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Article

Heroes and Hooligans: The Heterogeneity of Video Game Modders

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Abstract
Video games are hugely popular, generating more than twice the revenue of global movie and music industries combined. Whilst technically illegal and often carrying negative connotations, modding constitutes a moral grey area that is commonly accepted, often encouraged by proprietary owners and forum-centred gaming communities. Literature reflects a disparity between outsider and insider perceptions of modding, with a paucity of studies reflecting insider perspectives. Using Reddit forum data, this study contributes insight into perceptions of modding held by gamers and 'modders', as described in their words and their territory. Thematic analysis revealed four main themes relating to unfairness in the vendor community, modders as antagonists, differences between modders and modding as forms of self-defence. Conclusions include that modding appears to have both pro- and antisocial applications, but many people and organisations demonise modders as a homogeneous group, which may encourage antisocial behaviours.

Keywords
video game modification, gaming, digital drift, playbour, forums

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The global games market has dwarfed other entertainment industries for years and is currently forecast to feature 2.7 billion players and generates revenues totalling US$179.7billion US dollars in 2020 (Market Watch, 2021; Newzoo, 2020; Statista, 2020). The financial value of account information and the industry itself through games sales, downloadable content and in-game material, presents an attractive opportunity to hackers and cheats (Parizi, Dehghantanha, Choo, Hammoudeh, & Epiphaniou, 2019). The security concerns regarding such valuable data are clear, and video game modification (or 'modding') presents potentially serious security risks. This is evidenced by the 2011 Sony hack, allegedly committed using a modified PlayStation console, which affected over 77 million people (Parizi et al., 2019). However, modding also presents opportunities to increase revenue in an already lucrative industry (e.g. Postigo, 2007; Thiel & Lyle, 2019).

Modding can be defined as the act of editing an existing video game or gaming console to change elements or produce new material and capabilities and, thus, presents great diversity in potential modifications (e.g. Lee, Lin, Bezemer & Hassan, 2020). Modifications can be benevolent, such as fixing bugs, changing environments, producing game content (such as new maps), avatar skins and creative changes to the game itself. However, potential also extends to more lucrative additions to gameplay such as in-game money, inventory items and character abilities to boost gameplay experience and circumvent unwanted elements of the game. The UK National Crime Agency (NCA), in partnership with CREST (The Council for Registered Ethical Security Testers)[1], has reported that video gaming is an important part of a pathway to cybercrime (CREST, 2015). Specifically, a pathway is proposed from computer games to online games, gaming cheats, gaming modifications, to hacking forums, to committing cybercrime of escalating severity (CREST, 2015; NCA, 2017). This pathway suggests that cheating and modding are closely related, but recent work by Lee et al. (2020) found that only 16% of modifications studied were 'cheats'. Modding is the first step on the pathway that crosses a line of legality, but, unlike later steps, it remains a legal, moral and social grey area (Kretzschmar & Stanfill, 2019).

'Modding' and 'Hacking'

As well as being considered a precursor to more offensive hacking activities in other online environments (CREST, 2015; NCA, 2017), video game modifications, in themselves, are hacks – manipulations of hardware or software systems to improve or alter their operation (Holt, 2019a; Levy, 2010; Zarzycki, 2018). Proficient modders must be capable coders, able to write, pack and protect their codes in such a way that game security defences do not recognise the inserted or edited code as abnormal and potentially malicious (Palmer, 2020). To produce modifications without official modding tools, existing game code must be accessed in machine language form and retranslated to the original file format for editing; game developers encrypt the files to prevent this (Hawranke, 2020). Unofficial modding tool producers must, therefore, decrypt each file by examining the data and reverse-engineer the developer's process,

uncovering how the files were encrypted to develop a working decryption tool to be applied to other files (Hawranke, 2020). Through this process, modders become familiar with the way in which the game handles these files, and this informs modification design and repacking of code (Hawranke, 2020). This process parallels with many cyber-crimes and supports the asserted connection between video game modification, cybersecurity and cybercrime.

Unlike most hackers and malware developers, modders are often recognised for their creative accomplishments and targeted companies may not only tolerate modifications but reward innovation with prizes and prestigious roles within the industry (Mollick, 2005). The potential career benefits and employment opportunities in the game development industry offered by modding are indeed motivating (Postigo, 2007) but have been found to be the least important of identified motivations for modders, who favour enjoyment and enhancement of the gaming experience (Poor, 2014). In fact, research has found the making and sharing of modifications to be motivated primarily as an enjoyable artistic endeavour and an opportunity for modders to contribute to their online communities by improving the game and in-creasing their (and others) enjoyment (Poor, 2014; Postigo, 2007; Ryu & Jeong, 2019). Modding has also been found to be motivated by presenting challenges, team building and learning opportunities (see Sotamaa, 2010) with modders learning to modify via online communities through collaboration, mentoring and social validation (Ryu & Jeong, 2019). Indeed, evidence suggests that modding can be used as a learning aid in schools and online settings (El-Nasr and Smith, 2006; Ryu & Jeong, 2019).

Modding Toleration

Modding is met with mixed reception by users and vendors alike. Whilst technically breaching copyright laws and End User Licence Agreements, modding is often tol-erated and even encouraged by proprietary owners and embraced by gaming com-munities who value the collaborative, creative and problem-solving benefits that modding affords (Poor, 2014). While modders may be motivated by enjoyment and community rather than benefits from industry such as career prospects, modding offers undeniable benefits to the video game industry. Postigo (2007) refers to modders as 'fan-programmers' and highlights the economic benefits provided to vendors when modders and their communities add to, test and elevate the online presence of a game at no cost to the company. Poretski, Zalmanson and Arazy (2019) found that availability of community-based modifications directly increased game consumption. An additional indirect relationship was found as modifications drive 'word-of-mouth' publicity measured as online streaming of gameplay, also increasing game consumption (Poretski et al., 2019). Monitoring the popularity of modifications also provides vendors with extremely valuable insights into what their customers want, and how best to develop and market future releases, and modifications themselves lengthen the shelf life of the game (Arakji & Lang, 2007; Thiel & Lyle, 2019). Vendor acknowledgement of these benefits is demonstrated through the provision of modding tools (Lee et al., 2020).

The perceptions of modding held by vendors of each game differ considerably and generate a variety of reactions. When viewed as socially and culturally beneficial fan art which complements the game and is considered fair use of purchased property, it can be met with encouragement. However, when viewed as derivative works amounting to copyright infringement, it can be met with gaming bans, litigation and prosecution (Thiel & Lyle, 2019). Thus, there are inconsistencies in the social and legal acceptability of modding and the application of the law, where it exists (Kretzschmar & Stanfill, 2019).

The extant literature based on modding reflects disparity in perceptions held by both modding community 'outsiders' (e.g. gaming industry) and 'insiders' (i.e. modders; Thiel & Lyle, 2019). For example, opinions of modding from 'outsiders' focus on legal issues of ownership, financial benefit to gaming industries and capitalising on modifications for educational and economic purposes. Literature exploring the 'insider' perspective from modders themselves is a much less developed area (but see Thiel & Lyle, 2019) and focuses on motivations of modders and the social and collaborative aspects of online modding communities. Whereas 'outsiders' examine its economic value, to insiders, it is viewed as a non-profit activity aimed at enjoyment, creative expression and a sense of community and cooperation, although not entirely without opportunity for personal gain through social status or potential career development (Poor, 2014; Postigo, 2007; Sotamaa, 2010; Thiel & Lyle, 2019). With such strong emphasis on online communities within the limited literature on modding motivation from the perspectives of modders themselves and the pathway proposed (by 'outsiders') from modding forums to cybercrime, further exploration of this topic is warranted and much needed.

The Current Study

To address the underdeveloped area of 'insider' perspectives (Thiel & Lyle, 2019), this study aims to contribute to valuable insights into perceptions of modding held by gamers and modders themselves, as described in their own words and in their own territory. It is intended to provide an understanding of modding in context, and the extent to which it is encouraged (or discouraged). It will also examine the relationships that modders have with game vendors and the rules or laws that they represent, shedding light on associated security concerns and the NCA assertion that video game modification represents a 'gateway' to cybercrime.

Method

Data Used

Data were retrieved in 2019 from Reddit[2], a large discussion and aggregation website forming a social network system of topic-specific 'subreddit' forums. On average,

Reddit attracts over 430 million monthly active users and contains more than 130,000 subreddit communities (Reddit Inc, 2019). Data also included one post from a blog hosted on Nexus Mods[3] which was then discussed on Reddit.

Posts were taken from a variety of subreddits associated with video games including: (i) Grand Theft Auto Online (GTA Online); (ii) Fall Out 4; (iii) Star Wars: Battlefront; (iv) Avakin; (v) Skyrim; and (vi) Kenshi. Posts were originally published between the third of April and July 17, 2019. Data use was adherent with British Psychological Society (BPS) Ethics Guidelines for Internet-Mediated Research[4]; publicly available posts on Reddit were used and identifying information such as usernames were removed. Varying from stand-alone posts to those with up to 18 comments, in total, 19 English language threads were examined. There were 136 entries overall, with 19 initial posts and 117 comments.

Design and Procedure

The data were subjected to thematic analysis (TA) according to methods promoted by Braun and Clarke (2006). Following familiarisation with, and immersion in, the data, phrases were given initial codes based on content. These were then grouped together according to association following which themes and sub-themes emerged. A table comprising all themes (see Appendix 1) and a thematic map demonstrating relationships between themes were developed and findings discussed in relation to existing literature.

Results and Discussion

Analysis of Themes

Four main themes emerged with corresponding sub-themes. The main themes were as follows: (i) The Unfair Vendor; (ii) The Modder as an Antagonist; (iii) Depends on the Modder, and; (iv) Modding in Self-defence. Theme 1 relates to the perceived unfairness of companies who produce a specific game, own the rights, profit from its sale, and are responsible for the support of end-users. This theme contained three sub-themes (grind payoff; bans and lack of support, and; reliance on playbour to fix or improve the game). Theme 2 reflects the widely discussed perception of those who engage in video game modification as homogeneously bad, and the sub-themes cover a multitude of antisocial behaviours that modders are accused of. Main theme 3 describes the alternative view that modders are a heterogeneous population, demonstrating neutral, pro-, and antisocial behaviours, and addresses the contrast between this opinion and the view that all modders are the same. The final theme relates to the notion that modders themselves may fall victim to the behaviour of others and may use video game modification to protect themselves and retaliate against those who act antisocially. A table of all themes and sub-themes are available in Appendix 1.

Main Theme 1: The Unfair Vendor

Perceptions of unfairness, relating to game companies, emerged clearly from the data regarding both the justification and condemnation of modding. A seemingly unfair game vendor may contribute to the 'negation of offence' and 'sense of injustice' featured in Matza's (1964) theory describing a 'drift' in and out of criminal behaviours in juvenile delinquents. These components are associated with earlier neutralisation theory (see Sykes & Matza, 1957) which also included assigning the blame for actions to those who demonise it – to 'condemn the condemners'. Such neutralisation techniques allow users to commit deviant or unlawful acts and assuage any guilt felt by rationalising their actions as harmless or justifiable. To understand how internet users may commit both harmful and harmless acts online, Matza's (1964) drift theory has recently been applied in other digital settings such as newsgroups, chat rooms and social media, including the exacerbating impact of policing (Goldsmith & Brewer, 2015; Holt, Brewer, & Goldsmith, 2019). Through online subcultures, negation of offence and a sense of injustice, a belief forms that the law is irrelevant, unfair or applied inconsistently. This implies that the authorities and their rules have little legitimacy and need not be obeyed.

The inconsistent policing of online offences contributes to the perceived sense of injustice felt towards authorities which may increase online deviance by further neutralising any sense of wrongdoing (see Holt et al., 2019). Relevant to the research presented here, the relationship between vendor and modder demonstrates this inconsistency. Some vendors actively encourage modifications, while others punish those deemed guilty (even by association) and a single vendor may enforce their rules unpredictably. Perhaps most pertinent to any accusation of 'playbour' reliance, vendors have been urged to encourage modding to increase their game sales, despite copyright laws (Rosen, 2005). In addition, community-based modifications have been shown to significantly increase base product sales and add value to game, while 'official' vendor-developed modifications did not (Poretski & Arazy, 2017).

Sub-theme 1: Grind payoff. 'Grind' refers to the in-game labour performed by players which typically involves performing tasks or completing missions in return for experience points (increasing character strength or ability), in-game items and money. Games described in our data feature an 'in-game economy' which can be subverted using game modification to award money, items or upgrades to users without having to 'grind'. There were several attitudes presented in the data, with some participants respecting the grind payoff and enjoying the sense of achievement it provided. Others complained of unfair reward levels, necessitating far too much time and effort to progress in the game legitimately. This view appeared to be one of the main justifications for modding in relation to in-game financial gain. In other words, that the game required too much work to be enjoyable and that circumventing some of the grind allowed players to treat the game as entertainment as opposed to a chore:

"Modded money wouldn't be an issue if grinding were reasonably paced for this type of game" – H1

Some respondents blamed the vendor for punishing legitimate players unfairly and that this directly encouraged modding:

"I played fair, grinded my way to over $100M over 3 years, owned everything, didn't mod or dupe in anyway, and out of the blue [game vendor] ****ing banned me for 30 days and deleted both characters. Wouldn't tell me why. So any mod that dumps money on people are heroes." – M2

Sub-theme 2: Bans and lack of support. Also discussed by participants and related to perceptions of game vendors were bans and lack of support. The same user also commented that:

"Happened a year ago. Submitted nearly 40 support tickets (nearly 1 a day), one after the other as they kept getting closed with an autobot reply. Finally got someone who was a tier higher than the support staff who basically said they weren't reversing it and won't tell me what triggered the ban as that info would help cheaters. Their system is broken and they don't care" – M2

Other users agreed that there was a marked absence of support, even when directly contacted. This absence of support was balanced with a fear of vendor action, with players concerned about being banned for receiving modded cash without their consent;

"I said in chat that there was a modder. After, the modder starting giving me money so I left the game. When I came back I had 75 k and I deposited it. What do I do to not get banned." – P2

While some respondents attempted to reassure the player, others exaggerated the severity of vendor sanctions on those who receive modded cash for humorous effect. Some users pointed out that the reality of the situation was not far from scare-mongering and that the presence of modders tended to coincide with bans, even if the player did not modify themselves;

"The real issue these days is the looming presence of the ban policy progress resets. Bans tend to happen around cheaters. I don't want to lose everything. I don't have the time to play two accounts and I don't have the time to grind from zero." – P3

Sub-theme 3: Reliance on playbour to fix/improve the game. The data reflect an acknowledgement of the creative work that modding can entail, and this sub-theme refers to the perception that modders are fulfilling the responsibilities of the vendor in terms of fixing or improving the game.

"Just wanted to thank you all for allowing us to flesh out the game to our liking [...] your mods allow us to fix what otherwise may keep us from enjoying the game, or try a completely new experience to keep things fresh" – X2

"We still have to rely on modders for skins that the community has been requesting for over a year" – X3

Although these examples are perhaps the only statements relevant to this specific sub-theme, it forms an important juncture between the elements of an unfair vendor and the beneficial and creative potential of modification which is explored further in Main Theme 3.

Main Theme 2: The Modder as an Antagonist

Although data suggested that game developers are often at fault, most blame was attributed to modders, and a large proportion of the data contributed to this theme. Assertions were made regarding modding motivations and behaviours as purely malicious or antagonistic, and the terms 'cheaters' or 'hackers' were commonly used interchangeably to describe modders.

This theme may hold some relevance to the recent assertion that modding may be a pathway to committing cybercrime (CREST, 2015;NCA, 2017) as it is argued that antisocial online behaviour patterns emerge. Whilst violent or aggressive video games which promote immoral gameplay has links to offline immoral behaviours (e.g. Gabbiadini, Riva, Andrighetto, Volpato, & Bushman, 2014), our data refer to behaviours between players, rather than interactions with the game.

Sub-theme 1: Griefing or trolling. This sub-theme was characterised by comments regarding deliberate disruption and harm caused to players by modders for their own enjoyment. 'Griefing' and 'trolling' are terms commonly used to describe these behaviours, and in this dataset, they often refer to destruction or theft of other players' property, damage to characters and the overall game environment and prevention of gameplay by containment of characters, ejection of players and denial of entry to games:

"So many of them killing players or ruining business just for lolz" – Z1

"The vast majority of my experiences with ~~modders~~ [sic] cheating scumbags have been negative. For example, there's a griefing crew that actively seeks out known grinding crew tags, which they then instantly crash everyone's game out of that lobby. In times before I locked myself to solo, cheaters would intrude on every gunfight and ruin the fun. When the ban policy was changed during Bikers, pretty much every cheater I saw would spam their entire cheat menu on people trying to get people banned and reset." – P4

There are various motivations for griefing suggested by research, these include randomly targeting players for enjoyment and alleviation of boredom, to demonstrate

power or skill, discrimination against players based on gender, sexuality and race and retaliation or vigilantism (see Achterbosch, Miller, & Vamplew, 2017).

Sub-theme 2: Harassment and control. Modders were also accused of exercising their skills for more sinister purposes, including harassment, stalking and spying, self-exposure and control of other players. Respondents discussed perceptions of an invasion of privacy, the perversion of offending modders and attempts at manipulation. Reportedly, modifications are employed to afford a user invisibility, allowing them to observe players without their knowledge, and despite their efforts to maintain privacy:

> *"Something must be done about ghost modders. It feels like someone watching you in the shower"* – *X4*

> "…bragging to me about how he was stalking another player because she was trying to avoid him, and that if she didn't "straighten up," he would hack into her account and get her banned from the game"… "other guy I blocked because he was getting his jollies jumping from scene to scene with me and calling my attention to himself in PM so I'd glance at his profile to see him following me around in his tighty-whiteys"… "totally creeps me out to think he might have been able to spy on me anyway despite all my precautions" – E1

Through embodied cognition (Wilson, 2002), sensory experience affects our thinking and behaviours. By inhabiting an avatar and controlling their actions in an immersive and rich virtual world, players experience 'proxy embodiment'; a sense of *being* their avatar and 'prosthetic telepresence'; being in the video game (Klevjer, 2012). A long-standing avatar being victimised is comparable (although not equal) to a player being victimised, and our data reflect the emotional distress caused to players. The overzealous banning policies of gaming corporations ironically grant power to modders, who can not only non-consensually 'dump money' on players but also hack into their account to perform ban-worthy actions. As many players are so invested in the game, this represents an opportunity for control.

Online antisocial or harmful behaviours may also demonstrate concerning aspects of perpetration. This includes the as-yet-undetermined possibility that these acts without severe consequence become normalised behaviours and players progress to real-world offences against other individuals (Young, 2019). Conversely, allowing players to vicariously satisfy their deviant desires through media substitution may decrease offline crimes (Diamond and Uchiyama, 1999).

Sub-theme 3: Fear and avoidance. In attempts to mitigate the threat of the malicious modder and the effects (e.g. lag) that even benign modifications can have on games, players reported employing strategies to avoid modders entirely. These included private or 'friend-only' gameplay, leaving games where modders are present, deletion of friends and limitation of exposure through platform choice. The avoidance of

modders demonstrates the reputation they can carry, demonising anyone who modifies games as someone to be actively avoided;

> *"I play on Xbox where modding isn't a problem, and even there I NAT force empty lobbies immediately so I don't have to deal with idiots. PC online sounds like the freaking wild west." – W1*

> *"I've had to start making all my places friends only and ended up deleting 50 people i suspected of being modders" – V1*

This sub-theme not only featured fear and avoidance of mods which could affect the game but was closely linked to the actions of 'the unfair vendor' as many players feared and avoided modders simply because they feared being banned or punished themselves.

Main Theme 3: Depends on the Modder

This theme relates to the nature of the modification and modder. Whilst the previous theme focuses on the large body of data discussing modification use as negative and modders as antagonists, this theme concentrates on the important differences in behaviours, motivations and perception of modders.eve.

Sub-theme 1: The modder as a creator and problem-solver. The data acknowledged the beneficial potential of modding and the artistry of modders, including helping others, improving gameplay and customising games to the desires of players.

> *"Modders have made this game look absolutely breathtaking" – X5*

> *"I'm not in it to mess people up, I actually use my ill-gotten gains to help friends who are still working the grind" – S1*

Modders are most often motivated by a sense of artistic endeavor, with skill-development, community and social aspects also featuring highly in self-report measures (Poor, 2014; Postigo, 2007). While some of the creative applications of modding have been discussed with relation to fixing or improving the game under main theme 1, sub-theme 3, the sub-theme presented here also includes the way in which some modders were counted on by players to reverse damage caused by other, more malicious, modders:

> *"A lot of us have had this issue, another modder can help you out" – C1*

Sub-theme 2: Perceived differences or all the same. Relatedly, some participants in discussions described considerable differences between modders in terms of character and behaviour:

"Depends on the modder" – D1

"half of them give people money, the other half are griefers" – L1

Other participants claimed that modders were a homogeneous group of antagonists;

"I've never once seen a modder who wasn't a complete piece of sh*t" – Z2

Differences between modding groups and individuals are acknowledged as an underdeveloped area of study, but differences in modder motivations and activities have been evidenced in research (Sotamaa, 2010; Thiel & Lyle, 2019), despite the dominant perception observed in the current data that modders are a homogeneous group.

Sub-theme 3: Supportive community. Community is considered intrinsic to video game modification (Poor, 2014; Thiel & Lyle, 2019). The data presented here only described the intention to create a modding community and briefly mentioned an existing system, rather than providing a perspective from within such a community. One modder calls for assistance from another, needing '*someone to help me make the custom weapons*' (X10), asking them to help for free in the pursuit of creating modifications together. Another user suggests the creation of a '*full on cooperative community*' (S1), proposing an organised collaborative network to produce modifications more efficiently and foster social connections. The response to this suggestion is not as positive as the literature might have us predict, although this may be the result of the particular audience, who refer to existing discords and an assumption that collaborative groups will form without any deliberate intervention.

In addition to modding, the importance of sub-culture in hacking more generally is established, with online communities providing information, encouragement, status and collaboration (Holt, 2019b). Hacking communities provide 'guild-like social and learning structures' (Steinmetz, 2015, p. 130), celebrating challenge and the acquisition of ability, skill and experience, which dictate social standing (Steinmetz, 2015). The lowest rank within these communities are the 'script kiddies'; those who often lack any real technical knowledge and copy existing code scripts developed by more skilled individuals (hackers or 'elites'), often for selfish or destructive ends (Mollick, 2005; Nissenbaum, 2004). One contributor asserts that modders are, '*nothing more than script kiddies*' (B1), further demonstrating the modder's position as part of the hacker world.

Peer association has been shown to be the major predictor of each type of cybercrime studied with adolescent samples (Holt et al., 2012; Lee, 2018). The importance of peer association and subculture in the development or inhibition of antisocial behaviours is well documented in literature and features in Matza's (1964)

theory of drift into delinquency. Traditional and virtual peer association with those who model cyber-offending behaviours is found to be even more influential on a participant's predicted cyber-offending than prior computer knowledge or self-control (Nodeland and Morris, 2020).

Sub-theme 4: Reputation. Status and reputation are important in video game and modding communities, and one thread in the data was started by a modder explicitly asking other users to explain the reasons behind the negative reputation of modders generally. Another user complained about baseless rumours and jealousy damaging his reputation and that of his work:

> *"complaining about bugs on my mods that are caused by their own incapacity of install mods" – M1*

While some users attempted to comfort the user and show gratitude for their work, others were less sympathetic and even stated that they would not consider using these modifications based on his reputation:

> *"I don't think it's very appropriate to throw slurs and insults around at those that disagree with you" – X11*
> *"I just don't have time to vet every single one of his mods before installing and, well, with his justly earned reputation, I feel like I have to" – X12*

Reputation is important to modders, for whom motivations include proving one's self to peers rather than any financial reward (NCA, 2017). It was previously found by Poor (2014) that the majority of modders in their sample reported being proud of their modding work and that they produce modifications to improve the game for themselves and others rather than in the hope to secure work as a result. Thus, it stands to reason that if reputation is important to a modder, they may act in defence of it, with one user commenting:

> *"I s***talked this guy for abusing a jittermod, and then he messaged me saying let me show u my real mod and now I can't play" – X13*

Main Theme 4: Modding in Self-defence

Although not the most prevalent theme in our data, modders are victimised in ways other than attacks on reputation, including being griefed and harassed themselves. In fact, the data suggests that being a modder both attracts, and defends from, these unwelcome behaviours.

Sub-theme 1: Being harassed for money. Modders reported being harassed for their ability to assist players, with demands being made of them. This presents a security

risk in itself as modding has applications in social engineering by means of persuading other users to disclose personal, account and financial information, under the pretence of offering help, cheats and virtual items (Parizi et al., 2019). Furthermore, this harassment impeded modders' enjoyment of the game and provoked retaliatory action:

> *"People who beg for money are literally everywhere. If you're one of those innocent modders, no one even gives a sh*t to have fun, you just get swarmed and have 5-10 guys shoot at you spamming in chat 'money pls I'm poor'. Feels good to crash their game, or worse" – I2*

The commodification of skilled computer users and their illicit abilities is not unique to modding or to playbour. While many hacking tools are available as an open-source code, a 'crimeware-as-a-service' business model monetises what some consider a hobby and brings technically sophisticated or automated criminal processes to anyone with access and funds, whatever their computer knowledge (Neumann, 2017; Sood & Enbody, 2013).

In the data analysed here, no evidence suggested that modifications were used for financial gain, but the production and use of 'off the shelf' style code used by modding 'script kiddies' reflects the way in which resources on the internet have enabled users their first foray into hacking through community and open-source code. The demanding harassment from other players seems to demonstrate the lack of respect for these modifications and those who use them.

Sub-theme 2: Protection from other players/modders. Modifications being used as retaliation or defence were discussed further in relation to griefing or being kicked out of games for either unfair or legitimate reasons:

> *"now I can actually defend myself better" – J2*
> *"I tried to report him and as soon as I clicked send I was crashed out of the lobby" – T2*

Modding occurs more often in single-player games than multiplayer, possibly because game producers wish to safeguard the gaming experience of their paying customers and take greater steps to prevent modding in games where it would affect players other than the modder (Lee et al., 2020). Regardless of the motivation to mod, whether game expansion or alteration, cheating or griefing, many consider modding multiplayer games to be of benefit to nobody (Kretschmar and Stanfill, 2019). It consequently stands to reason that those with the ability to mod and protect themselves from the negative effects of other players and modders would do so, potentially exacerbating and escalating the situation.

It therefore seems that modding has applications to gaming beyond improving, expanding or cheating the game and can be utilised as both an offensive and defensive tool against other players.

General Discussion

Despite security concerns, modding has the potential to benefit the video game and its producers considerably by adding to games to fix or expand them, and, through popularity of certain modifications, by providing a form of market research. The data presented in this study, however, indicate that the gaming corporation discussed most extensively condemned modding in all forms and enforced these rules severely. While existing literature has encouraged game producers to increase their tolerance of modifications to maximise profits and improve player experience, this has apparently not yet translated into policy. One reason may be the lack of distinction between 'modders' and 'cheaters', terms used interchangeably in some of the data, but which carry very different implications, with 'cheats' representing only a small proportion of mods (Lee et al., 2020).

Anecdotal evidence suggests that the difference between modders in terms of motivation and behaviour is considered very important by those who play and use modifications. However, those who create modifications for artistic and game-expansive or corrective purposes do not associate or identify with those who modify for personal gain or griefing reasons. This mirrors the distinctions found between hackers in later stages of the proposed pathway to cybercrime. The literature demonstrates the difference between black-, white- and grey-hat hackers defined by varying motivations to attain different goals, but these classes of hacker also exhibit differing psychological profiles and factors attracting them to their respective hacking activities (Gaia et al., 2020). Recent literature suggests that more modern hackers may be classified more accurately according to a combination of four categories: (i) their expertise; (ii) their values and moral principles; (iii) the modus operandi and (iv) the tools and information they have at their disposal (Jaquet-Chiffelle & Loi, 2020).

While some participants in the current study noted a difference between modders, demonstrated by their behaviours, and some modders defended their actions and motivations as purely benevolent as opposed to self-serving, the main vendor in the data apparently made no such distinction. Any player associated with modding was subject to strict measures, yet this lacked consistency in execution. The inconsistent application of seemingly draconian rules towards modding appeared to foster negative feeling towards the vendors themselves, but, more prominently, towards modders. As well as alienating their customers, corporate use of sanctions such as bans without satisfactory reason or explanation also created friction between modders and other players who recognised that the mere presence of modders increased the chance of these events and thus demonised and ostracised those who modified games. Even benevolent and creative modifications can attract the attention of corporations and their punishments when the vendor recognises no distinction between modding and cheating. The risk of losing accounts and characters that may represent a player's online identity, their ability to play and

sometimes years of hard work, is enough to cause players to invest time and energy into avoiding virtual proximity to modders.

Modding itself also changes the game for players. They are avoided as a direct result of antagonistic behaviours, leading to generalisations that all modders are griefers or trolls. Modders who alter in-game economies change the pace and sense of achievement provided by gameplay, but this is often supported by players who criticise the increasing labour intensity of games, supposedly intended to coerce further revenue streams for the vendor through downloadable content. The presence of modifications, even aimed at improving gaming experiences, can overwhelm processing capabilities, causing the online gaming sessions and even personal computers to crash. In the avoidance of modders, players' experience of the game is also altered – they may delete friends they suspect might be modders, play alone, play less or play on consoles.

Whilst presenting an overall negative view of modding, the data discussed in this study demonstrate the variety of relationships that exist between gaming corporations, players and modders. Game vendors may have different relationships with players and modders based on their attitude towards modding and the level of grind payoff in games. Non-modding players may insult and ostracise modders, may harass them and demand in-game money or other modding work, and damage their reputation by criticising that work. Alternatively, players may encourage, show gratitude and generally support modders and their contributions, blaming corporations for failing customers.

From the data analysed in this study, modding simply appears far too diverse to consider unspecified modding a reliable gateway to equally unspecified cyber-crime. It is possible that by learning to modify and hack, those with malicious intent may harass, 'grief' and steal through their modding, and that *this* may be an indicator of future malicious cybercrime. Demonising modders as a homogeneous group and condemning any creative and collaborative outlets by banning and shunning modders may even develop that malicious intent in otherwise benign modders through rejection, alienation and perceived injustice. Similarly, benevolent, creative and vigilante modders may later become engaged in more altruistic online activities of varying legality such as teaching coding to others, innocent community projects or hacktivism. The data itself are not longitudinal, and it is therefore difficult to conclude that modding predicts any future activity whatsoever, but the artistic, social and collaborative nature of many mods and modding communities should not be overlooked due to an alleged general relationship to cybercrime.

Limitations of Study

As in other relevant studies (e.g. Poor, 2014), cohorts may be community-biased as samples were drawn from a discussion website and from topic-specific forums which are considered communities themselves. As such, they may also influence the data

and the Reddit 'ecosystem' presents a variety of social norms. Some are universal across Reddit, others are specific to certain subreddits. Moreover, some are set down in published rules and some are enforced with consistency as an 'unwritten rule' by moderators (Chandrasekharan et al., 2018).

As contributors to online forums are generally only identifiable by username, researchers cannot know how representative participants are of the wider gamer or modder population in terms of demographics. The age and nature of specific threads analysed also presents a snapshot concentrating on specific themes, games and vendors, while there may be greater breadth of data elsewhere – Reddit alone contains over 130,000 active subreddit communities (Reddit Inc., 2019). The game discussed most dominantly (GTA Online) was an online-only game where anti-social behaviour towards characters, including those operated by other players, is encouraged. Both factors may have also influenced the data. By encouraging competition, the game encourages those capable to develop advantages over other players. Further, modifications in online-only multiplayer games affect the gameplay for players other than the modder, and this may be why all modifications were forbidden by the vendor to keep the game true to design and fully functional, to improve player experience and protect reputation.

While the data are sourced from forums that arguably represent communities in themselves, Reddit posts are publicly available, and the hugely popular site does not form a community or subculture with any real exclusivity or secrecy. Modders may, therefore, prefer to use their own forums to discuss their activity and collaborate whilst protecting their identities, and free from judgement or insult by anti-modding players. Sites such as Nexus Mods provide such a space and present pro-modding sentiment, as opposed to the predominantly anti-modding sentiment exhibited in the Reddit data of this study. A broader sample across a greater number of games with both pro- and anti-modding forum populations may produce more balanced results.

Online content travels across the internet, and Reddit is often used as a setting for breakaway conversation threads, from discussions started on other platforms and websites. Further, there are diverse modes of platformed sociality – people interact differently on different websites and social networks based on topic specificity, moderation style, technical and multimedia affordances, demographics and social culture. Any of these venues will also experience the participation divide; the presence of 'lurkers' on social media platforms who consume content but do not make significant visible contributions to it. These points combine to suggest the data used here is unlikely to provide a full picture of the modding scene.

Conclusions

The analysis presented in this study suggests that there is a divide between modding and non-modding players, with hostility and fear felt towards modders. Some contributors recognised that modders are not a homogeneous group and some spoke in support of modders and their work, but most participants generalised the modding population and demonstrated negative sentiment towards them. The game vendors discussed also failed to discriminate between different types of modifications, and any association with modded material risked severe sanctions, even as a non-modding player. This vendor activity seems directly related to player perceptions of modders and mods, demonising them in the eyes of players.

There are some comparisons drawn in the discussion of results between modding and hacking more generally, particularly relating to antisocial behaviours, negation of offence, a sense of injustice from authority and retaliation against others. That said, nowhere in the data did a participant allude to cybercrime or illegal activity outside of video game modification, and it is therefore difficult to draw any reliable conclusion on the legitimacy of the NCA (2017) claim that modding is a crucial step on the pathway to cybercrime. Different modders may troll, grief or otherwise antagonise other players, or may use their abilities to help and support them, requesting and taking mod suggestions, and fixing, improving or tailoring the game for players. This does not appear consistent with a single pathway proposed from modding to cybercrime, with no specificity as to the nature of either. Rather, it may be the case that many cybercriminals were formerly modders, but also that very few modders become cybercriminals.

Video game modification has creative and socially beneficial applications, with contributors to the data discussing their benevolent intentions to simply improve the gaming experience for others. As this population is ostracised, ridiculed and even harassed; however, it appears that the temptation to use these abilities for antisocial purposes may increase. It is therefore plausible that by intervening at the point of modding, by allowing or encouraging only modifications which expand, repair or add creative or artistic material complementary to games, modders, players and vendors would all benefit. Speculatively, if this point does represent the first illegal step on a pathway to cybercrime, decriminalising and destigmatising the activity may redirect a modder's efforts to more prosocial ends and prevent further escalation into cybercrime.

Appendix 1 *Table of Themes.*

Main Themes	Sub-themes	Specific Codes	Examples
The Unfair Vendor	Grind payoff	Grind pace, hard work, value, achievement, modding ruins the game, time, fun	"Modded money wouldn't be an issue if grinding were reasonably paced for this type of game", "modders spoil the in game economy", "repetitive grinding and rewards that are most of the time not worth it"
	Bans and lack of support	Fear of corporation, unfair, absent corporation, bans	"Looming presence of the ban policy", "machine generated answers", "their system is broken and they don't care", "out of the blue…banned me for 30 days and deleted both characters. Wouldn't tell me why", "they should fix the hugging glitch"
	Relying on playbour to fix/improve game	Playbour	"We still have to rely on modders for skins that the community has been requesting for over a year", "your mods allow us to fix what otherwise may keep us from enjoying the game"

(continued)

Appendix I (continued)

Main Themes	Sub-themes	Specific Codes	Examples
The Modder as an Antagonist	Griefing/trolling	Grief, malicious mod, ruin the fun, damage, cheating	"Modders are sad, infantile jerks", "being endlessly exploded, put in a cage", "cheating scumbags", "modder decided to teleport to my vehicle cargo in god mode and blew it up because he felt like it", "there's a griefing crew that actively seeks out known grinding crew tags"
	Harassment and control	Invasion of privacy, perverse, (no) control, invisible, stalking, reporting, creepy	"He was stalking another player because she was trying to avoid him, and that is she didn't 'straighten up' he would hack into her account and get her banned", "feels like someone watching you in the shower", "totally creeps me out to think he might have been able to spy on me anyway despite all my precautions", "can also report people…used as a weapon and not for reporting actual negative activity", "those disgusting pervert"
	Fear and avoidance	Blocking, fear, distrust, avoiding modders	"I play on xbox where modding isn't a problem", "deleted 50 people I suspected of being modders", "modder starting giving me money so I left the game"

(continued)

Appendix 1 (continued)

Main Themes	Sub-themes	Specific Codes	Examples
Depends on the Modder	Modder as a creator and problem-solver	Supporting other players, beneficial mods, respect	"Modders have made this game look absolutely breathtaking", "another modder can help you out", "I am a new modder and I am taking suggestions", "I'm not in it to mess people up, I actually use my ill-gotten gains to help friends who are still working the grind", "making the experience for his/her peers enjoyable", "i need to make my older works match the quality and commitment of the new ones, as a sign of respect to all of you"
	Perceived differences or homogeneity	All the same, depends on the modder	"Depends on the modder", "only good modder is a dead one", "I've run into nice modders more than mean ones that ruin the game", "most modders I encounter are trolls", "I've never once seen a modder who wasn't a complete piece of sh*t", "half of them give people money, the other half are griefers", "modders are good. Scumbag cheaters like what OP is talking about aren't"
	Modder community	Working together	"Someone to help me make the custom weapons", "full on cooperative community", "create such a group and promote teamwork right off the bat, before we have 1000s of projects done by one person each, with 500 of them giving up because it's too much for one person"
	Reputation	Unfair, misinformation, jealousy	"Complaining about bugs on my mods that are caused by their own incapacity of install mods", "throw slurs and insults around at those that disagree with you", "I just don't have time to vet every single one of his mods before installing and, well, with his justly earned reputation, I feel like I have to"

(continued)

Appendix 1 (continued)

Main Themes	Sub-themes	Specific Codes	Examples
Modding in Self-defence	Being harassed for money	Harassed for money	"You just get swarmed and have 5-10 guys shoot at you spamming in chat 'money pls I'm poor'. Feels good to crash their game, or worse", "people get on and beg for money"
	Protection from other players/modders	Kicked, defend	"Now I can actually defend myself better", "almost every menu has protection from that so we don't have to worry", "I tried to report him and as soon as I clicked send I was crashed out of the lobby"

Declaration of Conflicting Interests

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Notes

1. CREST is known almost exclusively by its acronym (see https://www.crest-approved.org/)
2. http://www.reddit.com
3. Nexus Mods is a large community website for the hosting and distribution of PC game modifications, it has 21.9 million members and over four billion modification downloads for over 1000 games to date. http://www.nexusmods.com/
4. http://www.bps.org.uk/news-and-policy/ethics-guidelines-internet-mediated-research-2017

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