The Quirks of Being a Wallflower: Towards Defining Lurkers and Loners in Games Through A Systematic Literature Review

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ABSTRACT

Research support that online multiplayer games build social capital and contribute to people's well-being. Players build meaningful, strong relationships through games, resulting in complex communities, similar to *traditional* Online Social Networks (OSNs). In OSNs, the vast majority of the population consists of invisible users consuming content rather than actively engaging with the community: *lurkers*. While lurkers have been well-researched in OSNs, they have been under-investigated in games. In games, their behaviour may limit the social potential a game provides. Besides the big knowledge gap concerning lurkers in multiplayer environments, it is also yet unclear how lurkers differ from another class of non-social players: *loners*. In this work, we review and analyze the Games User Research (GUR) literature to understand (a) how lurkers and loners are defined in games and (b) which characteristics they exhibit. Our contributions are definitions of lurkers and loners in games and a future research agenda outlining opportunities to study them.

CCS CONCEPTS

• **Human-centered computing** → **HCI theory, concepts and models**; **Social networks**.

KEYWORDS

Social Network, Online Multiplayer Games, Lurkers, Loners, In-game behaviors

1 INTRODUCTION

In Online Social Networks (OSNs), only a minority of users actively engage with a platform and produce novel content, with the remaining being passive users—i.e., lurkers [13, 41]. Multiplayer games are

a particular type of OSN, although retaining many of their traditional properties (e.g., communities [62] and influencers [31]). Yet, little is known about *lurking* behaviours in games (e.g., whether lurkers exist and if they resemble OSN lurkers).

OSN *lurkers*, accounting for about 90% of users [60], are regular OSN guests, invisible to many others, but essential for the virtual ecosystem [63]. Despite not actively showing their presence, they still connect with the community [39, 41, 63] and it influences them [13], creating an impact in other OSNs or the real world. Nevertheless, to preserve the virtual community, a balance between creators and consumers of content must exist [57], hence "de-lurking" methods exist to actively engage them in the community [43].

While it might seem counter-intuitive for lurkers to exist in such highly interactive environments as games, users' motivation to lurk in OSNs (e.g., fear of judgement or cultural onboarding [29, 45]) might provoke similar behaviours in games. Combined with previous evidence of other OSN dynamics translated into games [31, 62], we speculate that lurkers, or a variant, also populate online multiplayer games.

Lurkers' reduced sociality recalls the concept of game *loners*- i.e., players that minimize in-game social interactions and prefer acting as a "lone wolf". This overlap leaves the question of whether loners are the game equivalent of lurkers or if more nuanced investigations and definitions are needed.

To summarize, we investigate how the terms lurkers and loners are used in research of online multiplayer games, reflecting on the following questions:

RQ1. What is the definition of lurkers in online games?
RQ2. What is the definition of loners in online games, and how does it differ from lurkers?
RQ3. How are lurkers and loners in games similar to OSN lurkers?
RQ4. What are future research opportunities and underinvestigated areas concerning lurkers and loners in games?

By answering these research questions, we contribute to Games User Research (GUR) in Human-Computer Interaction (HCI) by defining lurkers and loners in games, grounded in previous works in the literature. Then, we identify the knowledge gap in this space and the research opportunities connected to the social nature of games and how it can be used to improve players' well-being and foster relatedness.

2 SOCIAL MEDIA ORIGINS

In this section, we explain the background of lurkers in Online Social Networks. The following is not aimed to be a comprehensive

review, but a summary of the most relevant findings on lurkers in *traditional* OSNs (e.g., social media).

Being a *lurker* is often misinterpreted [13, 41], and multiple discordant definitions exist. Researchers pointed out the inaccuracy of the negative connotation attributed to the term and condemned the simplistic traditional definition of "silent observers" [13, 41]. Lurking is a normal behaviour [13], indispensable for the online content consumption [63]. In an online network, only 1% of the users create new content, while 9% engage with it, for instance, by editing it. The remainder 90% of the participants assume a passive—i.e., lurking—behaviour, and thus a read-only approach [60]. Recent research found variations of this "90-9-1" principle, impacted by the platform [3], context and size [42] of the community. However, the motivations driving users to lurk derive from many factors [29, 43, 45], such as personal reasons, a lack of engagement, the desire to know more about the group, usability issues, or integration problems.

Conversely to the general belief, lurkers show a strong sense of community [39, 41, 63], and still constitute an important part of the network [13]. They spend a considerable amount of time on the platform. As a result, they know and empathize with the rest of the community [13] and are impacted by its influence [13]. The study and analysis of lurking behaviours in OSNs do not necessarily aim to reach greater visible engagement. Instead, it should lead to a higher understanding of the impact lurkers have on other individuals and the community as a whole, and, consequently, to greater knowledge on the social network [13]. Although the existence of lurkers is beneficial to maintain the order online community, if the ratio with the posters increases, the amount of valuable content significantly decreases, hence the need for strategies to encourage their active participation [57] (e.g., by using chatbots to foster lurkers participation in online discussions [26]). When lurkers actively interact with the community, they are said to "delurk" [43].

Online multiplayer games are also a type of online community where players connect and form strong social bonds. Networks built from games host many social dynamics similar to other online communities (e.g., the existence of smaller highly-connected groups [62] and influencers [31]). Yet, a grounded understanding of what a lurker is and how they behave in games is still lacking, which is our study's purpose.

3 METHOD

We conducted a systematic review to identify, filter, and analyze peer-reviewed literature analyzing lurkers and loners in multiplayer online games and compare their usage to their meaning in online social networks. Towards this, We used a systematic review method based on the PRISMA guidelines.

Databases Games are researched in multiple disciplines, such as information technology, health interventions, psychology, and science. This diversity of game applications led to selecting the following databases for a detailed search to cover the published literature: (Guide) ACM Digital Library, IEEE Xplore, ScienceDirect, SpringerLink, and Scopus.

We conducted two separate searches in each database for lurkers and loners. Studies related to lurkers were retrieved using the query: "lurk* AND (multiplayer OR online) AND gam*", where * is a

wildcard. Loners-related research was collected through the query: "(lone OR loner? OR "isolated player*" OR "isolated user*" OR "solo player*") AND (multiplayer OR online) AND gam* ". The second half of the queries aim to filter games or gameful experiences in a multiplayer setting.

Inclusion Criteria This systematic review aimed to survey the broadest possible domain in which lurkers have been researched and analyzed in the context of multiplayer online games. Hence, the key inclusion criteria were (1) games research targeting social dynamics in online games and gameful environments; (2) and English literature comprising original, peer-reviewed empirical research; (3) the concept of *lurkers* and *loners* had to refer strictly to games or game-like context behaviours; and (4) lurkers and loners had to be addressed in the study, and not only in the Related Works sections. Studies that did not adhere to the above conditions were excluded from the current review.

4 RESULTS: USAGE & MEANING IN ONLINE MULTIPLAYER GAMES

This section presents the results obtained from our research on lurkers and loners in online multiplayer environments.

4.1 Lurkers

The research (Table 1) on lurkers produced 25 final articles (i.e., [4, 6–8, 12, 15–17, 19–23, 27, 28, 34, 38, 44, 49, 50, 53, 54, 58, 61, 64]), whose metadata are described in Figure 1a.

Definition. Lurkers are described as individuals with *medium usage* and *low variety* in terms of actions performed, moved by the desire of "killing" time and "consume entertainment" [6], and predominantly focused on *their own virtual space* [64]. Mostly, lurkers are defined by their scarce level of *visible* participation [7] and are addressed as observers [8, 20, 23, 50, 53], or invisible participants [4]. Both the adjectives active [28] and passive [20, 34, 53] have been used to describe and define lurkers. Active refers to their prolonged although invisible participation [8, 23], whereas passive emphasizes their lack of concrete, visible actions and/or contributions. Conversely to the general trend, few studies defined lurkers as dropout [44] or simply low-active players [58]. Lurkers have also been described within game streaming services, where their behaviour is seen as an active process of cultural onboarding [19].

Characterization. Few studies also attempted lurkers' characterization. Researchers studied the correlation between epidemic curiosity and future intent to play in the context of mobile games, in which they found the game lost novelty for those class of gamers [27]. In another study, researchers argue that peer communication, especially if socially-oriented, increases the chances of permanence in the group [12]. Being an active part of the player guilds (or communities) positively affects attitude and continuance intention to play [21]. Yeh et al. [64] analyzed users' participation in a virtual world, similar to Second Life. They found that lurkers' main motivation to participate was to create enjoyable experiences through observation rather than being social. Being a gamer, also in other platforms, does not prevent lurking, as well as players' interest in the platform and content [58], which can be explained by the

Table 1: Results of the lurkers research, and the retained papers after the scan on title/abstract (2nd row) and the full paper (3rd row).

	ACM Guide	IEEE	ScienceDirect	Springer	Scopus
No filtering	377	3	363	686	1203
Title/Abstract (No rep)	10	1	7	8	84
Final Set	5	0	4	3	13

Table 2: Results of the loners research, and the retained papers after the scan on title/abstract (2nd row) and the full paper (3rd row).

	ACM Guide	IEEE	ScienceDirect	Springer	Scopus
No filtering	946	7	422	323	923
Title/Abstract (No rep)	16	1	12	0	1
Final Set	13	1	10	0	1
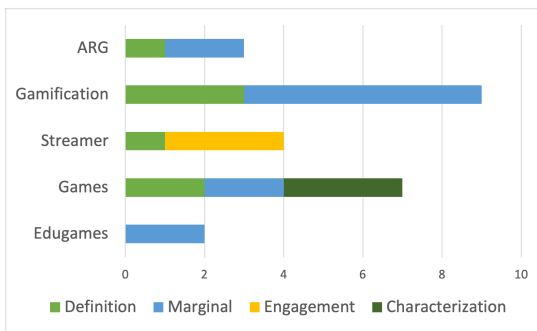
(a) Lurkers
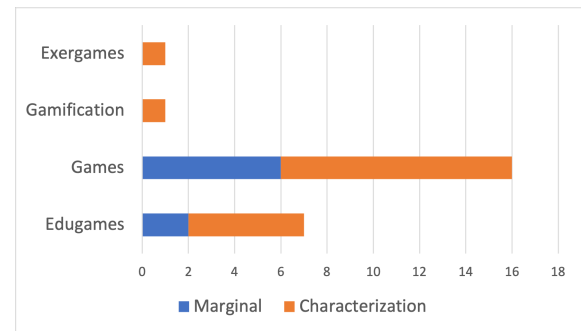
(b) Loners

Figure 1: Application domain and type of research (mutually exclusive).

motivation to lurk being manifold. The authors, for instance, hypothesize that the uninterested users were browsing for curiosity, while interested users wanted to get a feel of the community [58].

Similar to OSNs, game lurkers made up the majority of the population [20, 23, 38, 58, 64]. Although there is little understanding on lurkers [28], scholars speculate on and suggest methods to lure them out and encourage active participation [4, 61]. Examples are: special tutorials for newcomers, monitoring the level of inactivity rectified with special animations, the possibility to explicitly communicate particular requests (e.g., looking for work/help) [4].

In streaming contexts, engagement techniques have been used to promote participation from the spectators. For instance, the audience can decide if they want to help or hurt the streamer and plan their actions accordingly [17]. Spectators' behaviours can be analyzed to help explain these lurkers' transitions to first-time participant [49], and foster connection to the streamer and the audience using a participatory game [50].

Despite their invisible nature, lurkers still connect with the community and culture [15, 50], and are an important part of the population [15]. Yet, they are often neglected in (social) behavioural studies [8]. Games are thought to be unsuitable for lurkers, as each player must present their character and invest their resources [21].

However, the absence of lurking participants in studies does not imply that lurkers do not exist [22]. Lurkers are difficult to identify [16]. However, detailed information on the occurrence of lurking virtual world would be valuable to scholars and practitioners [22].

4.2 Loners

The research (Table 2) on loners produced 25 final manuscripts ([1, 2, 5, 9–11, 14, 18, 24, 25, 30, 32, 33, 35–37, 40, 46–48, 51, 55, 56, 59, 65]), whose metadata are described in Figure 1b.

Definition. The definition of loners is mostly coherent across the different studies and context domains. "*Lone wolfs*", lone fighters [56], or solo players [36, 46] are players who work alone [51, 59]). When playing alone is not possible because inherently forced in the design (e.g., impossible challenges to win alone [2, 33]), loners are identified as those players with no significant social network, filled with strangers [36]. The main differences lie in the (assumed) motivations: they are thought to dislike group processes [59], or play for individualistic reasons [10]. Others consider them as left-out players [14], novices learning how to play [55], or assigned a tagging role [1]. In general, lone wolfs are characterized by a much smaller amount of social interactions than other players [5].

Nevertheless, they are often active at the point that can also be considered achievers [32, 47].

Characterization. Loners often emerge from behavioural analyses performed by clustering players' telemetry data [5] and account for most of the population [36, 47]. Their social status was found more stable and consistent over time than more sociable players [11], which oscillated between different interaction patterns during the gameplay.

Researchers are in accordance that team, or social, play has huge benefits on engagement [24, 37], sense of belonging [24, 48], intrinsic motivation [37], attachment to the platform [10], and limits anger [46]. Identifying with solo play [18], however, does not imply that loners are less extroverted than team players [35]. As a result, solo-play may derive from the context and players' preferences [35]. Playing alone is also related to newcomers [25, 55], who join guilds later on in the game, although not always confirmed [9]. Another factor may be gender, as works showed that females are more likely to choose characters for solo [55], or prefer in routinized play with the same players [10].

Few researchers have also associated the term loner with the concept of achiever [32, 47]. In these studies, loners, accounting for a big part of the population, exhibited a high in-game activity level and completion ratio. The repercussion of socializing behaviours on in-game rewards and success, on the other hand, depended on the game design, in which some prized cooperation [32]. Despite this evidence of loners being connected to an elevated in-game activity, some studies reported them as more likely to churn than social players [5]. Besides behavioural studies, also loners' psychology has been researched.—specifically, *narcissism.* Disentangled into two aspects: rivalry and admiration were correlated to social in-game behaviours [56]. Gamers less keen to play with others showed higher scores on rivalry. Their results suggest that admiration and rivalry correlated to specific in-game behaviours: team leaders scored higher in admiration. At the same time, lone fighters were related to higher values on the rivalry axis.

Educational games provide conflicting results on how solo play affects learning [40, 65], as cooperation requires reciprocity [30]: when players share knowledge and move from individualistic to group goals, learning benefits exist.

5 DISCUSSION

This study reviewed the terms lurkers and loners in games and gameful environments (Table 3). First, we present a joint definition of lurkers (RQ1) and loners (RQ2) in games. Then, we provide a research agenda for future works. We argue for investigating lurkers and loners' psychological and behavioural characterization, based on previous works on lurkers in OSNs (RQ3). Finally, we point out some other research opportunities (RQ4).

5.1 Defining Lurkers and Loners

Most of the studies were in agreement with the definition of lurkers. In general, the idea of invisible consumers of content is recurrent [4, 6, 8, 20, 23, 50, 53], and in line with the consolidated definition of lurkers in OSNs [13, 41]. Yet, some researchers tend to confuse lurking behaviours with churners [44], unengaged players
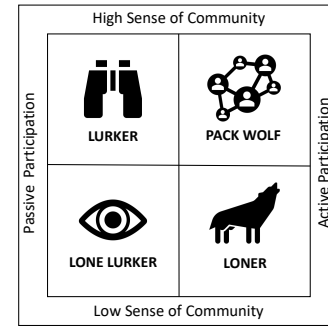

Figure 2: The *interaction model.* In the horizontal axis, we represent interaction with the environment, going from being invisible (viewing) to visible (acting). In the vertical axis, we model the sense of community, ranging from dependence to an independent state.

abandoning the game. This confusion is most likely due to the difficulty of identifying lurkers in games [16], caused by their inherently invisible nature and behavioural studies relying on data-driven loggable actions. Combining OSN lurkers connotation and the most acclaimed meaning used in games, we provide the following definition: "*Lurkers are active users, or players, who perform little visible actions, and prefer browsing and studying the environment. They are committed to the online multiplayer platform and are retained for a meaningful amount of time.*"

Despite lurkers feeling attached to the community of players [15, 50], they rarely, if not never, engage with others. The lack of social interactions is also a core feature of *loners* [5, 51, 56, 59]. In GUR, the term loners describe "*active players, who have few social contacts with others and prefer working alone*". Although researchers agree on the objective description of the behaviour, they often speculate on the motivations driving loners to drift apart from the community (e.g., dislike for group dynamics [59] or exclusion [14]).

In addition to the specific definitions of the terms 'lurkers' and 'loners,' we see a connection among the concept. Both lurkers and loners describe an extreme interaction behaviour, objectively observable and measurable. We describe those interaction behaviours on two axes (Figure 2): interaction with the environment and the community, and followed a standard Persona building approach. In the environment, *visible interactions*, which are usually logged and analyzed, are opposed to *invisible actions*, proper of lurkers (e.g., browsing, viewing). For the community axis, intensive—either visible or invisible—interaction behaviours describe a sense of *dependence* with the community, to some extent. On the other hand, *independence* from the community describes individualistic behaviours, such as in the loner case. According to our definition, Lurkers are low in the environment interaction axis (invisible) but have a high sense of community (dependence). Conversely, Loners are visibly active (high in the environment interaction) but independent from the community (low in the sense of community). When the values in both axes are low (independence and invisibility), we have a *lone lurker*. Finally, we call *pack wolves* players visible and connected to the community (dependent). Those four Personas (Lurker, Loner, Lone lurker, and Pack wolf) describe our model's extreme

Table 3: Summary of the most relevant properties of lurkers and loners, with the relative references.

Area	Properties	Lurkers	Loners
Behavioral	Engagement through observation	[4, 6, 8, 20, 23, 50, 53]	-
Behavioral	Tasks progression/completion	-	[5, 32, 47]
Behavioral	Attachment to community	[15, 50]	-
Behavioral	Little (none) explicit social interaction	[6, 64]	[5, 51, 56, 59]
Behavioral	Own virtual space	[64]	-
Behavioral	Achievers	-	[32, 47]
Psychological	Narcissism	-	[56]
Motivational	Novelty lost	[27]	-
Motivational	Cultural onboarding	[19]	[25, 55]
Other Effects	Churn risk	[12]	[5]
Statistics	Majority of the population	[20, 23, 38, 58, 64]	[36, 47]
Statistics	More likely to be females	-	[10, 55]

points, developed as a spectrum. However, players will likely fall in categories that are in between those points.

5.2 Future Works and Research Agenda

Many works treated the presence of lurkers and loners with superficiality or for argument's sake. Nevertheless, researchers argue for the importance of better understanding those behaviours [22] and reaching a greater awareness of the whole community and its social rules. We hereby present research opportunities on the description and modelling of lurkers and loners in games, as well as provide a high-level research agenda divided into thematic areas.

Definition and Identification Metrics. In this study, we provided a joint definition of lurkers and loners based on the GUR literature available and similarities with OSN works. Despite following a rigorous method, we only moved a step forward in this area of research. The model needs to be elaborated and validated in concrete, real-world use case scenarios. Moreover, in case empirical analyses highlight the need for finer-grained personas, the proposed model can be further refined. Finally, objective metrics and procedures must be defined to identify lurkers and loners, to allow reproducibility and cross-studies comparisons.

Psychological Characterization. Existent research only scraped the surface of the psychological characteristics of driving or connected to lurking and isolating games' behaviours. For example, researchers studied how epidemic curiosity related to lurkers in mobile games [27], while loners showed higher levels in the rivalry axis of narcissism [56]. From OSNs analyses, we know that lurkers' personality is frequently conscientious and agreeable and show high moral values as well [52]. Nevertheless, those findings cannot be assumed to generalize in gameful environments, too. Future work should explore lurkers' and loners' psychology to identify their personality, attitude, and way of connecting and interacting with others in the real world. A psychological model would convey a greater understanding of those peculiar players and provide a theoretical framework to behavioural and motivational models.

Motivational Drivers. In OSNs, some of the known motivations leading to lurking behaviours are lack of engagement, personal reasons, usability, integration issues, or preliminary exploration

of the community [29, 45]. Once again, we can only speculate on why lurkers lurk in games, as OSNs cannot be directly generalized. Similarly, the motivation behind loners and their isolating behaviours are never investigated; rather, assumptions are made. For instance, the lack of social interactions is interpreted as an explicit preference [59], or cultural onboarding [19, 55]. Future works should investigate the motivational drivers of lurking and isolating behaviours, and whether they derive from internal (e.g., players' personalities) or external (e.g., design issues) factors. Few studies also found females to be more likely to be loners [10], which could be connected with harassment and toxicity in some online games. New studies can highlight whether and when those behaviours are voluntary or a warning signal requiring intervention (e.g., exclusion and loneliness, dangerous for mental health).

Behavioural Characterization. Research characterizing lurkers' behaviours within the platform is scarce, both in OSNs and in games, as modelling interaction patterns for those invisible individuals is challenging [16]. Nevertheless, understanding how they browse and scan the platform can help identify their interests, inform usability testing, and provide tailored content for lurkers aimed at their engagement. Behavioural studies on lurkers can also describe how they perceive the community and whether they are impacted by it over time. On the other hand, loners are easier to model and identify and have been more studied. Although they are not necessarily the top players or the most committed users, loners have been described as achievers [32, 47], showing an intensive activity and higher completion rate than most users. Future research should focus on lurkers in-game interactions and understand how to distinguish them from loners. Researchers should also investigate how those behaviours change in time and further verify the stability of isolating behaviours (loners) [11], across games.

Impact on the Game and Players. Lurkers account for the vast majority of the OSN population [60], where 1% of the users produce almost all the content. Although changing the social platform also impacts the percentage of existing lurkers [3], they still cover a big piece of the users in games, too [20, 23, 38, 58, 64]. Similar findings have been found for loners [47]. While in OSNs, maintaining a good lurkers-posters balance is essential for the ecosystem to work [57],

lurkers' and loners' value in games is yet to be investigated. Hence, future studies should (i) research the presence of lurkers and loners in the system, (ii) understand when lurkers are absent and why, and (iii) investigate how lurkers' existence (or absence) impact the functioning of the game and its social dynamics.

Design Implications and Engagement. OSNs inherently indulge lurking behaviours by design: users are not required to perform actions in the social platform to observe the community and, internally, connect to it [39, 41, 63]. Although we still know little about lurkers in games, researchers point out how they seek enjoyable experiences through observation [4, 6, 8, 20, 23, 50, 53]. Hence, considering the design elements for observation or passive interactions can indulge lurking behaviours and interrupt the game [15]. Yet, a balance should exist among lurkers and posters for a prosperous OSN [57], preserved thought engagement techniques introduced when the lurkers' population increases [43]. Also, loners could be better accounted for in the systems' design and the motivation leading them to isolation. For instance, customized feedback [14], [51] and bots [49] may prevent involuntary isolating attitudes. In games, engaging lurkers and loners can benefit their retention. Social interactions and active participation within the guild correlate with a more positive attitude and a longer permanence ([5, 12], as well as a higher sense of belongingness [24] and engagement [10]. Future works should consider lurkers and loners already in the design phase to accommodate their behaviours but also develop engagement techniques adapted to players' preferences, personalities, and motivations to assume a lurking or isolating behaviour.

5.3 Conclusion

Invisible and isolated individuals often account for the majority of the population in online platforms. Following the research on lurkers in OSNs, we reviewed GUR literature on lurking and isolating behaviours to define and characterized those classes of players. We contribute to the CHI and GUR field by providing an objective definition of lurkers and loners and a connection among the two terms defining a 2-axes interaction model. Then, we provide a high-level research agenda, elaborating on macro areas of interest for future studies on lurkers and loners in multiplayer environments.

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