa...</b> 130.1k Fans	7  <b>BrattyCup...</b> 376,700 Likes	7  <b>North...</b> LainieLovee + 6	7  <b>trikelow</b> 121 Likes

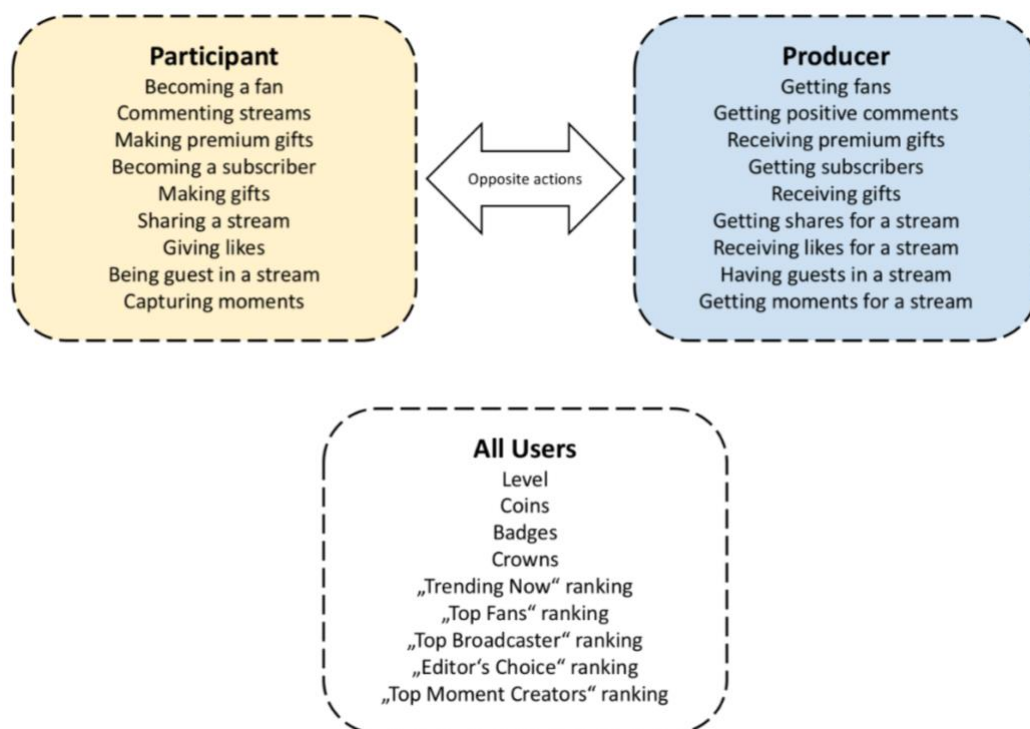
**Figure 11.2:** Leaderboards on YouNow

On the one hand, there is the “Editor’s Choice” ranking (green). It shows streamers who are discovered as talented by the editors of YouNow. “Editor’s Choice is awarded on a rotating basis and will be removed after a few weeks” [26]. Following, there is the “Top Broadcaster” ranking (purple), it lists “broadcasters with the highest number of likes in a particular broadcast” [27]. Furthermore, the “Top Fans” ranking (pink) “shows fans who have supported broadcasters with the greatest value of gifts in the past 24 h” [27], and finally, the “Top Moment Creators ranking” (blue) displays captured moments that have been liked by users. Concluding, YouNow offers many gamification elements, whereof seven items are rankings and there are three different kinds of badges. Nearly all of the elements allow the interaction or comparison with other users. In this investigation, the currency of bars as well as subscribing have been considered as further motivational features, because they cost real money. Also, commenting streams as well as sharing streams have been added as further motivational elements. Furthermore, the



“Broadcast Badge” has not been considered in the online survey, because it is a new element that has been added in the time frame of this investigation. Other SLSSs like Periscope or the live streaming function on Instagram only offer their users the opportunity to show attention during flying hearts.

The mentioned gamification elements and their related actions can be associated with the three different user groups (Fig. 11.3). Producers (blue) can receive or get something (e.g. comments, gifts) during the action of streaming live. The action one user receives during a stream has to be taken or sent by another user, the participant (yellow). Therefore, there are opposite actions for producers as well as participants. If a viewer participates in a stream, the producer will consequently perceive the action. There are some gamification elements, which can be used by all three user groups (white) – producers, participants as well as consumers. These are levels, coins, badges, crowns, and different kinds of rankings.



**Figure 11.3:** User groups and the related game elements and actions on YouNow

### 11.3 Methods

As an investigative method and to collect the required data, an online survey was conducted on umfrageonline.com. It was available in five different languages, namely English, German, Spanish, Arabic, as well as Turkish. The German survey was translated to English and Spanish,

- Motivation (gratification sought [1, 2, 13])
- Reward (gratification obtained [1, 12, 13])

### Likes on YouNow



Receiving likes on YouNow... \*

The distance between every number (1-7) is the same.

[illegible]

197

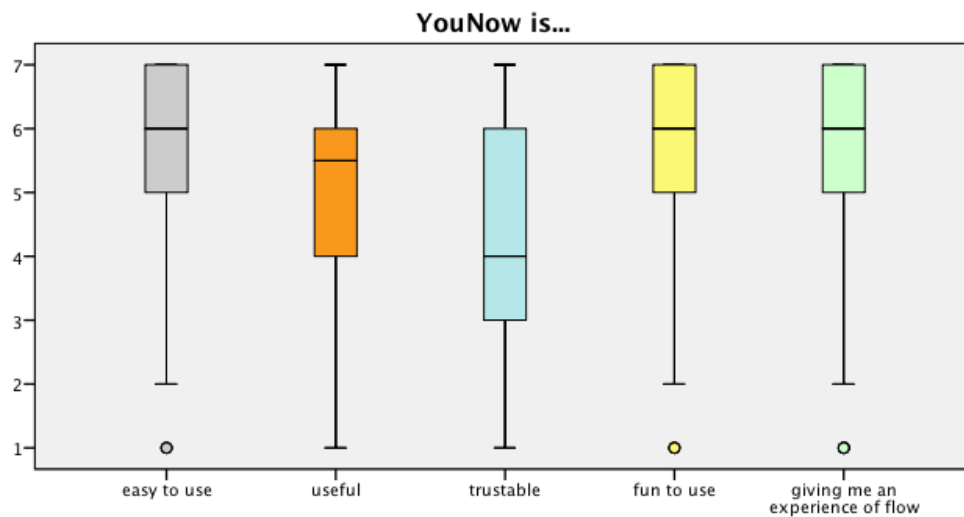
Since the data is ordinal scaled and not normally distributed, the median was considered as the first benchmark. Furthermore, the mean as well as the standard deviation (not mentioned in the table) were added as second and third sorting criterion. For the analysis of YouNow's ease of use, its usefulness, trustability, and giving users the experience of flow, we calculated the median and the interquartile range (IQR). In order to analyze the correlations between the positions of the actions of two rankings, Spearman's Rho rank coefficient has been calculated via SPSS. The common thresholds were used, namely two stars (\*\*) for 99% as well as "ns" for "not significant."

#### **11.4 Results**

Considering Alexa's online traffic statistics [29] about YouNow.com, most users are from the United States of America (30.1%), followed by Germany (11.6%), Turkey (8.1%), Saudi Arabia (6.5%), and Mexico (4.0%). The majority of survey attendees are from the United States of America (29.25%), or Germany (20.75%). Some attendees are from the United Kingdom (6.60%), Canada (5.66%), Saudi Arabia (5.66%), the Netherlands (4.72%), Turkey (2.83%), or New Zealand (2.83%) as well. Only a few are from Mexico (1.89%), Algeria (1.89%), Colombia (1.89%), Australia (1.89%), or Austria (1.89%). There are also participants from MENA countries (3.76%), other Latin American countries (3.76%), and other European countries (2.82%). In total participants from 26 different countries have applied.

Total 50.94% are male and 48.11% are female, the remaining amount would not state their gender. The participants are aged between 12 to 62 years, the median age is 23 and the modus is at the age of 17. From all participants 101 are only watching streams, 19 are only streaming, and 91 are watching streams and streaming actively as well. Most users (86.1%) are commenting streams and only a few (9.1%) do not, with 4.8% preferring not to say if they do (N = 165). Nearly half (47.8%) of the participants have at least bought bars once, the other half (49.5%) did not, and 2.7% would not state this question (N = 182). 54.42% of the users who have already bought bars think it was money well spent, only 27.93% think the money was not well spent. The remaining 17.65% points have a neutral point of view to this. With 48.9 percent points, slightly more users have already subscribed to someone, while 47.8% have not subscribed yet, and 3.3% prefer not to say if they do (N = 182). Already 52.7% have been a guest in a live stream on YouNow, and 45.6% have never been a guest in a stream, only few attendees (1.6%) would not answer this question (N = 182).

Regarding what users think about the SLSS YouNow (Fig. 11.5), for most users (min. 75%) it is easy and funny to use, and they have also experienced the feeling of flow (min. 75% as well) while being on YouNow (median is 6, each and IQR from 5 to 7). With the median at 5.5, users also noticed YouNow as a useful system. But, some users seem to have doubts whether YouNow is trustable, or not (median: 4).



**Figure 11.5:** What YouNow users think about the service (N=160)

Table 11.1 shows two different rankings regarding gratifications sought (top ranking) and gratifications obtained (bottom ranking) through the different gamification actions for producers. In both rankings, we can see a similarity at the positions and the median of the actions of "getting fans" (first rank, median of 7), "receiving premium gifts" (third rank, median of 7), "receiving gifts" (fifth position and median of 6), "having guests in a stream" (eighth position, median of 6) as well as "capturing moments for a stream" (ninth and last position, median of 5). One other action, "getting positive comments" is on the second position in the first ranking and on the fourth position in the second ranking, both with a median of 7. The action of "getting subscribers" is on the fourth place in the ranking for gratifications being sought and on the second position in the ranking for gratifications being obtained. Therefore, the positions for these actions have switched in both rankings. In the first ranking, the action of "getting shares" is on the sixth rank and "receiving likes" is on the seventh rank. Looking at the ranking about gratifications obtained, "receiving likes" is on the sixth rank and "getting shares" on the seventh rank. As mentioned, on the last two positions of both rankings is the action of "having guests in a stream" followed by the action of "getting moments." The first four positions of both rankings have a median of 7, the following positions, from five to eight, have a median

of 6 and the last position has, in both cases, a median of only 5. The correlation between the positions of the actions of the two rankings, according to Spearman's Rho rank coefficient, is 0.917\*\*.

**Table 11.1:** Rankings of gamification elements for producers (gratification sought/obtained)

<b>Actions by gamification elements for gratifications being sought (motivation)</b>				
Rank	Median	Mean	Action	N
1.	7	6.20	Getting fans	80
2.	7	6.20	Getting positive comments	79
3.	7	6.05	Receiving premium gifts	61
4.	7	6.01	Getting subscribers	74
5.	6	5.97	Receiving gifts	65
6.	6	5.68	Getting shares for a stream	56
7.	6	5.65	Receiving likes for a stream	81
8.	6	5.46	Having guests in a stream	57
9.	5	4.70	Getting moments for a stream	56
<b>Actions by gamification elements for gratifications being obtained (reward)</b>				
Rank	Median	Mean	Action	N
1.	7	6.30	Getting fans	79
2.	7	6.12	Getting subscribers	75
3.	7	6.10	Receiving premium gifts	61
4.	7	6.04	Getting positive comments	78
5.	6	6.12	Receiving gifts	65
6.	6	5.75	Receiving likes for a stream	79
7.	6	5.70	Getting shares for a stream	57
8.	6	5.19	Having guests in a stream	57
9.	5	4.71	Getting moments for a stream	55

Looking at the rankings of actions by gamification elements being sought as well as obtained for participants (Table 11.2), it strikes that the action on the first position of the first ranking, “commenting streams”, has a median of 6 and the first position of the second ranking (gratifications obtained), “making premium gifts”, has a median of 6.5. Comparing it to the previous table, the first rank starts with a smaller median for participants. “Commenting streams” is on the sixth place for gratifications obtained and “making premium gifts” is on the fifth position for gratifications sought. The second element in the ranking about gratifications sought is “being a guest in a stream”. Participants are motivated by being a guest in a stream. Comparing it to the ranking about the reward, “being guest in a stream” is on the eighth ranking. Nevertheless, they both have a median of 6 and a similar mean value (5.48 for sought; 5.40 for

obtained). Moving on with the third place, there is the action of “becoming a fan” in both rankings. “Becoming a subscriber” is on the fourth position at gratifications sought (median of 5.5) and on the second ranking (median of 6) for gratifications obtained. “Sharing a stream” has a median of 4 in the first ranking (8<sup>th</sup> rank) and a median of 6 in the second ranking (7<sup>th</sup> rank). Again, “capturing moments” is at the last position in both rankings. For the positions of the two rankings in Table 11.2, the Spearman’s Rho rank coefficient correlation is 0.233 and it is statistically not significant.

**Table 11.2:** Rankings of gamification elements for participants (gratification sought/obtained)

<b>Actions by gamification elements for gratifications being sought (motivation)</b>				
Rank	Median	Mean	Action	N
1.	6	5.60	Commenting streams	116
2.	6	5.48	Being a guest in a stream	58
3.	6	5.22	Becoming a fan	131
4.	5.5	5.24	Becoming a subscriber	72
5.	5	5.03	Making premium gifts	68
6.	5	4.94	Making gifts	114
7.	5	4.63	Giving likes	133
8.	4	4.49	Sharing a stream	100
9.	4	4.03	Capturing moments	101
<b>Actions by gamification elements for gratifications being obtained (reward)</b>				
Rank	Median	Mean	Action	N
1.	6.5	6.00	Making premium gifts	68
2.	6	6.04	Becoming a subscriber	72
3.	6	5.99	Becoming a fan	128
4.	6	5.74	Giving likes	134
5.	6	5.71	Making gifts	112
6.	6	5.68	Commenting streams	114
7.	6	5.49	Sharing a stream	101
8.	6	5.40	Being a guest in a stream	58
9.	5	4.55	Capturing moments	101

Considering the median values of the rankings about gamification elements concerning all user groups (Table 11.3), only the first rank of the motivating ranking (gratifications sought) has a median of 6, the second to eighth positions have a median of 5 and the last place has a median of 4. The other ranking, about which gamification elements are experienced as a reward (gratifications obtained), has a median of 6 from the first to the fifth ranking. The sixth place has a median of 5.5 and the others a median of 5. Therefore, the standard game mechanics are

generally experienced as more rewarding than motivating. Looking at the ranking positions, levels are on the first place for gratifications sought and on the second place for gratifications obtained (median of 6, each). The second position of the first ranking (sought) displays the gamification element coins and has a median of 5. In the second ranking (obtained), coins are in first place and have a median of 6.

**Table 11.3:** Rankings of gamification elements for consumers, producers, and participants as well (gratification sought/obtained)

<b>Gamification elements for gratifications being sought (motivation)</b>				
Rank	Median	Mean	Element	N
1.	6	5.21	Levels	113
2.	5	5.15	Coins	124
3.	5	5.03	“Trending Now” ranking	105
4.	5	4.86	“Editor’s Choice” ranking	101
5.	5	4.86	Crowns	98
6.	5	4.84	Badges	93
7.	5	4.79	“Top Fans” ranking	104
8.	5	4.64	“Top Broadcaster” ranking	104
9.	4	4.52	“Top Moment Creators” ranking	103
<b>Gamification elements for gratifications being obtained (reward)</b>				
Rank	Median	Mean	Element	N
1.	6	5.48	Coins	123
2.	6	5.36	Levels	108
3.	6	5.25	“Trending Now” ranking	101
4.	6	5.13	Crowns	100
5.	6	5.10	Badges	93
6.	5.5	5.05	“Top Broadcaster” ranking	96
7.	5	4.97	“Editor’s Choice” ranking	95
8.	5	4.97	“Top Fans” ranking	100
9.	5	4.65	“Top Moment Creators” ranking	97

The “Trending Now” ranking is in both rankings on the third place and has a median of 5 for gratifications sought and a median of 6 for gratifications obtained. Placed on the fourth position of motivating gamification elements, is the “Editor’s Choice” ranking, it has a median of 5. On the fifth and sixth position are crowns (5<sup>th</sup>) as well as badges (6<sup>th</sup>), both with a median of 5 as well. In the ranking about rewarding gamification elements, the “Editor’s Choice” ranking can be found at the seventh rank with a median of 5, crowns are on the fourth position, and badges are on the fifth position, both with a median of 6. The “Top Fans” ranking and the “Top

Broadcasters" ranking are on the seventh and eighth place of the first rankings and on the sixth and eighth place of the second ranking. With a median of 5, the "Top Fans" ranking is on the eighth position for gratifications obtained. Finally, the "Top Moment Creators" ranking is on the last rank for gratifications sought as well as for obtained. It has a median of 4 for motivating and a median of 5 for rewarding. The Spearman's Rho rank coefficient correlation for the positions of the elements in the two rankings (Table 11.3) is 0.850\*\*.

## 11.5 Discussion

This investigation presented a first insight about game mechanics and their rewarding, respectively motivating aspect on general live streaming services, and, if and through what gamification elements users are searching for as well as obtaining gratifications. On YouNow, users are confronted with many types of gamification elements. Every registered user has a level as well as a level process bar to compare their experience with other users and to be motivated to reach the next status. While watching a stream the audience is able to reward the streamer with likes and gifts. There is the opportunity to share a stream on other social media services as well as to capture moments (15 s) of a stream. To collaborate, one is able to request to be a guest in a stream of a producer. Users stay up-to-date through the fanning as well as subscribing function and collecting coins through several site activities. The other currency on YouNow, besides coins, that has to be bought with real money, is called bars. Bars are needed for special premium gifts. Moreover, YouNow offers its users seven different leaderboards to compare the performance towards other users and three different kinds of badges.

The online survey asked YouNow's users if they perceive the particular gamification elements as rewarding and motivating. According to the results, the actions a user perceives while producing a stream are experienced as the most rewarding as well as motivating. The rank order from the ranking about gratifications sought (motivating) is similar to the ranking about gratifications obtained (rewarding) for producers (correlation of 0.917\*\*), even the median values of each action is the same in both rankings. For producers, getting fans is the best way to search as well as to obtain gratifications, whereas getting moments is the least.

The actions users perceive while participating in a live stream are conceived as slightly less rewarding as well as motivating as for the producers. They are gently more rewarded through the different gamification actions than motivated and they are not searching for gratifications as much as they are obtaining them. For participants, commenting streams is the most



motivating action and making premium gifts is perceived as the most rewarding. The least action for participating is in both circumstances capturing moments.

Coming to the general gamification elements for all users, the most motivating one are levels and the most rewarding are coins. At the last ranking positions of both rankings was the “Top Moment Creators” ranking. In general, the standard gamification elements for all users of YouNow are perceived as the least rewarding as well as motivating, but all are at least perceived as neutral and the majority as thoroughly motivating, respectively rewarding. Users are more motivated by the actions they are able to perform on the service. Moments as well as the “Top Moment Creators” ranking are rated rather low, because YouNow’s users want to replay and watch the full video instead of the captured moments (15 s). Additionally, the results show that YouNow is easy as well as fun to use, YouNow’s users are experiencing flow while using the platform, and they think the information service is somehow useful as well.

As limitations of this investigation, one can mention the rather small number of participants (N = 211); also not every survey attendee has answered all questions concerning the high number of survey items. As an alternative, qualitative interviews with producers as well as the audience will be more accurate than pure quantitative data. The interviews could be performed live on YouNow. Moreover, 50% of the survey participants are 23 years old and older. If more users from generation Z [30] had participated, the data would be more accurate. The common users of YouNow are mainly teenagers and adolescents. For further research, a comparison of other live streaming services’ game mechanics would be helpful to have data on different live streaming services (as, e.g., Periscope is mainly used by generation Y and generation X and older people are mainly using Ustream). Moreover, an investigation about comparing the extent of gamification elements a service applies should be conducted. Also, an investigation about the distinction of users by gender, age, and culture will be an interesting research topic.

All in all, YouNow’s game mechanics are accepted very well. The very young users of YouNow do really enjoy the gamification elements of the service.

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## 12. Giving and Taking Gratifications in a Gamified Social Live Streaming Service

### 12.1 Introduction

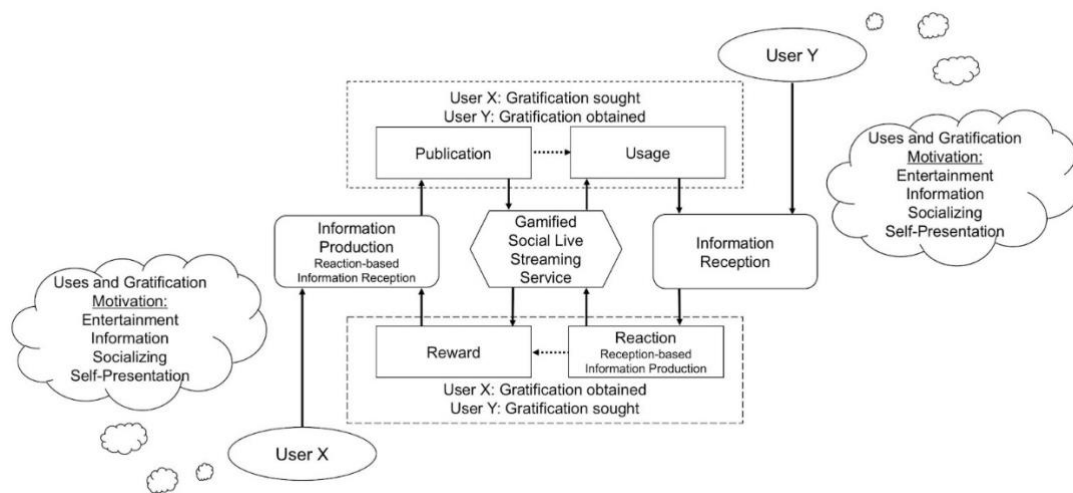
Gamification has become a central part of the modern society. The aim of gamification is to achieve the influence and change of users (information) behavior (Zichermann and Cunningham, 2011). Deterding (2012, p. 14) explains that “gamification’s guiding idea is to use elements of game design in non-game contexts, products, and services to motivate desired behaviors”. It is already used in many mobile applications as well as social media services (Deterding et al., 2011). But what is *gamification*? – *Game* (or gaming), like in “gamification”, has to be differentiated from the idea of *play* (or playing). Games, and gaming in general, make use of challenges, are denoted by exact rules, and are goal-oriented (Salen & Zimmermann, 2003). However, playing is mainly based on the idea of improvisation. Furthermore, gamification is associated with elements that are characteristic to games, and not considered as a full-fledged game. Another potential alternative for the idea of “gamification” would be the term “gameful design” (Deterding et al., 2011).

One to some extent new kind of social media applying game mechanics and dynamics are social live streaming services (SLSSs). Here, users are able to broadcast their own live videos by using the webcam of a computer or the camera of a mobile device (e.g. smartphone or tablet). The audience can interact with the streamer in real-time via chat messages and may react with likes or other rewards, such as gifts. As everything happens in real-time, live-streaming services are synchronous social media, in contrast to asynchronous social media, like Facebook, Instagram, or Twitter. There are some topic-specific live streaming services like Twitch (games) or Picarto (art) and general live streaming services as YouNow, Periscope or Ustream (Scheibe, Fietkiewicz and Stock, 2016). Following Friedländer (2017a) as well as Scheibe, Zimmer and Fietkiewicz (2017) YouNow’s users are highly motivated by the applied gamification elements of the service, therefore it was considered as case study in this investigation.

Scheibe, Fietkiewicz and Stock (2016) have investigated a model which shows the information behavior from users in a synchronous social network service. We have modified this model for a gamified social live streaming service and added several theoretical aspects (Figure 12.1).

Beginning with Lasswell’s communication theory (1948, p. 216) and the central question: “Who says what in which channel to whom with what effect?”, Lasswell’s described process is presented in the modified model. User X (“Who says?”) produces a publication (live stream)

(“what”) in the gamified SLSS (“in which channel”), user Y (“to whom”) might use and watch the live stream, receives information and will, perhaps, react to this (“with what effect”). But what makes users continue the usage of such social media services?



**Figure 12.1:** User information behavior model in a gamified SLSS (Modified from Scheibe, Fietkiewicz and Stock, 2016, p. 9)

Mentioning the uses and gratifications theory by Blumler and Katz (1974), the use of media is guided by need satisfaction and search for gratifications. It is also goal directed (McQuail, Blumler and Brown, 1971) and “shaped by [...] definite expectations” (Katz, Blumler and Gurevitch, 1974, p. 511). There are several motives which lead users to use media. McQuail (1983) summarized at least four central motives for media use, namely entertainment, information, personal identity, and social interaction. Shao (2009) distinguished the different motives by the action of consuming, participating, and producing. Consumers (only reception without reaction) use social media for information and entertainment. The goal of participants (reception with reaction) is information and entertainment, and additional social interaction (socializing). Finally, producers (i.e. streamers in SLSSs) in social networks are generating content additionally for self-expression and self-actualization (or self-presentation). Palmgreen, Wenner, and Rayburn (1980) discussed the aspects of gratification sought and gratification obtained in relation to the uses and gratifications theory – “since a gratification is sought it must necessarily be obtained” (p. 183). Thus, uses and gratifications are related to different information production and reception behaviors.

In Figure 12.1 user X and user Y are searching for gratifications through entertainment, information, socializing, and self-presentation. Producers are interacting live (in many cases, in

front of the camera) with their recipients, streamers are additionally reading the chat messages (consuming) and may respond (participate) immediately. YouNow offers recipients the opportunity to be a guest in a stream, which indicates the same motives for recipients as for producers. In the model, gratifications are sought during publishing as well as during reading comments, respectively watching streams. The streamer (user X) is producing content in a stream and searches for gratifications; gratifications are obtained for user X (consumer or participant) at the point of usage. For user X, the gratifications are obtained at the point where another user reacts to her or his stream. The reaction leads to gratification obtained for user X and to gratifications sought for user Y.

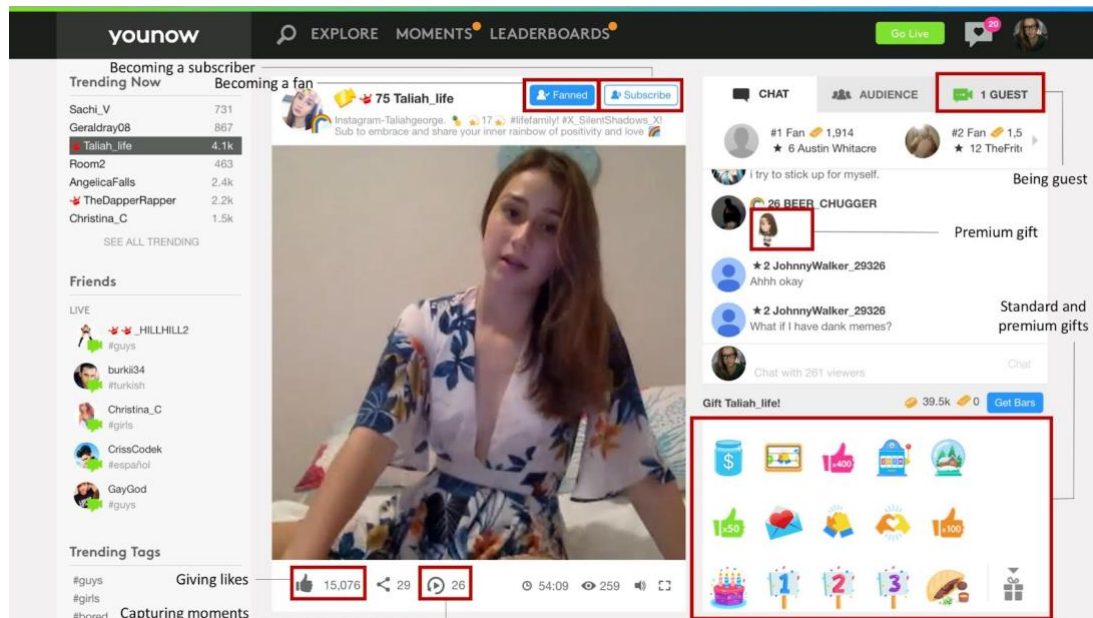
Gamification may have an effect on the user's motivation as well as his or her behavior. Based on the model shown in Figure 12.1 the following research questions (RQs) are answered in this investigation:

- **RQ1:** To what extent are gamification elements on SLSSs considered as funny, useful, motivating and rewarding?
- **RQ2:** What are the differences between the actions of giving and receiving gratifications?

Figure 12.2 shows a live streaming session on YouNow. The gamification elements examined in this investigation are marked. On YouNow are even more gamification elements, e.g. coins, badges, and rankings, which are not considered as research objects in this investigation. The live stream is placed in the middle of the website. On the right side a "Top Fans" ranking is displayed, as well as the chat-box where users can write chat messages and bestow the streamer with gifts. A user can also see the amount of coins and bars he or she has collected.

Coins are one of the virtual currencies on YouNow; one is able to collect them through several site activities. Users are able to buy (standard) gifts with coins. In contrast, bars (the other currency) have to be bought with real money. With bars users are able to buy premium gifts. In the other tabs on the right side one can see the usernames of the audience and users who are requesting guest sessions with the streamer. Above the livestream one can see the profile picture, badges (if available), the streamer's nickname as well as the profile information of the broadcaster. In addition, there is the fan and subscribe button. Fanning is like becoming a friend on Facebook or like the following function on Twitter and Instagram. To become a subscriber one has to pay a monthly fee. As a subscriber you have special features like badges and gifts as well as the opportunity of a secret chat with the streamer you subscribe to. Placed

under the stream one can see (left to right) the given likes, shares as well as captured moments, the streaming time and the number of users watching. On the left, the “Trending Now” ranking as well as a list with friends that are streaming at the moment are displayed. Furthermore, a ranking with trending tags is listed.



**Figure 12.2:** A livestream on YouNow with gamification elements marked

There are already some investigations about the topic-specific live streaming service Twitch (e.g., Kaytoue, 2012; Gros et al., 2017) as well as some about general live streaming services. Among these, we detected two investigations on potential law infringements (Honka et al., 2015; Zimmer, Fietkiewicz and Stock, 2017), one about user-generated content and the streamer’s motives (Friedländer, 2017b), papers about the evaluation of SLSSs having YouNow as a case study (Fietkiewicz and Scheibe, 2017; Friedländer, 2017a), and a paper on information behavior of users of SLSSs (Scheibe, Fietkiewicz and Stock, 2016). Furthermore, Wilk, Wulfert and Effelsberg (2015, p. 405) investigated how gamification influences the user behavior of mobile live video broadcasting users. They developed a live streaming mobile application in three different versions: First, the base version, second, a version with levels and a level process overview, and finally, the second version expanded by the opportunity of challenges and the collection of badges. Each version was evaluated by different users. The users were significantly more motivated by the gamification elements and spent more time with the system when more gamification elements applied.

## 12.2 Method

Based on our theoretical frameworks, an online survey was developed and distributed on [umfrageonline.com](http://umfrageonline.com). It was accessible from 30<sup>th</sup> August 2016 until 13<sup>th</sup> March 2017. Following the top five browsing locations of YouNow (Alexa, 2016), the survey was available in English, German, Spanish, Arabic, and Turkish. After checking the survey data, the answers from 211 YouNow users were left.

At first, the attendees had to answer if they are a user of YouNow and what they use YouNow for. The options to answer were “Only streaming”, “Only watching streams”, “Both: streaming and watching streams”, or “I do not use YouNow”. Either the attendee was only acting as a recipient (only watching streams), only as a producer (only streaming), or as both, recipient as well as producer. If the attendee chose “I do not use YouNow”, the survey was finished. The following questions were filtered depending on the status of the participant. Most survey items consisted of pre-formulated statements about each gamification element and a depiction of this element. For the statements, a 7-Point Likert Scale (Likert, 1932) from (1) “totally disagree” to (7) “totally agree” was prepared, which allows choosing a neutral (4) option. The 7-point scale was chosen in order to achieve a finer granularity of results than, e.g., a 5-point scale. Each game mechanic was evaluated concerning four aspects:

- Fun (theoretical justification: Information Service Evaluation model – Schumann and Stock, 2014; Deterding et al., 2011),
- Usefulness (Technology Acceptance Model – Davis, 1989),
- Motivation (Zichermann and Cunningham, 2011; Deterding et al, 2011),
- Reward (Zichermann and Cunningham, 2011; Blumler and Katz, 1974).

All other questions could be answered by “Yes”, “No”, or “Prefer not to say”. At the end the survey attendees were asked about demographics (age, gender, and country). To make a comparison of the results we could only use the data all attendees had answered (Both: producer and recipient) for this research. Therefore, the N of the data is lower than 211 and varies, but after all a trend can be seen in the answers.

Since the data is ordinal scaled (and, additionally, do not form a normal distribution), we decided to work with the median and the interquartile range (IQR). In order to statistically analyze the differences between giving and receiving something we applied the Wilcoxon test. We used the usual three thresholds, namely one star (\*) for 95%, two stars (\*\*) for 99%, and three stars (\*\*\*) for 99.9% probability as well as “ns” for “not significant”. All calculations were performed by the help of SPSS.

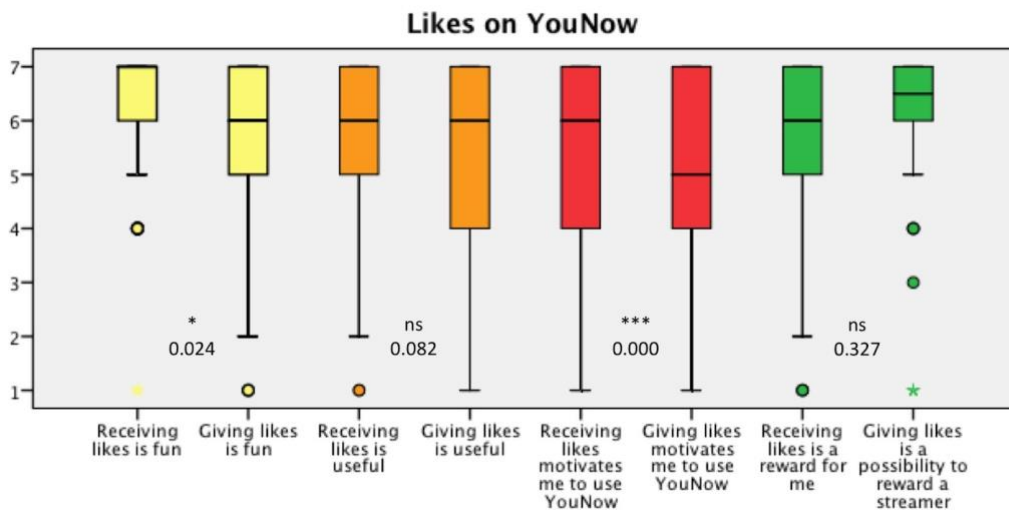


## 12.3 Results

Our results show the differences between the actions of receiving something and giving something as well as the differences between the aspects of fun, usefulness, motivation and reward.

### 12.3.1 Gamification Element: Likes

Figure 12.3 shows the different user estimations regarding the likes. It strikes that the action of receiving likes is always slightly better than giving likes. For the aspects of fun (\*) and motivation (\*\*\*) the differences are even statistically significant, both in favor of receiving.



**Figure 12.3:** Difference between receiving likes and giving likes (N=62)

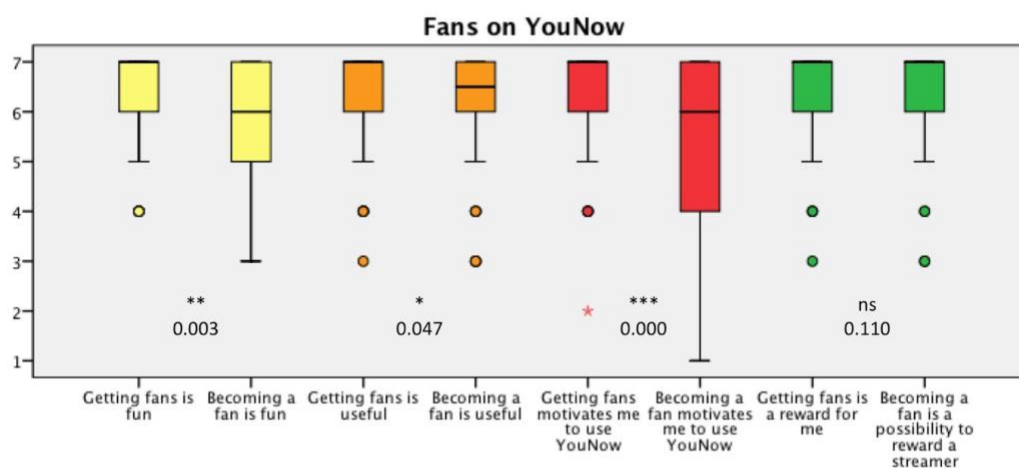
Receiving likes is fun, has its maximum as well as its median at 7 and an IQR of 1, from 6 to 7. Giving likes has the median at 6, which displays that only 50% rated it as very funny to give likes and the IQR equals 2 (yellow boxplots). Whether receiving likes as well as giving likes are useful, is rated with a median of 6 each (orange boxplots). But looking at the IQR, it stretches from 5 to 7 for receiving likes and from 4 to 7 for giving likes.

Considering the boxplots associated with motivation (red), the IQR of both boxplots, receiving as well as giving, are the same. But taking a look at the median, it is 6 for receiving likes and only at 5 for giving likes. Here, the result is clear: Receiving likes is (statistically very significant) more motivating the giving likes. Coming to the green boxplots, if receiving likes is a

reward for one, or giving likes is a possibility to reward another streamer. The median of the boxplot, showing the case of receiving likes, is at 6, while the one of giving likes has its median at 6.5. Also the IQR is different. The receiving side has the IQR from 5 to 7 and the giving side from 6 to 7. Therefore, the users think that giving likes is more a reward for a streamer than for themselves.

### 12.3.2 Gamification Element: Fans

The aspect of getting fans and becoming a fan (Figure 12.4) exhibits three (out of four) statistically significant differences – again, all in favor of getting something. It is funnier to get a fan than to become a fan (\*\*), it is more motivating to get fans than to become a fan (\*\*\*); and, finally, it is considered as more useful to get fans than to become a fan (\*).



**Figure 12.4:** Difference between getting fans and becoming a fan (N=62)

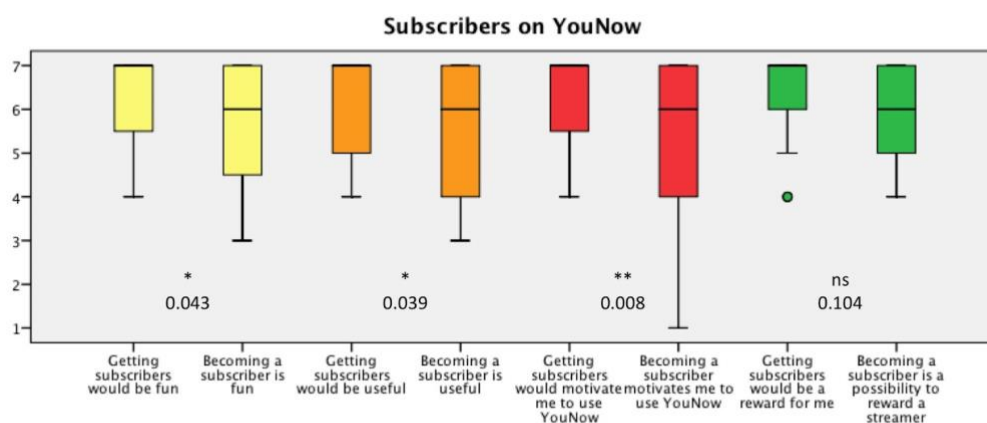
Considering the fun of actions of getting fans and becoming a fan, getting fans has its IQR from 6 to 7 and the median at 7. Becoming a fan's IQR goes from 5 to 7 and its median is at 6. Therefore, getting fans is more fun for the users of YouNow (\*\*). Coming to the usefulness of fans and fanning, both graphs have its minimum at 5 as well as its IQR from 6 to 7. However, the median is on the left side at 7 (getting fans) and on the right side (becoming a fan) at 6.5 (\*).

When it comes to motivation, getting fans has a median of 7; the IQR ranges from 6 to 7. Becoming a fan has its IQR runs between 4 and 7; the median is at 6. Getting fans is perceived as more motivating than becoming a fan (\*\*\*). Both, "getting fans is a reward for me", and

“becoming a fan is a possibility to reward a streamer” show the same (very positive) results (median: 7; IQR: 1).

### 12.3.3 Gamification Element: Subscribers

It seems to always be the same story. If it comes to statistically significant differences between (passively) getting something and (actively) giving or becoming something, the getting aspect shows the higher values. Concerning subscribers (Figure 12.5), it is funnier to get subscribers than to become a subscriber (\*), it is more useful (\*) and it is more motivating getting subscribers than becoming a subscriber (\*\*).



**Figure 12.5:** Difference between getting subscribers and becoming a subscriber (N=36)

Concerning the fun of getting subscribers and becoming a subscriber, the median is 7 for getting, and only 6 for becoming (\*). Also the IQRs differ from 5.5 to 7 (getting) in contrast to from 4.5 to 7 (becoming). The usefulness of getting subscribers and becoming a subscriber differs in the median (7 and 6) and in the IQR (5 to 7 versus 4 to 7), leading again to a significant difference (\*).

The motivating aspect of getting subscribers has its median at 7, the one for becoming a subscriber has its median at 6 (\*\*). The IQR from getting subscribers runs from 5.5 to 7; the IQR for becoming a subscriber has its IQR from 4 to 7. Getting subscribers is motivating the users more than becoming a subscriber. Getting a subscriber is indeed a reward for the user (median: 7), and becoming a subscriber is a possibility to reward a streamer has a median of 6.

### 12.3.4 Gamification Element: Gifts

Analyzing gifts (Figure 12.6), the only statistically significant difference is the motivational aspect. Receiving gifts is considered as more motivating than making gifts (\*\*).

Receiving gifts is slightly funnier (median 6.5) than making gifts (median: 6). There are no statistically visible differences between the usefulness of receiving and making gifts as both actions have their median at 6.

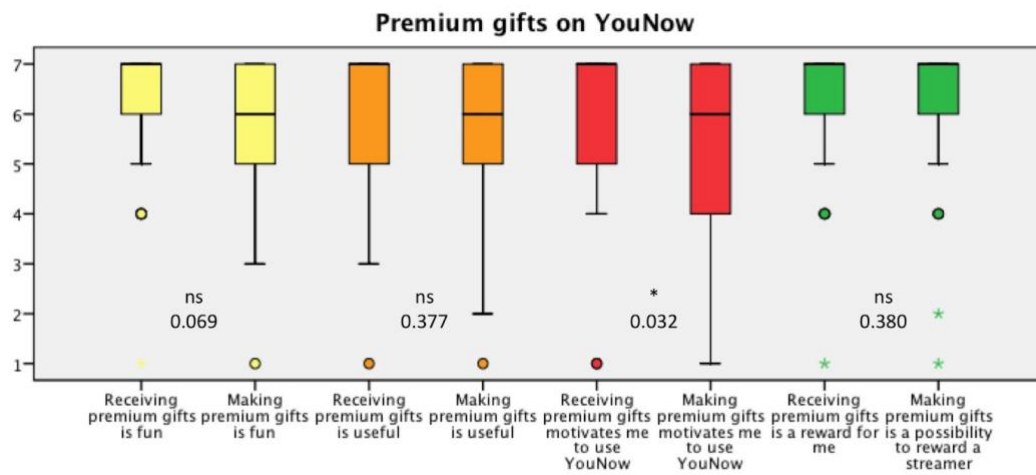


Figure 12.6: Difference between receiving gifts and making gifts (N=50)

The motivational effect of receiving gifts (median: 7; IQR: 2) is more distinctive than the effect of making gifts (median: 6, IQR: 3). The last two boxplots show the results of the statements for the rewarding factor. These ones are nearly the same; both have its median at 7 with an IQR 1 as well as its minimum at 5.

### 12.3.5 Gamification Element: Premium Gifts

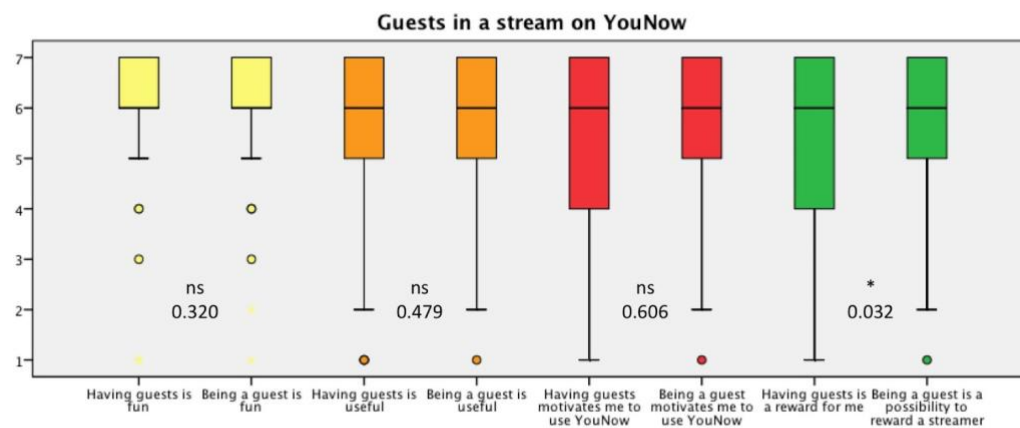
Similar to "normal" gifts, receiving premium gifts is more motivating to continuously use YouNow than making those gifts (\*) (Figure 12.7). All in all, the results for premium gifts correspond to the results of the other gifts (Figure 12.6). All median values (for both kinds of gifts) equal 6 or even 7.



**Figure 12.7:** Difference between receiving premium gifts and making premium gifts (N=42)

### 12.3.6 Gamification Element: Guest in a Stream

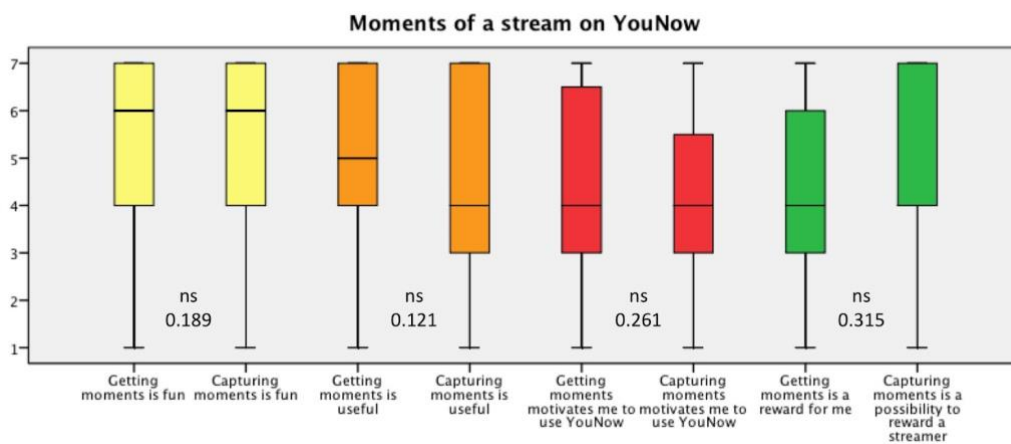
Concerning the gamification element of being a guest in a stream there is a statistically significant difference in the aspect of rewarding. Being guest in a stream is slightly more rewarding than having guest in the own stream (\*). Both median values are 6; however, the IQR for being a guest is 2 and for having a guest is 3. Again, all median values are (with 6 or 7) optimal (Figure 12.8).



**Figure 12.8:** Difference between having guests in a stream and being guest in a stream (N=45)

### 12.3.7 Gamification Element: Moments of a Stream

With regards to “moments” (which are short sequences of the entire video), there is no statistically significant difference between getting moments and capturing moments (Figure 12.9). However, “moments” are by no means as fascinating as all other analyzed gamification elements. Moments (getting as well as capturing) are funny (median: 6); moments nevertheless lack popularity concerning usefulness (median getting moments: 5; median capturing moments: 4), motivation (median: 4) and reward (median: 4).



**Figure 12.9:** Difference between getting moments for a stream and capturing moments of a stream (N=44)

## 12.4 Discussion

### 12.4.1 RQ1. To what extent are gamification elements on SLSSs considered as funny, useful, motivating and rewarding?

The SLSS YouNow offers its users many gamification elements. All game mechanics (except “moments”) are perceived as funny, useful, motivating and rewarding by our participants. Most median values of the users’ estimations for likes, fans, subscribers, gifts, premium gifts and guests in a stream are (on a 7-point scale) 6 or 7. Here is a clear result: those gamification elements are seen only very positively by the participants. Considering “moments”, most median values equal 4, which means that the participants vote for “neutral”. Moments do not really bother the users, but most users do not need this functionality.

#### **12.4.2 RQ2. What are the differences between the actions of giving and receiving gratifications?**

Indeed, there is in many cases a statistically significant difference between giving something and receiving something in favor of receiving. Receiving likes, getting fans and getting subscribers is – statistically significant – *funnier* than giving likes, becoming a fan and becoming a subscriber. Getting fans and getting subscribers is considered more *useful* than becoming a fan or a subscriber. Receiving likes, getting fans, getting subscribers, receiving “normal” gifts and receiving premium gifts is more *motivating* than giving likes, becoming a fan, becoming a subscriber, making “normal” gifts and making premium gifts. Being a guest in a stream is more rewarding than having a guest in one’s own stream.

#### **12.4.3 Limitations and Outlook**

This investigation has some limitations. First, the survey had only a small number of participants (N = 211); also the amount of survey questions was relatively high, consequently not every participant has completed the survey and we could only use a small number of results due to the fact that only the answers from users who are both, recipients as well as producers, were applicable for this investigation. Second, 50% of the survey participants are 23 years old and older. The data will be more accurate if more users from generation Z (Fietkiewicz et al., 2016) had participated, as mainly teenagers are the common users of YouNow.

Furthermore, qualitative interviews with broadcasters as well as viewers will be more accurate than pure quantitative data. The interviews could be directly performed live on YouNow. For future research a comparison of other SLSSs’ gamification elements would be helpful to have data on further live streaming services (as, e.g., Periscope is used mainly by generation Y and Ustream is used by generation X and older people). Furthermore, the extent of gamification elements a service applies should be investigated and compared. Also, a differentiation of users by gender, culture and age will be an interesting research topic.

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## **13. Gender Differences in Perception of Gamification Elements on Social Live Streaming Services**

### **13.1 Introduction**

More and more Social Live Streaming Services (SLSSs) are appearing on the world wide web. Only in China they already have a number of over 200 live streaming platforms (Lu, Xia, Heo, & Wigdor, 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 in 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 esports 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 a separable outcome” (Ryan & Deci, 2000b, p. 55). 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 shows that women are likely to perceive gamification more positively 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 changes 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?

## **13.2 Background**

### ***13.2.1 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; Hilvert-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 factors 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.

### **13.2.2 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 users (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 fulfillment,” 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 females take more interest in streamers sharing their life (Chen & Lin, 2018).

### **13.2.3 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.

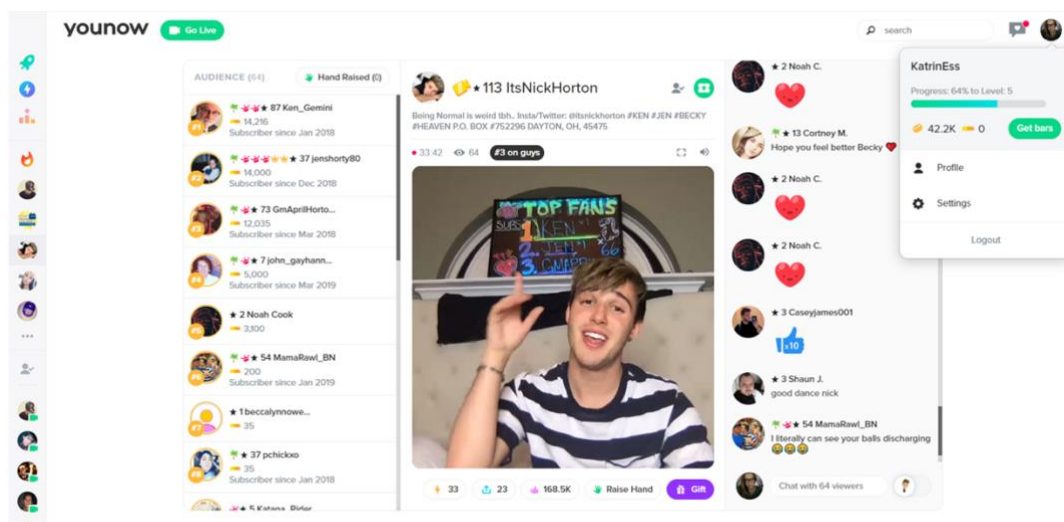
Wilk, Wulffert, and Effelsberg (2015) developed a mobile broadcasting application in three different versions. Starting with a base version (A) without game mechanics, they added levels to the next version (B), and finally they added challenges as well as badges to the third version (C). The investigation 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.

#### **13.2.4 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 13.1), 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.

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]ubscription includes a Super Gift, 20 on-screen 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 there 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 raise 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).



**Figure 13.1:** Screenshot of a live stream on YouNow by ItsNickHorton. Screenshot taken by one of the authors. (Source: YouNow.com, March 31, 2019)

Streamers also have the opportunity to collaborate on YouNow, which 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).

### **13.3 Methods**

To answer the research questions an online questionnaire about the gamification elements on YouNow was conducted via [umfrageonline.com](http://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 30<sup>th</sup> August 2016 until 13<sup>th</sup> 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 were 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 finished 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 (Csikszentmihalyi, 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

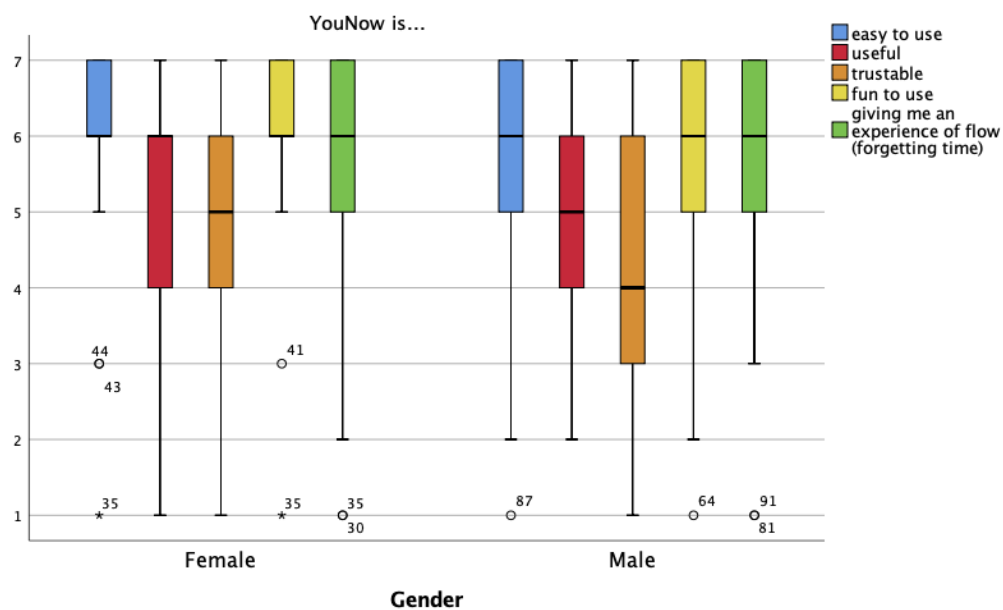


attendees to decide for an answer. Also, a 7-point Likert scale allows a more accurate and detailed result than a 5-point Likert scale. The pre-formulated statements were based on the theoretical definitions of gamification and its motivating function (Deterding, 2012; Seaborn & Fels, 2015; Zichermann & 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.

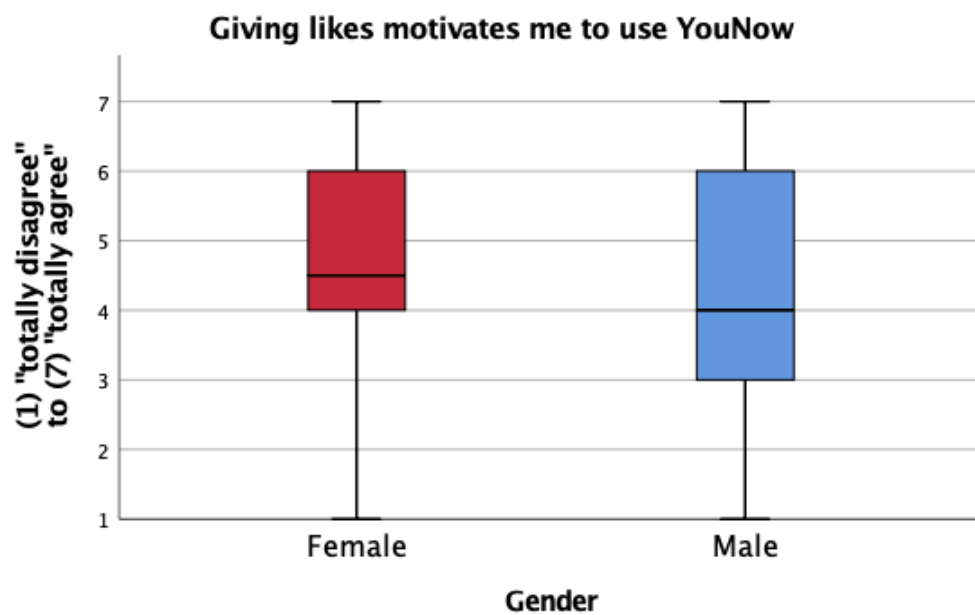
### 13.4 Results

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 USA (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 13.2), the majority of female and male users agree with a median of 6 that YouNow is easy to use (first boxplots).



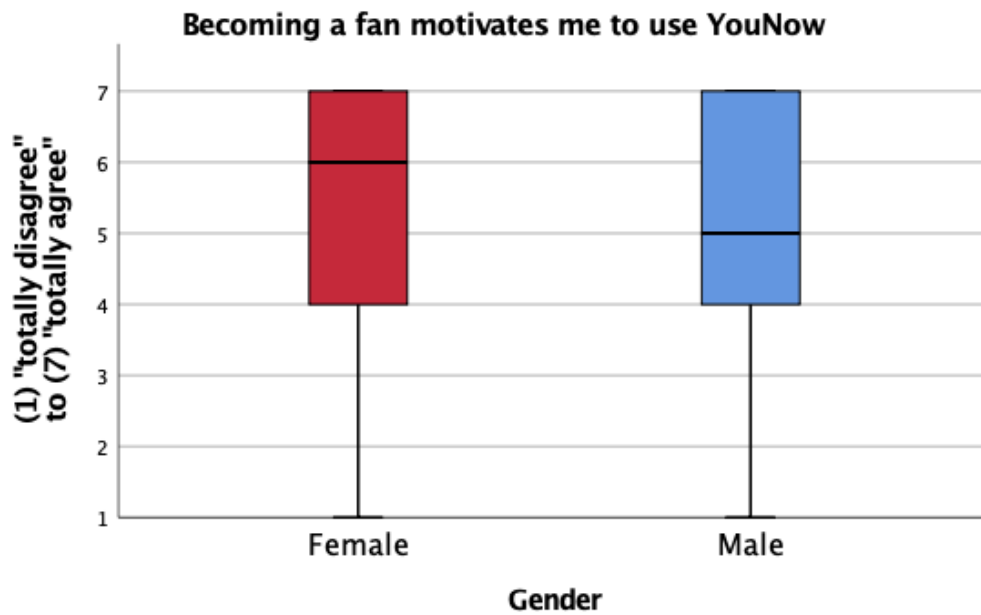
**Figure 13.2:** What female (N=48) and male users (N=46) think about YouNow

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 to 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.



**Figure 13.3:** Giving likes motivates to use YouNow; female (N=48), male (N=46)

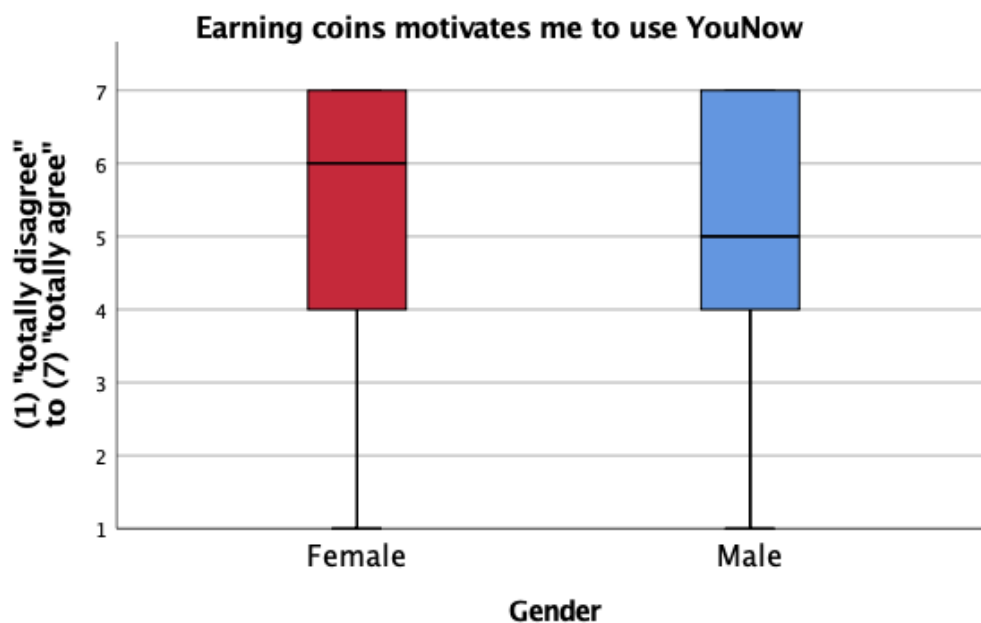
Answering the second research question, 45.8% of the female users (N = 48) state that they have bought bars, and 54.2% did not. Considering the answers of the male users, 59.1% of them have bought bars at least once, and 40.9% did not (N = 44). 52.1% of the female users (N = 48) have already subscribed to someone on YouNow, whereas 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 a 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.



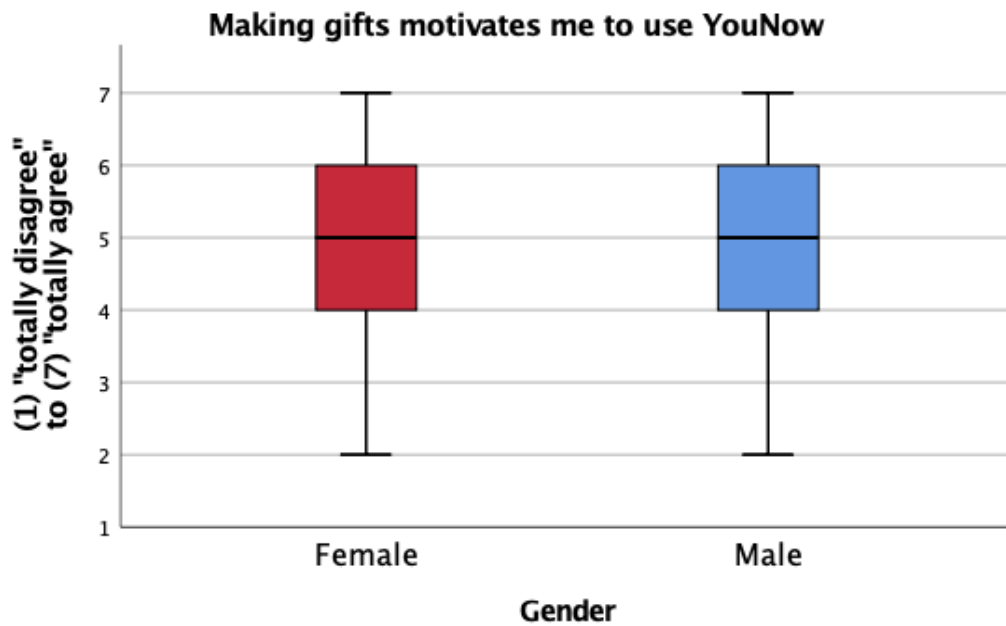
**Figure 13.4:** Becoming a fan motivates to use YouNow; female (N=48), male (N=46)

Moving on to the third research question, looking at Figure 13.3, 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).

For the action of becoming a fan of a streamer (Figure 13.4), female users agree that it is motivating (median 6) and male users are motivated as well, but a little bit less (median 5).

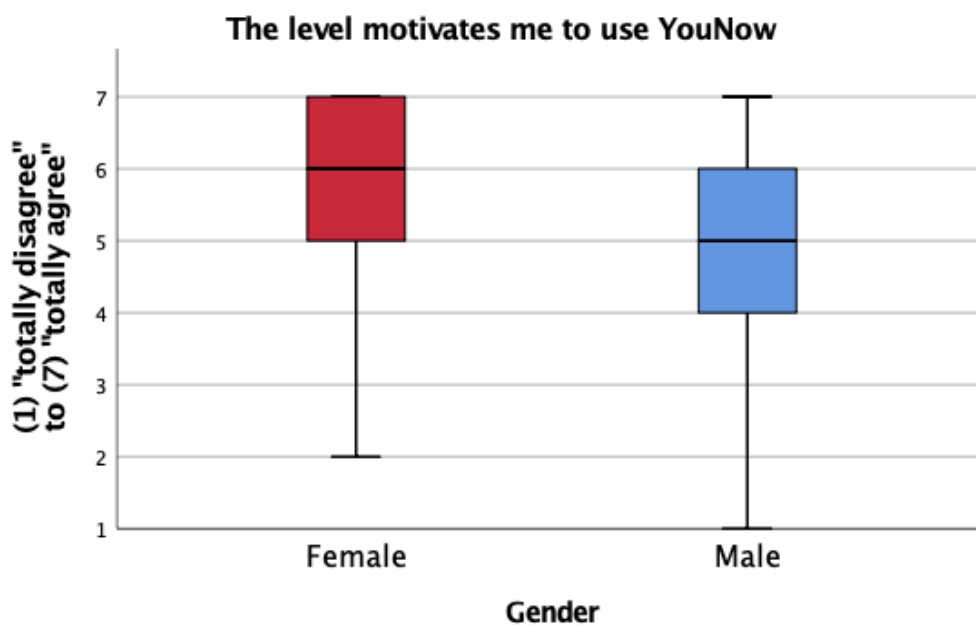


**Figure 13.5:** Earning coins motivates to use YouNow; female (N=48), male (N=46)

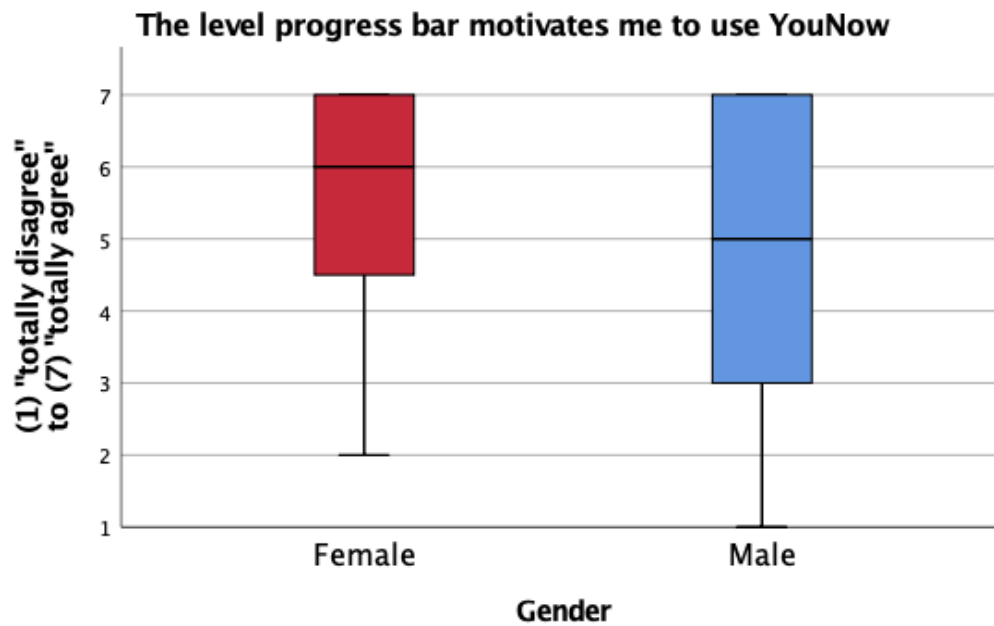


**Figure 13.6:** Making gifts motivates to use YouNow; female (N=48), male (N=46)

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 13.5). Receiving gifts (Figure 13.6) is for both, female and male users, slightly motivating (both with a median of 5 and the same interquartile range).

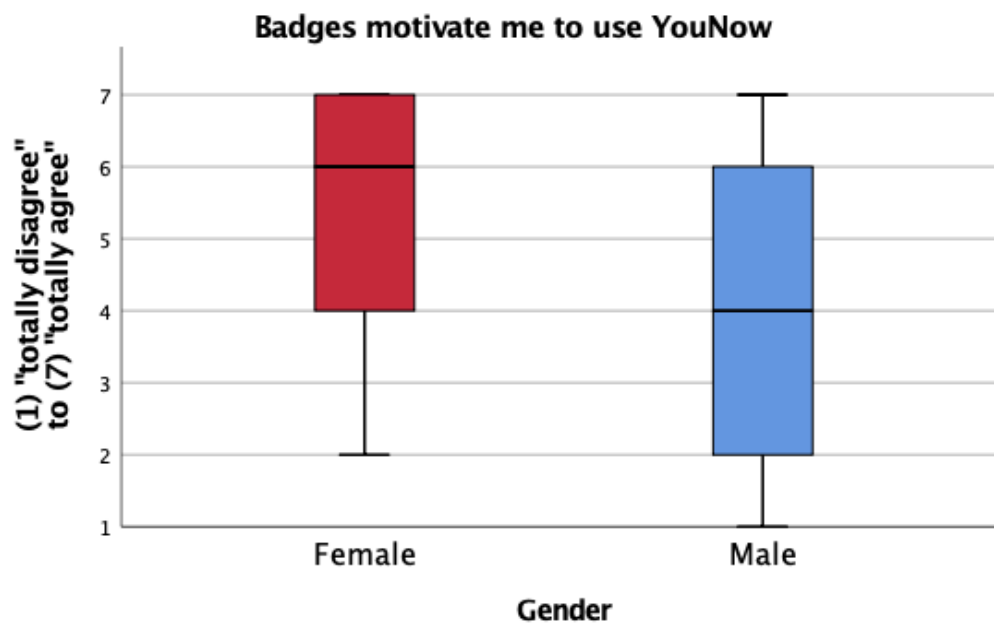


**Figure 13.7:** Levels motivate to use YouNow; female (N=48), male (N=46)

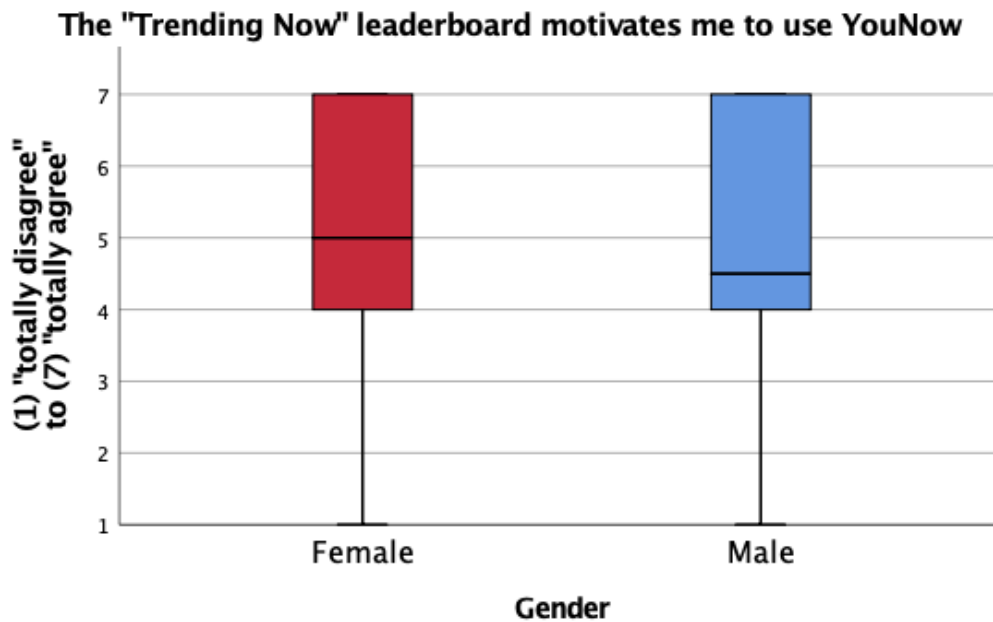


**Figure 13.8:** Progress bar motivates to use YouNow; female (N=48), male (N=46)

The statement that levels are motivating (Figure 13.7) 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 13.8).

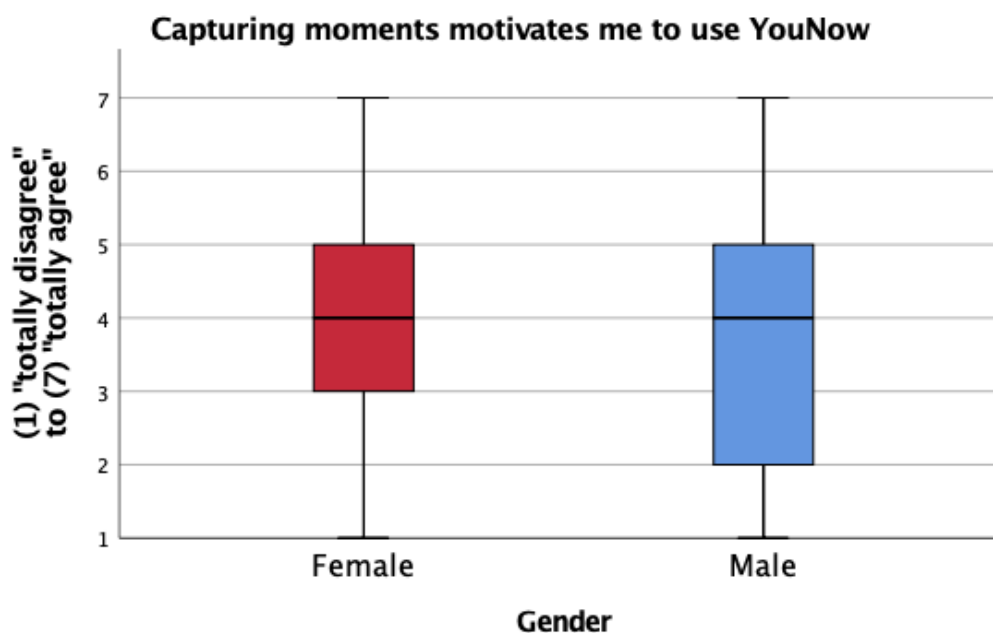


**Figure 13.9:** Badges motivate to use YouNow; female (N = 48), male (N = 46)



**Figure 13.10:** Trending Now motivates to use YouNow; female (N=48), male (N=46)

Male users rate the statement if badges are motivating (Figure 13.9) 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 13.10), 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 13.11:** Capturing moments motivates to use YouNow; female (N=48), male (N=46)

If capturing moments of a stream is motivating was rated by both, female and male users with a median of 4 (“neutral”), but females rate it slightly better with a smaller interquartile range (Figure 13.11). Table 13.1 shows the comparison of gamification elements acceptance distributed among female and male streamers.

**Table 13.1:** 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

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).

### 13.5 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 streamers. 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 an 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 until the end ( $N = 94$ ). 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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## 14. Conclusion

### 14.1 Main Research Results

The main contribution of this thesis to the field of information science is a proposed model for user information behavior research on social media. It incorporates the users and usage of social media applications as information systems by further emphasizing the different types of user roles, namely producer, consumers, and participants (Shao, 2009). Further, existing theories (Uses and Gratifications Theory, Lasswell's Communication Theory, Self-determination Theory) are integrated in the framework and lead to processes and motives for information production and information consumption as well as possible information needs of users. The framework can serve as a basis for scientifically explaining the interplay between information behavior and interaction patterns of social media users regarding their user role. Furthermore, the manifold functionalities and particularities of a social media platform are considered. The building blocks of the proposed "Information Behavior on Social Media" framework can be adjusted to match the aspects to be researched. Several research projects were conducted to shed light on the applicability of the model and investigate the information behavior of social media users:

#### Part 1: Information and Users on Social Media

**RQ1: a.)** What community-driven and cognitive information behavior patterns can be observed on social media? **b.)** How is the user-generated content on Reddit perceived by users and how do users perceive Reddit's quality as an information system?

Via a sentiment analysis, negative, positive, and neutral comments on Instagram posts of the official account and fan-based accounts of Miley Cyrus have been analyzed. How much negativity (hate) can be found in the community's comments towards posts of a (at the time of the study) polarizing celebrity? Indeed, 15% of the analyzed comments have a negative drive and also spam was detected during the data cleaning process (*Chapter 3*). However, most comments are neutral (46%), and many are positive (39%) as well. While official and fan-based accounts were analyzed, the official account has the most neutral comments and least positive comments. Comments below fan-based accounts' posts are more positive.

As Reddit is a social news system on which users are anonymous, at least less biased content production and information sharing in terms of information behavior can be expected. A case study as well as content analysis on posts, comments, and replies on Reddit was performed to observe cognitive information behavior patterns. A certain type of cognitive information behavior pattern could be observed and identified (*Chapter 2*): Users prefer to consume content in regard to their interests and in line with their prevailing opinion. This behavior builds a user's

social network, as primarily people who have the same or a similar opinion become part of it. The social media service's algorithm displays new content matching a user's interests by amplifying the information behavior patterns, resulting in selective exposure. Truth is in the eye of the beholder: If users do not question (false) propositions and ignore other opinions, their information behavior can result in the development of an echo chamber.

The social news system Reddit is perceived as enjoyable, trustable, and easy to use and is primarily used to satisfy needs for information and entertainment (*Chapter 4*). Users search for content by browsing and also by using the platform's search function. In terms of the service's (user-generated) content quality, it is perceived as easily readable and easily understandable as well as up-to-date. Users have a neutral opinion in terms of structure, credibility, and truthfulness. However, users perceive the content as biased, prejudiced, and partial. Results indicate that Reddit is favored by users because it is entertaining and informative, the platform is easy to use, and the content is easily understandable and readable; in addition, users are anonymous and can behave more freely than on platforms on which they can easily be identified.

## **Part 2: Information Behavior and Social Media Usage of Asylum Seekers**

**RQ2: a.)** What impact does context, situation, and information horizon have on users' information behavior? **b.)** What (information) needs of asylum seekers are satisfied through social media usage?

By proposing an intuitive research model about asylum seekers' information behavior (*Chapter 5*), we shed light on the variety of circumstances asylum seekers go through during their flight – beginning in their home country until arriving in the target country. Their information horizon is shaped by their life in the home country, however during their flight experience, for some also including to stay in “refugee camps,” asylum seekers' information horizons change and their information needs adapt to the respective context and situation. Finally, when arriving in the target country, new information is needed during several stages of integration and there are various challenges asylum seekers as vulnerable people have to face: The language barrier in the new country and a varying standard of information and digital literacy skills. While seeking for information and need satisfaction, asylum seekers consult a variety of information sources, including ICT, online and social media, but also traditional media, e.g., books, and also other people.

Many asylum seekers rely on their smartphone as a multifunctional tool during integration. They also use the television as an information source, while in contrast many do not use a desktop computer or notebook anymore. The smartphone is used for a variety of purposes

(Chapter 6), including the satisfaction of several needs in accordance with the uses and gratification theory: Information, entertainment, social interaction, and self-presentation. Thereby different social media services are applied, the favored ones are Facebook, WhatsApp, and YouTube. All three services are preferred in order to find information. Asylum seekers especially have a need for information regarding health, education, jobs, and legal advice. Entertainment needs are satisfied through watching videos on YouTube and through the social networking service Facebook. Facebook and WhatsApp enable communication with their personal network. Their social contacts include not only their relatives and friends in the home country, but also other migrants met during flight and integration or people from the target country. Many asylum seekers primarily are in contact with people with the same cultural background and primarily consume content in the language of their home country. Most people report they try to validate newly learned information through their personal network.

### **Part 3: Information Behavior on Social Live Streaming Services**

**RQ3: a.)** What is the information behavior of live streaming service users? **b.)** How can information behavior of and online social relations between live streaming service users be described?

A comprehensive theoretical framework was proposed to study information behavior on a new kind of information system – social live streaming services (Chapter 7). The model considers different user roles (consumers, producers, and participants) and the synchronous interaction process on live streaming services by displaying the backchannel from the viewer to the streamer and among the viewers. Included are established theories, namely Lasswell's sender-centered formula of communication, the Uses and Gratifications Theory for motives of media usage, the Self-determination Theory for users' motivation (considering also gamification and flow), and the information science-based Information Service Evaluation model. The framework should serve as a basis for empirical research investigations, as the separate building blocks of the framework can be analyzed. The building blocks of the framework are variable and can be modified accordingly to fit the research project and other types of social media.

YouNow as a social live streaming service is easily applicable and fun to use, some users even experience flow while using the platform (Chapter 8). Nearly half of YouNow users make use of the streaming function, some prepare themselves and test the equipment for their stream. Streams take around one-hour on average; however, some can take several days. Although streaming live is simple, users may face potential law infringements (e.g., copyright and personality rights) during their live broadcast, especially while playing music or videos during their live stream. Many users apply the service because of boredom and to chat with

other people, i.e., for social interaction. Generally speaking, users of live streaming services are motivated by the need of belonging to a community, indicating a very community-driven and community-focused type of social media.

Social live streaming services provide a streamer- and viewer-friendly environment, in which communicative and interactive actions (including also gamification elements) are promoted. Forms of interaction are live broadcasts by the streamers, chat messages from audience members and the streamer, and further (sometimes monetary) gift giving of users. By performing social actions, users feel a certain co-experience which leads to an emotional connectedness towards other users and the development of a sense of community. Social interactions and relations on live streaming services are exceptional, as actions happen in a real time environment. As on live streaming services there is no spatial proximity, there are by definition no social relations. However, as there is temporal proximity and reciprocity, we cannot speak of parasocial relations either. We arrive at a new concept for online interaction on social media and a new kind of information behavior pattern in-between social and parasocial relations, namely cyber-social relations (*Chapter 9*).

#### **Part 4: Gamification and Motivation on Social Media**

**RQ4: a.)** What impact does gamification have on social live streaming service users' motivation and (information) behavior? **b.)** What gender-dependent differences can be observed?

Gamification encourages user motivation, promotes a change in users' (information) behavior, and fosters continuous usage of a service. As an exceptional type of social media, social live streaming services apply a comparatively large number of gamification elements (*Chapter 10*). Observations of various live streaming platforms from the Western and East-Asian region show that particularly live streaming services popular in China are highly gamified and even apply various types of different gamification elements (e.g., different types of currencies). The two most gamified Chinese live streaming services applied twelve types of gamification elements. In comparison, few gamification elements are implemented on live streaming services from the Western context. The most employed gamification elements on social live streaming services are leaderboards, badges, gifts, points, and levels. In the one-to-many channel, gamification provides an additional form of user interaction.

YouNow, as one of the most gamified live streaming services from the Western region, served as a case study to investigate gamification's impact on users' motivation and users' (information) behavior (*Chapter 11–13*). Most gamification elements are perceived as highly motivating and rewarding for users of the service. Each element is at least perceived as neutral (i.e., not discouraging users). It can be distinguished between actions one performs to gratify



another user (as a participant) and actions one receives (as a streamer) as gratification from other users as well as further elements that can be perceived by all users as part of the system (e.g., levels, points, leaderboards). If users receive a gratification, it is perceived as more motivating and rewarding than to give gratification for another user, although it is very motivating and rewarding as well. Communicative and interactive actions are favored, speaking of getting and becoming a fan, writing and receiving comments as well as giving and receiving gifts. Coins and levels are the most motivating and rewarding in terms of system-related elements. It should be emphasized that coins as virtual currency can be used to buy gifts.

Differences regarding the perception of gamification elements have been observed by considering the gender of users (*Chapter 13*). Female users are somewhat more motivated by gamification elements than male users. Popular elements among female users are levels, progress bars, and badges, whereby male users like coins, gifts, and levels. Further differences were observed regarding the spending of real money. Male users are more prone to spend real money on YouNow's virtual currency while female users tend to spend more money in order to subscribe to users on YouNow. Consequently, a great variety of gamification elements is needed to be appealing for users with diverse backgrounds.

## **14.2 Implications for Application**

By introducing a model about information behavior on social media, this cumulative dissertation highlights the importance of distinguishing social media users' behavior in accordance with their user roles, as they can act as information producers and also as consumers of information. If a user on social media performs both actions, one may be named prosumer (Linde & Stock, 2011). The information flow on social media, as displayed in the proposed model, can lead to a possible backchannel and a feedback loop. The model and multiple research contributions led to various insights about information behavior research on social media in the field of information science (*Chapter 14.1*). Following are some implications for the application of the presented framework:

- (1) The model can be applied by information scientists and researchers of related fields as a research framework for behavioral studies in the context of social media. Since the building blocks of the model can be adjusted according to the aspects to be researched, the model is versatile in its application and can fit different research approaches.
- (2) The proposed model displays the interplay of information production and information consumption of social media users. Information consumers can become participants in the sense of Shao (2009) by reacting to a post or even producers by commenting on a post.

Hence, in information behavior research on social media information production and information consumption on the one hand have to be examined independently, but on the other hand also their interplay should be considered if necessary (e.g., in the context of a content analysis).

(3) Several models about information behavior already exist. However, these models do not display the circumstances of the information system and do not always consider the respective characteristics and circumstances of the user. As contribution to the field of information science research, it can be determined what aspects exactly belong to the users' information behavior when acting in the particular user role (consumer, producer, participant) and what aspects do not. They fall under the aspect of users' "information horizon" and should always be considered and defined for the research setup.

(4) Since social media services are used by many people every day and are applied as information sources or communication channels, the model can be used to teach different processes of social interaction and information behavior. Further, it can be applied in different fields as it is multi-disciplinary (e.g., communication science, information science, social sciences, and law studies).

*Part 1* of this dissertation focuses on user-generated content in terms of fake news and hate, and how users of Reddit perceive user-generated content and the information system. We can say that one cannot speak of *the truth*, as truth is in the eyes of the beholder. Echo chambers are formed because algorithms amplify a user's information behavior (*Chapter 2*). However, not only misinformation on social media is crucial, but also hate and bullying. Negativity was found in comments below Miley Cyrus's Instagram posts (*Chapter 3*). Analyzing the social media service Reddit, the platform is perceived as easy to use. Users consider the user-generated content as easily readable and easy to understand (*Chapter 4*).

(5) Information on social media should not be trusted blindly. An individual user or a group is the starting point of fake news on social media. The users' selective exposure to information, their cognitive patterns, and their social network may result in an echo chamber. Critically questioning the information by comparing sources and checking the evidence of the content is necessary. Digital competences and information literacy should therefore be taught by educators, beginning in early childhood. It should be an ongoing process to be able to break behavioral patterns of one's social network.

(6) Since most social media platforms do not have restrictions for the production of information, everyone can publish and disseminate the information they want to. Possible

misinformative posts and hate speech on social media make platform moderation and governance necessary. Therefore, social media platforms are in need of a functioning governance plan. Some platform moderation processes can even be realized automatically and should be constantly adapted and improved.

(7) Reddit, as one of the top globally visited websites, is easy to use and its content is easily understandable and readable. It has several sub-communities called Subreddits in which different topics are discussed. Reddit has a simple interface design. As Reddit is accepted by many users with different cultural backgrounds, it is suggested to keep information systems simple in design and focus on the necessity of functions. Furthermore, having different spaces for varying topics (e.g., Facebook groups, Instagram channels) as “safe spaces” to discuss vulnerable topics. Therefore, it is suggested for system developers to provide functionalities for offering content to a limited group of people.

In *Part 2*, a research model is proposed to illustrate the process of asylum seekers’ information behavior and the effect of one’s information horizon (Zimmer, 2023) (*Chapter 5*). Their information behavior and information needs change with varying situations and circumstances. Living in a new country, asylum seekers’ ICT and social media usage was analyzed (*Chapter 6*). They use different services for varying needs: Facebook, WhatsApp, and YouTube for information and entertainment, Facebook and WhatsApp for social interaction and self-presentation.

(8) The changing situation and context of people who have to flee their country and become asylum seekers reflects a change in their information needs. People’s information horizons are based upon the cultural background, social network, and experiences. A person’s information horizon should therefore be considered when analyzing the information behavior and when designing information systems. This should be considered by information scientists and system developers in future research concepts and technology development, respectively.

(9) Different kinds of social media are used as an information source by people. Especially when people become migrants, they rely on their social network as an information source. Newly learned information is validated through their social network as well. However, not everything can be answered by their social network. Particularly vulnerable groups need certainty when it comes to information. Therefore, the government should additionally inform people who have a migration background via social media and should set up an official migration-themed account.

(10) People have different information needs depending on their circumstances. It is necessary to design information systems appropriate to the information needs of users. Information systems should be available in multiple languages or at least should offer the opportunity to translate texts. One information platform for asylum seekers and refugees is a forum called Wefugees. However, questions could only be asked in German or English. Newly migrated people are in need of information in their own mother tongue, not in the language of the country of arrival. Another information system from the German government, especially developed for migrants and asylum seekers, is called *mbeon*. However, none of the survey attendants mentioned the service as an information source. Suitable marketing and communication of such a system is necessary.

(11) Since the results indicate that many people from the Middle Eastern Northern African (MENA) region do not use a laptop or computer anymore, teaching digital literacy and information literacy in integration classes would be crucial for the future of migrants' integration. For example, searching for an accommodation and finding a job (particularly office jobs) requires computer skills. The government and teachers should consider promoting digital literacy courses and information practices during classes.

*Part 3* gives insights about the information behavior of users on a novel type of social media, namely social live streaming services. A framework for users' information behavior on synchronous social media (live streaming services) was introduced (*Chapter 7*), YouNow users were surveyed about their information behavior (*Chapter 8*), and based on a literature review, social interactions on live streaming services were termed "cyber-social interactions" (*Chapter 9*).

(12) The proposed model for synchronous information behavior and communication on social media can be applied to illustrate information behavior on asynchronous social media as well. However, one has to take into account the timely difference of the interaction. The proposed model can further be applied by scientists who examine Virtual Reality (VR) or Augmented Reality (AR) services as well. Here, the (virtual) spatial difference has to be considered.

(13) Users of live streaming services watch streams mainly because they are bored and want to have fun. In the past, people watched TV if they were in need for entertainment and information. However, it would be interesting to see future developments. Will people from Generation Z watch live streams instead of TV-shows as their evening leisure activity? Scholars should conduct follow-up research about this information behavior.

(14) Cyber-social relations by definition do not include spatial proximity. However, with the development of, for instance, VR and AR environments (virtual) spatial proximity can be perceived by persons who interact via a VR/AR device. It further brings a new shift into the definition of social relations. The new kind of social interaction should therefore be considered by researchers as well. However, the impact of live streaming and cyber-social relations should not be underestimated in terms of potential psychological risks for users. Research is needed to assess potential risks.

(15) An ongoing trend of young people who want to become influencers and “micro”-celebrities (in China *wanghong*) can be observed. By generating monetary outcomes while streaming, sometimes by pursuing their hobby, streamers get a taste of the community’s attention and see the benefits of a supposedly easy way of making money. Sometimes even parents bring their children into the spotlight. Here, clear legal regulations should be initiated and monitored by the government.

In *Part 4* motivation and gamification in social live streaming services are of interest. Many live streaming services are highly gamified. Especially live streaming services from East-Asian countries apply many gamification elements (*Chapter 10*). Gamification elements are perceived as motivating and fun (*Chapter 11*). Getting positive feedback by receiving gifts or other gamification elements is perceived as more motivating, rewarding, and fun than using gamification elements to give feedback (*Chapter 12*). Also, women perceive gamification elements more positive than men (*Chapter 13*).

(16) Considering the differences observed regarding the application of gamification elements on social live streaming services in different countries, it strikes that live streaming services from the East-Asian region apply more game elements than the ones from Western countries. Scholars should therefore consider researching this phenomenon, as it indicates a culture-based difference in perception of gamification elements. This further highlights that the user base needs to be considered when implementing functions. Gamification should not be added to an information system without having a respective purpose in mind.

(17) In implications of application made for *Part 1*, it is suggested that information system design should be simple and clean. However, social media are not purely information systems. Social media are used for many reasons, especially to socialize and to get entertained. If applied correctly, gamification has a positive effect and promotes user engagement (Hamari et al., 2014). Especially if the primary group of users are teenagers and

adolescents, gamification seems to be a promising feature to encourage users' behavior. This further strengthens the statement to adapt systems to their users' needs (*Part 2*).

(18) On social live streaming services, a kind of social media which primarily offers a one-to-many communication, with the opportunity to write chat messages as a form of interaction from the viewer to the streamer and among the viewers, gamification was observed to be an additional form of social interaction. In particular, monetary and non-monetary gifts can be applied in other kinds of social media as well to promote a desired behavior in users. However, researchers should analyze the gift-giving behavior as a kind of social interaction in more detail.

### 14.3 Limitations

Due to the diversity of the presented research approaches, several limitations of this work need to be addressed. However, some have already been mentioned in the respective chapters (*Chapters 2–13*). Beginning with limitations of the proposed “Information Behavior on Social Media” framework, there are far more facets that can be researched with the help of the model which are not displayed, for example, aspects regarding the user-generated content. Since the space is limited, only the characteristics investigated in this research compendium (law, sentiment, (perceived) quality, truthfulness) were integrated and are represented in the model.

In *Chapter 2*, a case study and content analysis were applied. The sample size is rather small and the potential misinformative posts have a similar political topic. This may lead to biased results that only reflect a typical group-related behavior. Further, due to the applied method, only the cognitive behavior of producers and participating users was analyzed. What about the behavior of users who only consume content (consumers)? Also, comments that were deleted by moderators could not be considered in the analysis. Furthermore, we only investigated possible online echo chambers. The data do not give insights about offline echo chambers and offline cognitive behaviors.

A sentiment analysis was performed in *Chapter 3*. As it is an automated process, there are several determinants that have an influence on the results. Although samples of the automatic processes were checked, some comments may have not been detected as spam and were still integrated in the analysis; additionally, the automatic translation to English may not have been exact every time. Moreover, negative comments of users may have been deleted by moderators or the accounts' hosts, which could therefore not be included in the analysis.

By asking Reddit's users for the perceived quality of the service and the perceived quality of the user-generated content on Reddit with the help of a survey (*Chapter 4*), only a few things could be asked about. A broader understanding is needed to describe a comprehensive information behavior of Reddit's users. Therefore, interviews with Reddit users could help to gather qualitative data and to broaden the understanding of the service's users. Further, although 495 Reddit users took part in the survey, the number of respondents is rather small in comparison to the actual number of users. The data could further be biased, because each Subreddit is a community on its own and the answers of the respondents might differ in accordance to the visited Subreddits.

In *Chapter 6*, asylum seekers were asked about their social media usage and information needs with the survey methodology. As it was challenging to get in contact with people who are asylum seekers and who could speak German at an adequate level, the number of respondents is small. The results would have been more reliable if more people had answered the survey. Furthermore, the asked asylum seekers had a minimum level of B2 German language certificate. Results about people who cannot speak German that well and are new to Germany would have been interesting, too. We could further compare the different groups in accordance to their German language skills or in accordance to the time they were living in Germany. The stage of the migrants' and asylum seekers' integration process and their language level might also have been considered in the proposed model presented in *Chapter 5*.

In *Chapter 8* a survey about the information behavior of YouNow's users has been conducted and in *Chapters 11–13* one about gamification on YouNow. In both surveys, the social live streaming service YouNow served as a case study. First of all, YouNow's users cannot stand alone for users of all social live streaming surveys. Additionally, the number of respondents of the two surveys is rather small, a total of 123 users and 211 users, respectively. YouNow is mainly used by teenagers and adolescents (Fietkiewicz et al., 2016; Friedländer, 2017), which is also reflected in the demographics of people who answered the survey. Gathering data from users with more variable demographic backgrounds would be beneficial for a more diverse overview towards live streaming as a form of social interaction and about the perception of gamification on live streaming services. Also, YouNow is a general live streaming service as it has no specific topic (in contrast to *Twitch.tv* or *Picarto* for gaming and creativity, respectively). Examining users' information behavior of topic-specific live streaming platforms would give further insights and may enable the comparison of different kinds of video live streaming platforms. Furthermore, the survey was mainly answered by German and English-speaking participants, whereby YouNow is widely applied in The United Arabian Emirates as well.

To determine users' relations and interaction on social live streaming services, a literature review was conducted in *Chapter 9*. Total 77 research contributions were included in the analysis. There might be remaining literature that was not detected during the literature search. The established concept for interactions on live streaming services was termed "cyber-social relations," as they happen in cyberspace. However, there is already some kind of (sometimes romantic) Internet relationship that is termed "cyber-relationship" (e.g., Resnik, 1996; Jaureguizar et al., 2023). The two terms need to be separated and distinguished from each other.

One of the presented studies towards gamification (*Chapter 10*) contained a content analysis about the applied gamification elements on social live streaming service websites. The number of analyzed websites is 21, only allowing a limited overview, as solely in China are over 200 different live streaming platforms. What about other websites and also social live streaming websites from additional countries? A broader analysis would give clearer insights. Due to the gamification overload and the language barrier on East-Asian websites, we might have missed some gamification elements during our analysis.

#### **14.4 Future Research**

This work already shed light on some of the various facets of information behavior on social media, considering different systems, their users' characteristics, and the systems' features. The findings of the research projects have revealed new and interesting perspectives that led to further possible research initiatives:

##### **Part 1: Information and Users on Social Media**

In the first part, the social news aggregator Reddit served as a case study for two research studies. It has been noticed that Reddit is mainly used by male people (*Chapter 4*). Why are male people more likely to use Reddit? Data gathered for the study about fake news and echo chambers (*Chapter 2*) were also collected from Reddit. A gender-dependent comparison would give additional insights about gender-related cognitive behaviors. Can we also find misinformative user-generated content on similar information systems? What leads people to spread fake news, especially if they are not anonymous (different from Reddit)? Ongoing research is necessary to understand the various aspects of peoples' cognitive misinformative behavior. Furthermore, the question of how to detect fake news on social media and distinguish them from "real" information remains. It would be interesting to see if certain cognitive and information behavior patterns may lead to fake news detection. Do specific community



behaviors lead to fake news detection as well? To further the understanding about the spreading of fake news, analyzing and comparing offline and online echo chambers would be crucial.

By analyzing the sentiment of comments below Instagram posts of only one polarizing celebrity (*Chapter 3*), it was not possible to compare the data. What about the content of comments below posts of other celebrities? Are there fewer negative comments below posts (of Miley Cyrus) these days than there used to be? It would be interesting to perform an updated sentiment analysis on the data. Further, has the automatic detection of hate comments become more precise over the years? How did the precision of sentiment analysis change with the development of artificial intelligence and neural networks?

## **Part 2: Information Behavior and Social Media Usage of Asylum Seekers**

In part two, by looking at the information behavior and social media usage of asylum seekers (*Chapter 6*), only asylum seekers and refugees whose target country is Germany were asked. What about asylum seekers and refugees in other target countries? The presented research did not consider how long people were already staying in the target country. It would be helpful to investigate which information is needed by asylum seekers and refugees soon after arrival and later on. Authorities could profit from the results and develop information systems or e-learning and in-person classes in accordance with the asylum seekers' needs. Also, the question arises whether social media services are used by asylum seekers in accordance to the target country's standards. Are there clusters of asylum seekers (age, gender, cultural background) with different information needs and information behavior? In the presented study, mainly asylum seekers from the MENA region were asked. With the escalation of the Russian Ukrainian War in February 2022, people from Ukraine and Russia became asylum seekers and refugees. Are there any differences in the information needs of people from MENA countries and people from Russia and Ukraine?

During the research process, an information platform called mbeon, on which asylum seekers may directly ask questions, was found. What questions are asked by asylum seekers on mbeon? How often and in what situations do people consult the service? Are there certain information needs of asylum seekers that cannot be satisfied by experts working for mbeon? Analyzing the data of the platform and further conducting interviews with volunteers of the platform could gain further and more precise insights about the raised questions.

## **Part 3: Information Behavior on Social Live Streaming Services**

Social live streaming service users' information behavior was investigated in part three of this dissertation. On most social live streaming services, the content is not available to re-watch after

the live stream, which raises the question if users experience a fear of missing out. This could be a fear of missing the streamed content, but also the missed opportunity to interact with a streamer or a streamer's community (cyber-social interactions). Furthermore, is there a certain avoidance of live streaming content by users because of unexpected content and hard to regulate content (e.g., suicide, live stream of disasters)?

In *Chapter 9*, we have conceptualized the phenomenon of cyber-social relations on live video streaming services. Is the proposed concept of cyber-social relations accepted by users of social media? This could be investigated by conducting interviews and by distribution of a survey afterwards. For cyber-social relations there is reciprocity and temporal proximity, but no spatial proximity and bodily contact. What about cyber-social relations in VR and AR services? Do we have cyber-social relations there as well? Can we speak of a (virtual) spatial proximity for virtual reality worlds? This should be defined for the new kind of VR/AR based social media services.

Because of the COVID-19 pandemic, many business meetings were performed through video meeting platforms. Also, some celebrities streamed their live concerts online via live video broadcasts. Are people willing to attend online live concerts in the future as well? Furthermore, e-commerce live streaming is very popular in East-Asian countries. However, the phenomenon is not widespread and poorly applied in the Western region. What cultural differences are responsible for this behavior? What leads to the acceptance of buying products in online live streams? It would be helpful to understand the mentioned aspects in order to understand the application of platform features. There are further questions that arise in regard to culture and gamification on video live streaming platforms displayed in future research of *Part 4*.

#### **Part 4: Gamification and Motivation on Social Media**

Part four of this dissertation dealt with gamification and motivation on social media, more precisely on social live streaming services. Gender-dependent differences in perception of gamification elements have been observed in our study (*Chapter 13*) and in the study of Koivisto and Hamari (2014), as women perceive gamification more positively than men. Can age-dependent differences for the perception of gamification be observed as well? Does gamification have the same impact on older people as on younger people? Why do predominantly younger people from Generation Z use live streaming services (Fietkiewicz et al., 2016)? It would be crucial to know if gamification elements have an impact on it. Also, as live streaming is primarily a one-to-many performance, gamification elements offer an additional form of (social) interaction. Are users primarily motivated by the streamed content and by the community engagement or rather because of the gamification elements? Live streaming services offer many gamification elements, but what about gamification elements on other

social media services? It would be interesting to investigate how many gamification elements can be found on other social media services.

A few live streaming services from the Western and East-Asian context have been observed in this research compendium (*Chapter 10*). There is a wide variety of different live streaming platforms in East-Asian countries. Solely in China there are over 200 different ones (Lu et al., 2018). It stands out that live streaming services based in the East-Asian region offer many gamification elements, even more than the ones observed from the Western region. Why are live streaming services from the East-Asian background highly gamified? Are other kinds of social media services from the East-Asian context highly gamified as well? Understanding the cultural differences and discrepancy between Western and East-Asian social media landscape in terms of gamification elements and popularity of social live streaming service usage would be crucial.

## 14.5 Outlook

With the advent of social media, peoples' way of information exchange and communication changed. The scope of information behavior on social media is manifold and different from traditional information systems, where information can only be sought by actively seeking for documents, like in retrieval systems and databases. Online information seeking can now be performed by information production, i.e., by actively asking questions. Information behavior research has always been an initial part of information science. Just like social media services are constantly changing and adjusting (Weller, 2016),

“[h]uman behaviour will also change, since we function within an environment composed of many forces and when those forces change or evolve or mutate, we change our behaviour. (...) [W]e cannot take the present as a guide to the future and people will have to respond to these possible changes and to more. The world of the information behaviour researcher will be very different, because the world of information interactions will be different. It seems very likely, however, that information behaviour research will continue to be a challenging area of information science. (...) [I]nformation behavior research will continue to have relevance into the future.”

(Wilson, 2022, p. 98)

An important example of an influencing factor and changing force in the social media landscape is the change of Twitter's CEO. When Elon Musk became CEO of the microblogging service Twitter (today known as X), he entailed changes in Twitter's governance and moderation system, resulting in many users stopping to use the service or even opting-out (Chang et al., 2022) and migrating to another service. Further, as some social media platforms added live video broadcasting as a functionality (Scheibe & Zimmer, 2019), it resulted in a change of interaction

possibilities on these platforms. Various determinants have an impact on user information behavior: Research results only give insight about temporary conditions. Thus, ongoing research in the area of social media and especially research about social media user's information behavior is necessary. How do new functionalities, change in governance, society, and competing services (see Information Service Evaluation model; Schumann & Stock, 2014) influence and change social media user's information behavior?

The possibilities of information sharing and social interactions on social media have developed over time: From text (e.g., forums, chatrooms), to pictures (e.g., Flickr, Instagram) and audio messages (e.g., WhatsApp), to video-sharing (e.g., YouTube), short-video sharing (e.g., TikTok), and audio broadcasts (e.g., Clubhouse) to video live streaming (e.g., Twitch, YouNow). However, the concept of cyber-social interactions was detected as a new form of social interaction that happens synchronously in cyberspace. We can only guess what impact cyber-social relations will have on information behavior with the progressing development of VR and AR services. In terms of information behavior, while further considering the field of knowledge representation and knowledge management, virtual reality environments will allow new forms of socialization, combination, externalization, and internalization (Nonaka & Takeuchi, 1995) – making online interactions and, e.g., online learning more “real” and experiential. Information retrieval in virtual reality environments is already a rising topic of interest in information behavior research (Schleußinger et al., 2023). Looking at information behavior on social media VR/AR services from a marketing perspective, new forms of online marketing have already evolved (e.g., first virtual Metaverse Fashion Week in 2022; McDowell, 2022, March 29). Online virtual reality worlds and virtual reality social media can further be an opportunity for people with disabilities and (social) anxiety disorder to take part virtually in social, for them hardly manageable, situations.

An influential development in social media will bring the deployment of machine learning and artificial intelligence (AI). Users, the average social media user and professional users alike, will be able to make use of AI for content production. In many East-Asian video live streams, broadcasters already modify their faces with the help of AI to appear more beautiful and more nicely. It cannot only be applied to modify videos and images, but also to automatically generate entirely new images, videos, and texts. Will there be a new era of AI-based social media accounts with their own “information behavior?” Yet, the starting point of information behavior is a user's (information) need; however, even with AI-based accounts, a human will develop the AI accounts with a certain motivation. Further, AI can provide possible sustainable solutions for content creation, e.g., instead of realizing a content production in-person, the scenario can be

built and visualized with AI tools instead. In that way, companies may save money by using AI. However, this produces a false (fake) reality for people and may trigger false expectations, having a possible psychological impact on content consumers. The advent of AI brings several opportunities for social media information; nevertheless, possible risks should be considered. Nearly everything has a two-sided effect, just like social media usage did and still does.

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- Zimmer, F., Scheibe, K., & 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. Technologies and Analytics* (pp. 429–448). Springer.
- Zimmer, F., Scheibe, K., Stock, W. G., & Stock, M. (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 Conference Proceedings* (pp. 1–22). Hawaii University International Conferences.
- 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. Design, Ethics, User Behavior, and Social Network Analysis* (pp. 184–197). Springer.

Zuckerberg, M., Sanghvi, R., Bosworth, A., Cox, C., Sittig, A., Hughes, C., Geminder, K., & Corson, D. (2006). *Dynamically providing a news feed about a user of a social network* (U.S. Patent No. 7,669,123 B2). U.S. Patent and Trademark Office.

## Katrin Scheibe: List of Publications (2016–2023)

Publications marked with a (\*) are included in this thesis and are peer-reviewed.

### In press

Entezari, R., & Scheibe, K. (in press). Nutzer-basierte Evaluierung der Google Knowledge Panel-Funktion: Wissensrepräsentation innerhalb eines Information Retrieval Systems. *Information. Wissenschaft & Praxis*, in press.

Zimmer, F., Scheibe, K., Macey, J., & Hamari, J. (in press). Introduction to the Minitrack on Streaming Media in Entertainment. In T. X. Bui (Ed.), *Proceedings of the 57th Annual Hawaii International Conference on System Sciences* (in press). ScholarSpace.

### 2023

Imeri, A., Scheibe K., & Zimmer, F. (Eds.) (2023). *Informationswissenschaft im Wandel – Wissenschaftliche Tagung 2022 (IWWT22)*. vwh Verlag Werner Hülsbusch.

Zimmer, F., Scheibe, K., & Fietkiewicz, K. J. (2023). Cyber-soziale Interaktionen. Zwischen sozialem und para-sozialem Informationsverhalten. In A. Imeri, K. Scheibe, & F. Zimmer (Eds.), *Informationswissenschaft im Wandel – Wissenschaftliche Tagung 2022 (IWWT22)* (pp. 164–180). vwh Verlag Werner Hülsbusch.

Reichmann, G., Schlögl, C., & Scheibe, K. (2023). „Do only the good survive?!“ – Ein Vergleich der Forschungsleistung universitärer Einheiten aus dem Bereich der Informationswissenschaft im deutschsprachigen Raum. In A. Imeri, K. Scheibe, & F. Zimmer (Eds.), *Informationswissenschaft im Wandel – Wissenschaftliche Tagung 2022 (IWWT22)* (pp. 228–245). vwh Verlag Werner Hülsbusch.

Zhang, H., & Scheibe, K. (2023). Multi-platform Distribution of Video Content: An Analysis of Video Content Cross-posted by YouTubers on Bilibili. In C. Stephanidis, M. Antona, S. Ntoa, & G. Alvendy (Eds.), *Communications in Computer and Information Science: Vol. 1835. HCI International 2023 Posters* (pp. 149–156). Springer.

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Zimmer, F., & Scheibe, K. (2023, January 21). Gamification in Theory and Practice Seminar – Designing an App. *Information Matters*, 3(1).  
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## 2022

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.

Scheibe, K., Imeri, A., & Zimmer, F. (2022, June 01). Aufruf zur Teilnahme: Informationswissenschaft im Wandel. *Open Password*, 1080. <https://www.infobroker.de/password-online/archiv/aspb-75-jahre-wechselnde-herausforderungen-bestanden-und-der-spirit-und-zusammenhalt-der-ersten-jahre-sind-immer-noch-da/>

Scheibe, K., & Zimmer, F. (2022, March 23). Die Nutzung digitaler Medien und Informations- und Kommunikationstechnologien von Asylbewerbern. *Open Password*, 1045. <https://www.infobroker.de/password-online/archiv/nutzung-digitaler-medien-und-informations-und-kommunikationstechnologien-von-asylbewerbern/>

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Zimmer, F., Scheibe, K., Töhrönen, M., & Hamari, J., (2022). Introduction to the Minitrack on Streaming Media in Entertainment. In T. X. Bui (Ed.), *Proceedings of the 55th Annual Hawaii International Conference on System Sciences* (pp. 3337–3338). ScholarSpace.

## 2021

Scheibe, K., & Zimmer, F. (2021, December 10). Gamification auf Social-Live-Streaming-Diensten. *Password Online*, 1009. <https://www.infobroker.de/password-online/archiv/gamification-auf-social-live-streaming-diensten-2/>

Jüttner, K., Nowak, P., Scheibe, K., Zimmer, F., & Fietkiewicz, K. J. (2021). The Faceless Vicinity: Who Uses Location-Based Anonymous Social Networks Like Jodel and Why? In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 12774. Social Computing and Social Media: Experience Design and Social Network Analysis* (pp. 54–73). Springer.



## 2020

- Scheibe, K., & Zimmer, F. (2020). „Ein Bild Sagt Mehr als Tausend Worte“. Inhaltsanalyse der Social-Media-Bilder von Prof. Wolfgang G. Stock. In I. Dorsch, K. J. Fietkiewicz, A. Ilhan, C. Meschede, & T. Siebenlist (Eds.), *Facetten von Wolf Stock und ihre Bedeutung für die Informationswissenschaft: Festschrift zu Ehren von Wolfgang G. Stock* (pp. 119–132). vwh Verlag Werner Hülsbusch.
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- Zimmer F., Scheibe K., & Zhang H. (2020). Gamification Elements on Social Live Streaming Service Mobile Applications. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 12194. Social Computing and Social Media. Design, Ethics, User Behavior, and Social Network Analysis* (pp. 184–197). Springer.
- (\*) 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.
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## 2019

- (\*) Scheibe, K., & Zimmer, F. (2019). Gender Differences in Perception of Gamification Elements on Social Live Streaming Services. *International Journal on Interactive Communication Systems and Technologies (IJICST)*, 9(2), 1–15.
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- (\*) Zimmer, F., Scheibe, K., Stock, M., & Stock, W. G. (2019). Fake News in Social Media: Bad Algorithms or Biased Users? *Journal of Information Science Theory and Practice*, 7(2), 40–53.
- Zimmer, F., Scheibe, K., Schmoly, L., & Dreisiebner, S. (2019). Fake News im Zeitalter der Social Media. In S. Büttner (Ed.), *Die digitale Transformation in Institutionen des kulturellen Gedächtnisses* (pp. 211–239). Simon Verlag für Bibliothekswesen.

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## 2018

- Scheibe, K. (2018, November 16). Steilvorlagen für den Unternehmenserfolg 2018 - KI als Mittel zur Effizienzsteigerung - Von Daten zu Einsichten im Versicherungsmarkt - Die Bedeutung intelligenter Fehler. *Password Online*, 469.  
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- Fietkiewicz, K. J., Dorsch, I., Scheibe, K., Zimmer, F., & Stock, W. G. (2018). Dreaming of Stardom and Money: Micro-celebrities and Influencers on Live Streaming Services. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 10913. Social Computing and Social Media. User Experience and Behavior* (pp. 240–253). Springer.
- (\*) Scheibe, K. (2018). The Impact of Gamification in Social Live Streaming Services. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 10914. Social Computing and Social Media. Technologies and Analytics* (pp. 99–113). Springer.
- (\*) Zimmer, F., Scheibe, K., & 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. Technologies and Analytics* (pp. 429–448). Springer.

Zimmer, F., Akyürek, H., Gelfart, D., Mariami, H., Scheibe, K., Stodden, R., Fietkiewicz, K. J., & Stock, W. G. (2018). An Evaluation of the Social News Aggregator Reddit. In C. V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 364–373). Academic Conferences and Publishing Limited.

(\*) Scheibe, K., Philipps, J., Schaffarczyk, L., Nikolic, J., & Stock, W. G. (2018). A Sentiment Analysis on Miley Cyrus' Instagram Accounts. In C. V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 274–282). Academic Conferences and Publishing Limited.

(\*) Scheibe, K., Meschede, C., Göretz, J., & Stock, W. G. (2018). Giving and Taking Gratifications in a Gamified Social Live Streaming Service. In C. V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 264–273). Academic Conferences and Publishing Limited.

## 2017

Scheibe, K., Zimmer, F., & Fietkiewicz, K. (2017). Das Informationsverhalten von Streamern und Zuschauern bei Social Live-Streaming Diensten am Fallbeispiel YouNow. *Information. Wissenschaft & Praxis*, 68(5-6), 352–364.

Fietkiewicz, K. J., & Scheibe, K. (2017). Good Morning... Good Afternoon, Good Evening and Good Night: Adoption, Usage and Impact of the Social Live Streaming Platform YouNow. In *Proceedings of the 3rd International Conference on Library and Information Science* (pp. 92–115). International Business Academics Consortium.

Friedländer, M. B. (2017). And Action! Live in Front of the Camera: An Evaluation of the Social Live Streaming Service YouNow. *International Journal of Information Communication Technologies and Human Development*, 9(1), 15–33. (Corresponding author of Mathilde B. Friedländer for this article: Katrin Scheibe)

## 2016

(\*) Scheibe, K., Fietkiewicz, K. J., & Stock, W. G. (2016). Information Behavior on Social Live Streaming Services. *Journal of Information Science Theory and Practice*, 4(2), 6–20.

## Workshare of Publications

**Chapter 2:** Zimmer, F., Scheibe, K., Stock, M., & Stock, W. G. (2019). Fake news in social media: Bad algorithms or biased users? *Journal of Information Science Theory and Practice*, 7(2), 40–53.

The workshare amounted **25%** and included partially the research idea, partially the writing, and partially reviewing and editing.

**Chapter 3:** Scheibe, K., Philipps, J., Schaffarczyk, L., Nikolic, J., & Stock, W. G. (2018). A sentiment analysis on Miley Cyrus' Instagram accounts. In V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 274–282). Academic Conferences and Publishing International Limited.

The workshare amounted **50%** and included partially the research idea, partially the data collection, partially the data analysis, the writing, the visualization (tables/figures), and partially reviewing and editing.

**Chapter 4:** 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. Design, Ethics, User Behavior, and Social Network Analysis* (pp. 636–646). Springer.

The workshare amounted **60%** and included partially the research idea, the data collection process, partially the data analysis, partially writing, partially visualization (tables/figures), and partially reviewing and editing.

**Chapter 5:** Scheibe, K. & Zimmer, F. (2022). Theoretical foundations. In *Asylees' ICT and Digital Media Usage: New Life – New Information?* (pp. 52–64). De Gruyter Saur.

The workshare amounted **80%** and included partially the research idea, partially writing, the visualization (tables/figures), and partially reviewing and editing.

**Chapter 6:** Scheibe, K., Zimmer, F., & Stock, W. G. (2019). Social media usage of asylum seekers in Germany. In W. Popma & S. Francis (Eds.), *Proceedings of the 6th European Conference on Social Media* (pp. 263–272). Academic Conferences and Publishing International Limited.

The workshare amounted **70%** and included partially the research idea, partially the data collection, partially the data analysis, partially the writing, the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 7:** Zimmer, F., Scheibe, K., & 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. Technologies and Analytics* (pp. 429–448). Springer.

The workshare amounted **30%** and included partially the research idea, partially the writing, partially the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 8:** Scheibe, K., Fietkiewicz, K. J., & Stock, W. G. (2016). Information behavior on social live streaming services. *Journal of Information Science Theory and Practice*, 4(2), 6–20.

The workshare amounted **60%** and included partially the research idea, the data collection, the data analysis, partially the writing, the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 9:** Scheibe, K., Zimmer, F., Fietkiewicz, K. J., & Stock, W. G. (2022). Interpersonal relations and social actions on live streaming services. A systematic review on cyber-social relations. In T. X. Bui (Ed.), *Proceedings of the 55th Annual Hawaii International Conference on System Sciences* (pp. 3349–3358). ScholarSpace.

The workshare amounted **30%** and included partially the research idea, partially the writing, partially the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 10:** Scheibe, K. (2018). The impact of gamification in social live streaming services. In G. Meiselwitz (Ed.), *Lecture Notes in Computer Science: Vol. 10914. Social Computing and Social Media. Technologies and Analytics* (pp. 99–113). Springer.

The work amounted **100%**.

**Chapter 11:** Scheibe, K., Meschede, C., Göretz, J., & Stock, W. G. (2018). Giving and taking gratifications in a gamified social live streaming service. In V. Cunnane & N. Corcoran (Eds.), *Proceedings of the 5th European Conference on Social Media* (pp. 264–273). Academic Conferences and Publishing International Limited.

The workshare amounted **70%** and included partially the research idea, the data collection, the data analysis, the writing, the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 12:** 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 **60%** and included partially the research idea, partially the data collection, partially the data analysis, partially the writing, partially the visualization (tables/figures), and partially the reviewing and editing.

**Chapter 13:** Scheibe, K. & Zimmer, F. (2019). Gender differences in perception of gamification elements on social live streaming services. *International Journal on Interactive Communication Systems and Technologies (IJICST)*, 9(2), 1–15.

The workshare amounted **60%** and included partially the research idea, the data collection, the data analysis, partially the writing, the visualization (tables/figures), and partially the reviewing and editing.

## Résumé

**Katrin Scheibe** born July 31<sup>st</sup>, 1995 in Dorsten, Germany  
katrin.scheibe@hhu.de || [www.isi.hhu.de/scheibe](http://www.isi.hhu.de/scheibe) || ORCID: 0000-0002-0592-7222

## HIGHER EDUCATION

Since 12/2019 Heinrich Heine University Düsseldorf, Germany  
PhD in Information Science  
Title: Information Behavior on Social Media: Services, Usage, and Users

08/2017 – 09/2019 Heinrich Heine University Düsseldorf, Germany  
M.A. in Information Science and Language Technology  
Grade: 1.3

10/2013 – 07/2017 Heinrich Heine University Düsseldorf, Germany  
B.A. in Information Science and Language Technology  
Grade: 2.1

## WORK & PROFESSIONAL EXPERIENCE

Since 09/2017                      Heinrich Heine University                      Düsseldorf, Germany  
Research associate, Department of Information Science

01/2016 – 08/2017 Heinrich Heine University Düsseldorf, Germany  
Student assistant, Department of Information Science

11/2022 – 12/2022 Karl Franzens University Graz, Austria  
Visiting scholar, Institute for Operations and Information Systems

08/2016 – 10/2016	Rosemarie Jacoby	Burscheid, Germany
Internship, Website Design, Website Content, Website Optimization		

## ACADEMIC SERVICE

11/2019 – 10/2021	ASIS&T	Online
	European Student Chapter: Social Media Manager (2019–2020)	
	European Chapter Webmaster (2020–2021)	
	SIG Social Media: Secretary (2020–2021)	

Reviewer activities for journals and conferences, teaching and mentoring, module coordinator (information retrieval for bachelor and masters), student internship coordinator (bachelor students information science), conference chair/associate chair/programme committee, minitrack/session co-chair

## **Declaration of Academic Honesty**

I affirm in lieu of an oath that this dissertation has been prepared by me independently and without unauthorized external assistance, in compliance with the 'Regulations on the Principles for Ensuring Good Scientific Practice at Heinrich Heine University Düsseldorf'.

## **Eidesstattliche Versicherung**

Ich versichere an Eides statt, dass die Dissertation von mir selbständig und ohne unzulässige fremde Hilfe unter Beachtung der ‚Ordnung über die Grundsätze zur Sicherung guter wissenschaftlicher Praxis an der Heinrich-Heine-Universität Düsseldorf‘ erstellt worden ist.

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Ort, Datum

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Unterschrift