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Online Pornography

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Pornography has played a crucial, albeit often neglected role in the development of Web solutions and Web economy since their very earliest days. The enterprises of online gaming and shopping began to pick up towards the end of the 1990s, whereas pornography remained, virtually from the launch of the first graphic Web browsers, one of the few forms of content that users were consistently willing to pay for (Lane, 2001: xiii; Perdue, 2002). Safe credit card processing systems, streaming video technologies, hosting services, promotional design practices such as banner advertisements, mouse-trapping, and pop-ups were first developed for and applied on porn sites (Bennett, 2001; Lane, 2001: 70; Johnson, 2010; McNair, 2013: 27–9). Pornography has often been heralded as a 'killer app' as a form of content that quickly migrates to new media platforms with commercial success: this was certainly the case with the Web in the 1990s.

Despite both online pornography's remarkable perennial popularity among consumers and the vocal public concerns that it tends to evoke, academic studies concerning it – and particularly ones focusing on commercial platforms – remained few up until the 2010s. The rare in-depth studies that did exist focused almost exclusively on US contexts (Lane, 2001), on alternative and independent pornographies (Jacobs, 2007), or both (Magnet, 2007). It is fair to state that Web porn long remained one of the most under-studied areas in Internet research. Significant knowledge gaps continue to exist when it comes to the production, distribution, and consumption of Web pornography in a historical perspective.

More porn is available on the Web than ever to date and massively popular video aggregator sites modelled after YouTube (est. 2005) sport multiple billion annual visits. This development seems to resonate with the broad diagnoses on the pornification of media culture, according to which pornographic aesthetics have grown ubiquitous enough to infiltrate diverse visual media practices from

advertising to the circulation of nude selfies. At the same time, pornography's role and position is currently crucially different than in the Web cultures of the 1990s. Despite its perennial popularity, the role of porn as a driving force of dot.com enterprise and technical innovation has clearly passed, as has the period when one could create quick profits by simply setting up an adult site. Pornographic content is actively weeded out from the targeted advertising and linked content on social media sites such as Facebook, Instagram, and Pinterest. As tech journalist Cade Metz notes,

> with the rising power of companies like Apple and Google and Facebook, the adult industry doesn't drive new technology. In many respects, it doesn't even have access to new technology. The big tech companies behind the big platforms control not only the gateway services (the iPhone app store, Google Search, the Facebook social network) but the gateway devices (the iPhone, Android phones, Google Chromecast, the Amazon Fire TV, the Oculus Rift virtual reality headset). And for the most part, they've shut porn out. (Metz, 2015)

All this results in a complex nexus where the abundant accessibility and diversity of Web porn meets its limited visibility on social media and app markets, insufficient knowledge of the working practices and economies of pornography, and public discourses of concern on the pornification of culture. Exploring these connections and disconnections, this chapter first maps out the development of Web pornography from the home-grown enterprises of the early 1990s to the increasing visibility of sexual subcultures and the presence of established companies on online platforms. It then examines the shifts that have occurred in porn production with the ubiquity of proam (a.k.a. professional amateur), reality, and amateur productions, as well as the centralization of porn distribution on video aggregator sites. The chapter explains how Web technologies and the centrality of search functions and metadata in particular have affected the development and uses of pornographic content, what kinds of sexual taste cultures have emerged, how the

public visibility of pornography has been altered in the course of its online distribution, and how this connects to the policing of online content in national-level media regulation and policy, as well as in terms of the moderation carried out by online platforms. All this necessitates understanding the production of Web pornography, as well as the notion of the porn industry that it connects to, as characterized by inner distinctions and constant fragmentation on the one hand, and by the increasing centralization of ownership and distribution, on the other.

PORN AND THE WEB: A PERFECT MATCH?

Graphic Web browsers such as Mosaic (1993), Netscape Navigator (1994), and Microsoft Explorer (1995) made it possible to embed image files and, gradually, animated GIFs and video clips into the interface. Multimodal interface design possibilities were understandably lucrative for the distribution of pornography, which relies heavily on visual and audiovisual material, despite the continuing popularity of literary porn, especially in its user-generated forms (Lane, 2001: 69–70; Paasonen, 2010a). At the time, the market of porn was dominated by VHS, DVD, and magazine releases sold in special shops and newsagents, as well as through mail order.

Pornography was readily and plentifully available on Usenet and bulletin board systems (BBSs) alike as binary files, and it soon migrated to Web platforms. Initially, the most visible and successful Web porn enterprises were small-scale ventures that occasionally had the same people performing in front of the camera as writing the HTML. Some – such as the amateur star 'Wifey' of Wife's World – had established their reputation on Usenet, while others – such as Danni Ashe, the owner and star of Danni.com – also had modelling and stripping experience before

starting to run their own sites (Perdue, 2002: 27, 156–8; Mash, 2004; Paasonen, 2011: 35, 93–5). Large, established video production studios and print publishers, from Playboy to Penthouse, Hustler, Vivid, and Private, did not similarly pioneer in establishing their Web presence, coin innovative online services, or by any means invest extensively in them (Perdue, 2002: 63). These companies advertised their productions online but were relatively slow in extending their business models to Web distribution. The dwindling markets of DVD and magazine retail later considerably hurt such established brands. Playboy temporarily dropped sexually explicit images in 2016 in response to feedback from its younger readers, while both Hustler and Penthouse have struggled to keep up their print production.

Code remained simple and easily manageable during the first years of the Web. Before the development of Web professions and design solutions such as cascading stylesheets (CSS) and JavaScript, it took relatively little skill to set up and run a site. Since the professional standards of Web design were yet to be established (Kotamraju, 1999), the playground was notably level for both aspiring independent pornographers and multi-million-dollar companies trading in porn superstars. Consequently, 1990s Web porn was heterogeneous in terms of its agents, economies, aesthetics, and agendas. Porn was made available in limited 'free tour' sections of pay sites, as pirated content, as thumbnail teasers on link sites, as free content, and as materials protected by pay walls. US products dominated the markets of Web porn, yet low distribution costs, coupled with the increasing affordability of digital cameras and the gradual demographic diversification of Internet users in terms of nationality, age, and ethnicity, broadened the base of porn production. Combined with the increased circulation and accumulation of pre-digital pornographies on online platforms and the rise in the distribution of amateur content, this resulted in the clear expansion of available pornographies, from sites specializing in erotica writing to queer experimental porn and glossy commercial pornography targeted at straight male audiences.

While Web hosting was never exactly free, especially when involving larger user bases and audiovisual content necessitating more bandwidth, online distribution was particularly tempting for independent entrepreneurs that had little or no resources to engage in DVD or print production. Online distribution was an attractive option for porn producers on a number of levels. First of all, it afforded a potentially global audience unlimited by restrictions in local regulation, store hours, and access to retail opportunities. Content not allowed for distribution in one country could easily be placed on a server outside its borders, which eroded the viability of established systems of media regulation based on pre-screening and classification developed for the distribution of film, video, and print materials. Furthermore, by doing away with theatres, mail-order companies, and stores that have traditionally gained considerably from selling porn, Web platforms gradually redefined the ways in which porn producers reach consumers. Meanwhile, other middlemen profiting from the traffic, such as credit card companies, continued to thrive.

For consumers, online platforms drastically changed the accessibility and uses of pornography. Since porn use no longer necessitated the acquisition of material commodities, it was unnecessary to visit a specialty shop or indeed to move anywhere from one's computer. Despite the factual tracking capacities inbuilt in IP addresses and cookies, online porn consumption allowed for an unprecedented impression of anonymity. The range of available Web pornographies very soon grew, allowing for a degree of option unavailable even in the largest of porn retail stores. Given the volume of freely accessible teasers and pirated files, it was not even necessary to pay for the content downloaded beyond the connectivity charges themselves. The costs of dial-up connections were

generally calculated either by second or by the bytes downloaded, and access to free pornography was therefore not all free.

AMATEURS, PROAMS, AND INDIE PRODUCERS

The spread of digital cameras, camcorders, and smart phones provided both amateurs and semi-professional producers with inexpensive tools for making their own pornography. While amateurs have produced their own explicit content in virtually all media known to man, it was not easy to circulate on VHS tapes or as printed matter beyond one's immediate social circles (Esch and Mayer, 2007: 101). People shared their own digital content in newsgroups and through IRC (Internet Relay Chat), which allowed for exchanges between people with similar sexual palates (Slater, 1998; Dery, 2007). Amateur Web porn was successful throughout the 1990s (e.g. Lane, 2001: 209–12), yet its visibility and popularity peaked in the mid 2000s as porn distribution began to shift to platforms emulating the operating principles of social media sites. The rise in amateur porn therefore runs parallel to the overall rise in user-generated content crucial to the operating principles and business models of Web 2.0 and social media (Dijck, 2013; Marwick, 2013: 21–66; Jarrett, 2015: 7–10).

The central promise and attraction of amateur porn involves its unpolished look of realness and authenticity, which is seen to contrast with the stylized scenarios and trimmed bodies of commercial productions (e.g. Hardy, 2009; Hilderbrand, 2009: 66–7; Paasonen, 2010b). Uploaded on both general-interest video aggregator sites and platforms specialized in amateur content, user-generated clips have been shared for free, in return for gift vouchers and fixed fees. The performers of the most popular – and hence also the most visible – amateur videos have generally conformed to the body norms of (female) youth,

whiteness, and thinness. The acts, gestures, and positions performed have similarly followed the choreographies of commercial porn, which are used as templates in making amateur clips look like pornography (Doorn, 2010). At the same time, videos need to have a domestic feel in order to come across as amateur productions. Amateur porn production therefore involves particular forms of gendered domestic labour even as it is presented as no work at all (Hofer, 2014: 335, 343–4). Their aesthetic of homey intimacy is connected to the assumed ethics of production, according to which amateur content is voluntarily produced for the sake of pleasure rather than for profit, and it therefore remains detached from the oppressive work conditions of the porn industry (Paasonen, 2010b: 1302–4). Images and videos leaked, stolen, and otherwise distributed without permission on revenge porn sites have a different sort of appeal, one geared towards slut shaming (Stroud, 2014). For their part, celebrity sex tapes have been both leaked and knowingly produced as the means of building one's star image (e.g. Esch and Mayer, 2007; Hilderbrand, 2009: 68–71; Cruz, 2011).

The rise in amateur pornography has been a key trend of Web porn for over a decade. The appeal of immediacy and realness is crucial to the genre of pornography, which has promised to convey sexual acts through the lens of the camera as they unfold ever since the advent of film (Williams, 1989). Gonzo porn rose to popularity in the 1990s with its seemingly improvised scenes, non-professional performers, and subjective camera shots (Maina and Zecca, 2016; Stella, 2016). On Web platforms, the concept of gonzo gave way to reality porn, such as the sites run by the Miami-based Reality Kings. Shot on streets and in cars, motels, and private residencies, reality porn makes use of proam performers and the constant, renewable stream of new young talent. Inexpensive to produce, reality porn balances amateur codes of authenticity with repetitive thematic and narrative patterns: the standard

plot of Backroom Casting Couch, for example, involves ingénue actresses performing sexual favours in the hope of landing a part, whereas, in Bait Bus, young women are assumedly lured to have sex with the promise of money they are never to receive.

Parallel to the staged and rehearsed authenticity of reality sites and the avalanche of amateur porn, Web porn has afforded a broader public visibility to a range of sexual niches and subcultures while also commodifying them in different degrees. Be it a question of preferences concerning body size, age, ethnicity, hirsuteness or the lack thereof; tastes in role-play, bondage or discipline; fetishes involving uniforms, hiking boots, balloons, or fake fur; interest in the sexual frolicking of cartoon characters or Hollywood stars, Web platforms cater to virtually any fantasy scenarios and participatory possibilities. This has contributed to the ever clearer articulation of sexual taste cultures in the realm of pornography.

Established in 2001, Suicide Girls became the best-known soft-core alt porn site, with its emphasis on female sexual agency and subcultural body styles. The models featured tattoos, piercings, and punk and Goth coiffures, and users were invited as members to read their blogs and engage with them: in this sense, Suicide Girls framed membership as a lifestyle choice (Attwood, 2007; Magnet, 2007). The adult performer and producer Joanna Angel established Burning Angel in 2002 as the more sexually explicit alt porn site. In their applications of subcultural capital and sexual titillation, alt porn became, in Feona Attwood's (2007: 449–50) phrasing, representative of 'new sex taste cultures', which defined 'themselves through a variety of oppositions to mainstream culture – and especially mainstream porn – as creative, vibrant, classy, intelligent, glamorous, erotic, radical, varied, original, unique, exceptional and sincere'.

While alt and indie porn have been argued to challenge the porn industry in terms of their ethics of production and their

community feel, they have, seemingly paradoxically, equally been identified as 'the research and development arm of the porn industry' (Cramer and Home, 2007: 165). In order to evoke the interest of users with novelties and specialities, so-called mainstream porn companies have long drawn on sexual subcultures and niche pornographies for inspiration, hence also familiarizing them in the process (McNair, 2002: 206; Dery, 2007).

All kinds of porn sites have turned towards alt porn when seeking out new audiences, diverse content, and novel principles of operation (Attwood, 2007: 452). Tattooed and pierced female models have long ceased to be exceptional in so-called mainstream productions – quite the contrary – while community features have grown increasingly central to how users are invited to engage with sites, comment on content, grade it, and upload material themselves.

Some scholars have identified the transformations fuelled by digital production and online distribution as entailing a rupture in the history of pornography. In the mid 2000s, these perspectives were united under the rubric of netporn, defined as pornographies particular to online platforms and networks (Jacobs, 2007; Jacobs et al., 2007). Netporn referred to the blurred boundaries of porn producers and consumers, and the rise in alternative body aesthetics and amateur, sex activist, and art projects, as well as the slipperiness of the very notion of porn caused by the proliferation of queer, independent, and alternative content. It was contrasted with 'porn on the Net', namely the recycling of the same old pornographic images and videos online (Shah, 2007). The notion of netporn, as outlined in the two Netporn conferences held in Amsterdam in 2005 and 2007, a listserv, and an edited reader (2007), was premised on technological, aesthetic, ethical, political, and economic particularity. It helped to mark out the increasing visibility of non-normative sexual palates and minoritarian sexual cultures, yet its binary premises and dynamics were of less assistance in

mapping out the transformations that the production, distribution, consumption, and range of pornography were undergoing (Paasonen, 2010b). Furthermore, it was the Web, and not the Net more generally, that had become the norm in porn distribution on a global scale. While scholarly interest towards alternative and independent pornographies remains, the vocabulary of netporn is currently in scarce use.

METADATA, SEARCHABILITY, AND PORN TAXONOMIES

Pornographic images distributed in newsgroups, BBSs, IRC, or Gopher were indexed through file names and categories. In contrast, the searchability of visual and audio-visual Web content necessitated a much more clear and complex textual marking out of subcategories, terms, names, titles, acts, and preferences (Chun, 2006: 106). Such contextual metadata was necessary for the functionality of search engines but equally for the search functions of porn sites themselves, as they grew in size to host hundreds of thousands of files. Porn images and videos are indexed on the basis of factors such as date, file size and length, subgenre, popularity of content, number of views, body types, national origins, performers, production studios, and the acts performed. Metadata remains crucial to the diverse categorizations and tagging functions of aggregator sites appropriating the participatory models of social media. Dictated by the necessities of information architecture, metadata has helped to render the inner distinctions within the genre of pornography more manifest than ever.

Print, VHS, and DVD porn were all broadly categorized through parameters such as straight or gay, as being focused on specific acts or scenarios (e.g. anal sex, BDSM), through their stars, and production styles such as amateur and gonzo pornography.

Such distinctions provided users with broad options to navigate in between. The range and plethora of tagging practices marks the latest stage in the development that has, throughout the history of Web porn, rendered the variety of body styles, roles and positions, niches, and fetishes increasingly articulate and therefore also more recognizable. This has also involved the familiarization – if not precisely the domestication – of fringe pornographies that were previously deemed too marginal for mainstream consumption.

This has perhaps most obviously been the case with Japanese pornographic anime, hentai, which routinely depicts penetrative sex between humans, demons, and monsters, notably often in scenarios of non-consensual domination and submission. Hentai remained a specialty niche too bizarre for DVD appeal distribution in the 1990s, only to enter the menus of all kinds of porn Web sites during the following decade (Dahlqvist and Vigilant, 2004). The popularity of hentai has since only increased in connection with both the rise of cartoon porn and Japanese game porn fandom. Another equally visible example involves transgender porn targeted at heterosexual male consumers. While so-called 'she-male' and 'chicks with dicks' pornography – a field distinct from transgender porn produced and consumed within queer communities – had long been produced in Brazil in particular, the subgenre was more thoroughly commodified and modified on Web platforms as it grew into a staple element of the palette of online porn in the early 2000s (Paasonen, 2011: 147–50). The relatively early entry of both transgender porn and hentai into the interfaces of so-called mainstream porn speaks of the fragmentation and diversification of online pornography in ways that call into question the veracity of the very notion of the mainstream.

The promise of the Web was, since the mid 1990s, one of abundant and diverse pornography that only waited to be found. In practice, finding it was not, however, always easy. Content remained fragmented across the

Web, occasionally brought together as Web rings pointing users from one affiliated site to another, and as listed on directory sites that were the default means of finding content before search engines were in common use. Persian Kitty's Adult Links was one of the best-known link sites facilitating access to free porn images. Established by Beth Mansfield, 'a Tacoma, Washington homemaker and mother of two' (Lane, 2001: 89) in 1995, Persian Kitty was a simple directory page with links to featured sites that paid for advertising space and an alphabetical listing of sites with information on the number of images that each of them contained. By 1998, Persian Kitty attracted over half a million visitors per day and made tens of thousands in monthly profit. During a period when finding pornography, and free porn in particular, was cumbersome, Persian Kitty grew into one of the prime portals for accessing it (Lane, 2001: 190–2).

The earliest version of Persian Kitty available through the Internet Archive (archive.org) is from November 26, 1996. Its featured content includes the site's sponsor, Danni's Hard Drive, as well as Amateur Hardcore with 'A quarter-million fast downloading *hardcore* amateur pix and totally raw movie clips, in AVI, Quicktime & Mpeg. *Unlimited* downloads! *Instant* Access! And it's all Keyword-searchable! Thumbnails and descriptions, too! Raunchy! Nasty! Extreme Hardcore!' The description of the alphabetically listed link sites remained much more straightforward, as this excerpt illustrates:

HENTAI MANGA ANIME PAGE – 50 hentai pix
HERMITAGE – 20 Asian pix
HEUY'S PAGE – 12 pix
HOLLYWOOD HILLS HOOCHIES – 25 babe pix, no preview
HONNEAMISE ASIANS – 20 pix, no preview
HORNY TOADS – 9 babe pix, 1 avi
HOT CHICKS – 30 babe pix, no preview
HOT PEPPERS – 15 pix, no preview
HOTTEST BABE ON THE WEB – 20 pix a week, vote for your favorite
THE HOTZONE – 18 pix, no preview

Some of the sites listed offered as few as five or six images, while only two promised more than 1,000 images. The contextual metadata describing the style, genre, and content of the images remained thin or even absent. Since thumbnail preview was by no means always in use, it was necessary to first download the images in order to see what they were. Given the speed of dial-up connections, this would have been a slow enterprise. Dial-up modems had the maximum download speed of 56 kilobytes per second, which severely constrained the use of images and video clips. Larger files easily took minutes to download and small thumbnails were in broad use for giving the user some idea of the awaiting visual content. Rough black-and-white bitmap (BMP) raster images were also used for similar purposes, gradually fading away from the background as the desired JPG or GIF file of the same width and height grew visible. Indeed, according to an early Web design rule-of-thumb, individual pages should not exceed 100K in size, were they to download smoothly.

Web directories were not necessarily maintained frequently enough to keep their links fully up to date. Meanwhile, porn sites tried to knowingly derail users to click on lucrative links, independent of what the users may have been specifically looking for. The optimization of clicks emerged early as a strategy of profit generation, while other solutions, including mouse-trapping and pop-ups, were designed to force users to stay on the site, or to become acquainted with content against their will (Perdue, 2002). For porn users, the landscape of Web porn was therefore one of endless, optimistic yet frustrating waiting, searching and clicking, getting stuck, and regularly ending up with different content than that advertised (Patterson, 2004).

Altavista, the leading search engine preceding the reign of Google, was launched in 1995, the year that Yahoo! started out as a Web directory and a year after the equally popular search tools Lycos, Infoseek, and WebCrawler were introduced. The increasing use of search

engines marked a gradual shift from link sites to keyword searches in porn use. Pornography was remarkably popular with early searches: in 1997, almost 17 per cent of search queries were connected to pornography and sexuality. In contrast, in 2005, porn comprised less than 4 per cent of all searches (Spink et al., 2006). This proportional drop does not speak of a decrease in the popularity of pornography – quite the contrary, both the volume and use of Web porn continued to grow, and they continue to do so to this date. It rather speaks of expansive increase in all Web content and in the diversification of its user base: to mention only a few examples, during this period, public broadcasting companies started making their content available through online archives and streaming video services; banks shifted their services online; online learning platforms emerged; online shopping had grown steeply with giants such as Amazon and eBay leading the way; and social media platforms were about to make a breakthrough. In 1995, there were an estimated 23,500 websites (that is, unique hostnames): the number grew to over three million by 1999. Out of these, an estimated 30,000 were focused on pornography (Lane, 2001: 135). By 2005, the total number of sites was close to 65 million and by 2015, over 860 million (Internet Live Stats, 2017). As the volume of Web content rapidly grew in number and variety, the proportional volume of porn sites decreased. The same applied to search queries.

Directories, link and click sites continue to live on in a range of forms, from personally curated fan selections to metasites that routinely guide users to different directions than those of their own choosing – and even Persian Kitty is still up and running. The rhythms and temporalities of porn browsing have nevertheless undergone clear transformations since the 1990s when one needed to constantly wait for servers to respond and for materials to download. The gradual spread of broadband connections around the new millennium allowed for image resolutions to increase to the point that high-definition

became a profitable novelty while streaming video, and the format of the video clip in particular, began to dominate as the default format of porn consumption.

VIDEO AGGREGATOR SITES AND THE IMPLICATIONS OF CENTRALIZATION

Porn sites adopted streaming video technologies early on since many users found applications requiring plug-ins, such as Real Player and Microsoft Media Player, too cumbersome (Perdue, 2002: 140–3). In 2002, pornographic content was estimated to take 30 to 70 per cent of all bandwidth, largely for the reason that other forms of video content remained much less popular (Perdue, 2002: 179–84). The success of porn video aggregator sites such as YouPorn (est. 2006), RedTube (2006), Xtube (2006), XVideos (2007), xHamster (2007), and Pornhub (2007) means that pornography continues to occupy server space and user attention, yet with platforms such as YouTube, Netflix, and Hulu in the mix, the landscape of streaming video looks clearly different than it did in the early 2000s. In 2016, an impressive 92 billion videos were watched on Pornhub, the world's second most popular porn site, yet YouTube's number was 20 times higher, with almost five billion daily views.

Aggregator sites marked a departure from the free and centralized accessibility of video clips. As more and more video became available online as torrents shared in P2P networks and as tube content shared by studios for marketing purposes, uploaded by users with little regard for copyright, and produced by the users themselves, DVD sales began to steeply and permanently drop (Moye, 2013; Rosen, 2013). This drop equalled the transformations that had occurred in the music industry since the launch of peer-to-peer sharing app Napster in 1999 (Leyshon et al., 2005), yet it took place significantly later, around the financial crisis of 2008.

Pornography was long considered 'recession-proof' in the sense that its profits tended to steadily increase despite any oscillations in national or international economy. More pornography is being produced than ever to date, there is factually more pornography available, and the number of visits to porn sites continues to increase, yet the profits of the porn industry have, as a whole, decreased. Users have grown unwilling to pay subscription fees even for specialized and premium content. Kink.com (est. 1997), one of the success stories of Web porn, specializing in rough scenarios of domination and control, announced in 2016 that its revenues had recently been cut in half due to drastic drop in membership subscriptions. Webcams, with their live nature and interaction possibilities with porn stars, amateurs, and proams alike, remain virtually the only form of adult content that users are willing to broadly pay for. Pornographic webcams have been popular for as long as the technology has been available (Lane, 2001: 249–58; Senft, 2008; Hillis, 2010), yet webcamming has also increasingly centralized around hubs. At the time of writing, the largest of these were the Hungarian-born site LiveJasmin (est. 2001), the California-based Chaturbate (est. 2011), and the Cyprus-based BongaCams (est. 2012).

The money flows of Web porn have not suddenly dried up, but they are following different routes than during the previous decades. As studios focused on DVD production and pay content have suffered, many of them have been bought up. The originally Montreal-based MindGeek (formerly known as Manwin) alone has bought major brand names such as Men.com, Brazzers, Reality Kings, and Digital Playground. This has resulted in an unprecedented centralization of ownership in both porn production and distribution, given that MindGeek also runs the most popular video aggregator sites (with the exception of XVideos and xHamster). Analysing MindGeek's dominant role in porn, technology writer David Auerbach

(2014) notes that its 'producers make porn films mostly for the sake of being uploaded on to MindGeek's free tube sites, with lower returns for the producers but higher returns for MindGeek, which makes money off of the tube ads that does not go to anyone involved in the production side'. In other words, the profits of online pornography revolve around distribution, while the income streams have grown considerably thinner in its production.

Production studios have moved from establishing long exclusive contracts with models to a system where producers hire the necessary crew and cast for each title. As Heather Berg (2016: 161) points out, this 'gig economy' builds on a reserve army of labour that is 'willing to perform in porn even when pay and conditions are poor' and the workers of which are placed 'in shifting positions as entrepreneurs, independent contractors, employees, contracted and freelance managers, and producers'. On the one hand, the economy of Web porn has grown increasingly corporate and centralized, especially in North America. On the other hand, the labour of porn has grown increasingly precarious as a source of income for its makers.

Just as the traffic of views, links, and clicks connected to news items, memes, and video clips is driven through globally leading social media hubs, the traffic of online porn is increasingly centralized and organized through aggregator sites. If, throughout the 1990s and beyond, porn consumption was characterized by endless searching, in the 2010s, tube sites promise to host all possible content within one interface: users need merely to browse through the available categories and conduct key term searches within the site. This centralization follows similar patterns to those followed by developments connected to corporations like Google, Microsoft, and Facebook, which buy up smaller enterprises, aggressively expand their operations within the online economy, and collect massive volumes of data on user activities, preferences, and trends while doing so. This means that select companies have

considerable power to modulate the accessibility of content and forms of usage while not needing to be transparent as to the parameters of operation. Most Web porn companies are not listed, and the financial specificities are therefore not subject to public knowledge. It then follows that there is much opaqueness to their flows of money and labour.

The work of video aggregator sites largely involves tasks such as running servers, the management of data, and the tweaking of algorithms. As is the case with any social media platforms or online services, the successful operation of porn tubes necessitates large-scale investments into software engineering and programming. The careers available at MindGeek – including PHP and Web development, project management, customer service, sales, support, video editing, website optimization, mobile design, legal counsel, financial, data, security, Web analysis, marketing, sales, and PR – differ notably little from those in other tech companies. Alongside this partial redefinition of porn labour as tech work runs the mainstreaming of companies such as MindGeek as brands with more general cultural visibility. Adult entertainment companies have abroad social media presence, yet, with the exceptions of Twitter and Tumblr, social media terms of service generally ban gratuitous displays of nudity and sex with the explicit aim of blocking pornographic content from platforms such as Facebook, Pinterest, and Instagram. Since this sets automated limits to the circulation of sexually explicit content, porn companies have resorted to a range of publicity stunts.

In the case of Pornhub, such efforts have ranged from their globally circulated annual infographics detailing search trends, lengths, and the volume of visits within the calendar year (since 2013) to campaigns against breast cancer (since 2012) and for the protection of sperm whales (in 2016) and media stunts such as the Pornhub theme song (2014) and advert contests (2014). These campaigns afford broad social media publicity for virtually no expense (see Paasonen et al., forthcoming). In an *Adweek* interview, Pornhub's vice president, Corey Price, explained how the company wants to let 'people know that watching porn shouldn't be an underground activity that's to be seen as shameful. Everyone does it, why not just bring that out in the open?' (Monnlos, 2014). The overall aim of the campaigns is to build an entertainment brand with mainstream recognizability of the kind previously gained by Playboy or Hustler.

PORNIFICATION AND FILTERING

The increased public visibility of Web pornography and its key brands, together with the more general flirtation with sexual representation across the fields of media, have given rise to a myriad of diagnoses on the pornification culture (McNair, 2002; Paasonen et al., 2007; Attwood, 2009; Smith, 2010; Mulholland, 2013; Paasonen, 2016). While these diagnoses remain notably diverse in their examples and premises, they share a focus on how pornography has grown mundane in its abundant availability and how its codes and conventions travel across media platforms. The mainstreaming of pornography is mapped in terms of its sheer popularity, as well as the cultural presence of pornography in the guise of porn stars turned mainstream media celebrities, and in its aesthetics circulated in films, television shows, journalistic overviews, and art projects (Attwood, 2009: xiv). It is nevertheless online pornography that has become the key symptom of and symbol for such developments.

In public discourse, online porn is frequently posed as a problem in its exaggerated displays of gendered and racialized relations of control and in its arguably addictive qualities. The access of minors to online porn has similarly been a key concern since the mid 1990s. A range of filtering software has been developed for blocking adolescents' access

to porn and Google introduced SafeSearch, namely the automatic filtering of pornographic content, in 2009 (Paasonen, 2011: 32, 43–5). Concerns over the exposure of minors to sexually explicit content remain vocal, especially given the increasing ubiquity of smart phones, which also allow minors to generate and share their own content. Incidents concerning sexting have given rise to bullying as well as legal action: in the United States, adolescents taking naked selfies have been identified as sex offenders for producing and distributing child pornography (Zhang, 2010). Child pornography remains a topic of great public concern, especially in connection with the distribution facilities allowed by networked communications. Since child pornography is illegal and heavily policed internationally, it is primarily distributed in the so-called deep Web rather than on openly accessible platforms. It is also a form of content actively filtered out from virtually any website.

Parallel to the concern about the public accessibility of all kinds of online smut runs a range of filtering and censorship practices ranging from governmental firewalls in countries such as China and Saudi Arabia to the filtering of hentai in Australia and the application of obscenity laws to niche pornographies in the UK. Few politicians or tech-sector professionals are willing to defend pornography with other arguments than possibly those concerning the freedom of speech: the work or content of porn would not be included in most considerations of creative labour or innovation. On the contrary, the well-acknowledged presence and ubiquity of smut online and the harmful resonances it is seen to involve have been rationale for a broad range of content policing practices from traffic filtering to nation-specific acts of blocking, tracking, and banning. Such governance practices are by no means limited to porn, yet they gain political and public support through attempts to fight it. Pornography is, in sum, despite its public visibility and perennial popularity among consumers, considered to be the quintessentially 'bad' form of online content that would be best weeded out.

The history of Web pornography is one of simultaneous and possibly paradoxical fragmentation, diversification, and centralization. Despite the recent increase in academic interest and in examinations of the webcam sector in particular, many white areas remain in studies of Web porn, its economies, and labour practices in perspectives both historical and contemporary. Porn may sit awkwardly in the overall palette of Web content, not least in terms of the content allowed on most social media platforms, yet there is no doubt as to the central role that it has played in technological and economic developments throughout the history of the Web. Rather than continuing to routinely fence off pornography as a special concern, a social problem, or a marginal field of activity, it is crucial to acknowledge the role it has played in online content production and distribution, and to account for it in analyses thereof. The tenacious exclusion of pornography from studies of e-commerce, site design, Web technology, user cultures, and their affective entanglements can ultimately only obscure the overall understanding of how the Web has developed, and how it continues to do so. This would mean both reproducing existing knowledge bias and ignoring the insights brought forth in scholarship on online pornography.

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