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# Old Habits Die Hard: A Diary Study of On-Demand Video Viewing

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**Abstract**

On-demand video services allow viewers to access media wherever and whenever they like, on a wide variety of devices. These services have become extremely popular in recent years, but exactly how people interact with these services has not been studied in detail. We conducted a diary study with nine households to investigate this, and present the preliminary results in this paper. Participants took advantage of the freedom and choice these services provided, watching on different devices, in different locations, and for extended periods of time. However, the majority of viewing conformed to traditional patterns, occurring in the evening on large screens, though viewing on a laptop was slightly more popular than the television. We found that usage of on-demand services was influenced by situational factors such as location and the devices that are available.

**Author Keywords**

On-demand video; film; television; streaming, diary study

**ACM Classification Keywords**

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

**Introduction**

Consuming video through on-demand video services has become a popular activity in recent years. According to the

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Household (responses)	Profile
A (27)	M, 68, British; F, 57, British. Cohabiting couple, Birmingham, UK.
B (36)	M, 33, British; F, 38, British. Family, Birmingham, UK. Children: M, 8; F, 4; M, 2.
C (22)	Withdrew - no data.
D (22)	M, 32, Spanish; F, 29, Spanish. Cohabiting couple, London, UK.
E (18)	M, 31, Danish; F, 29, Danish. Cohabiting couple, London, UK.
F (24)	F, 27, Mexican, London, UK.
G (14)	M, 32, Italian; F, 32, Italian. Cohabiting couple, London, UK.
H (15)	F, 27 British; F, 30, British. Cohabiting, Oxford, UK.
I (7)	F, 27, German; M, 35, British. Cohabiting couple, London, UK.
J (15)	M, 31, German; M, 33, British. Cohabiting couple, London, UK.

**Table 1:** Household profiles (M = male, F = female)

Nielsen company, 43% of people globally watch some kind of on-demand video at least once a day [2]. Subscriptions to paid services (e.g. Netflix and Amazon Video) are rising yearly, and total viewing of both free and paid on-demand services, including viewer-recorded content, increased in the UK to 45% in 2017 [6]. This research also shows that mobile devices are increasing in popularity viewing as viewing screens instead of the traditional TV set, with 21% of the online population watching on a phone, 23% on a tablet and 33% on a computer at least once a month. This rises in the 16-24 and 25-34 age group. Instant access to large volumes of content has seen a rise in "binge watching", where a lot of content is viewed in one sitting [6].

Although the majority of on-demand viewing happens on a TV, a significant amount happens on other devices. An Ofcom survey [4] found that 22% of respondents said they were consuming video on screens other than the television more than the previous year. While a number of previous studies have sought to understand how viewing habits are changing, they have typically focused on viewing in the living room (e.g. [9, 10]). Due to this focus on traditional TV viewing, on-demand viewing on mobile devices could account for significant amounts of viewing time outside of the living room setting. This motivates the need to further examine on-demand service usage practices in detail.

Given the popularity of on-demand video services and mobile viewing, surprisingly little HCI literature has addressed it. Barkhuus and Brown [1] found that video recorders and the internet drove new viewing practices independent of TV schedules. A study by O'Hara et al. [7] sought to better understand how mobile video fits into everyday life, and found that portability and fitting in with other peoples' schedules were important, similar to findings by Ofcom [5]. They also found other motivations, such as simply passing time, and

being able to be present with others while still consuming video privately. Conversely, the authors found that mobile video was used to disengage with others and signifying the wish to be left alone. This study mainly focused on the motivations rather than establishing prevalence, perhaps due to being conducted before powerful mobile devices and on-demand services had become popular.

McNally and Harrington [3] conducted a more recent study on how teens and millennial consume mobile video, focusing on motivations rather than prevalence. They found that motivations depended on mood and emotional state. The authors also investigated how content was chosen, finding that it was based on the level of stimulation provided, as well as video length and amount of engagement required.

The current paper describes the results of a diary study conducted to provide a detailed snapshot of everyday viewing practices using on-demand services. We ascertained when and where viewing took place, as well as which services and devices were used. Nine households participated, and recorded information each time they viewed on-demand content. Pre and post interviews were also conducted to further explore behaviours. In the following paper, we focus on the data obtained from these diaries.

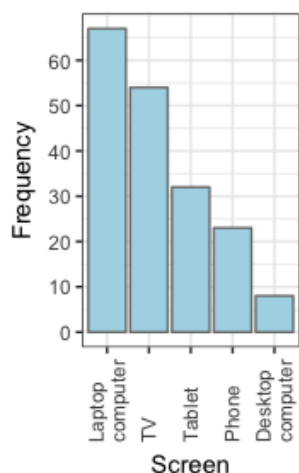
## Method

### *Participants*

Ten households who watched at least five hours of on-demand content per week were recruited through word of mouth and advertisements (see Table 1 for breakdown). One withdrew, leaving nine households. Households were paid £100 ( \$137) for 14 days of continuous participation.

### *Materials*

Households chose either a paper or digital diary. Seven chose digital and two chose paper. For the digital diary,



**Figure 1:** Distribution of viewing screens

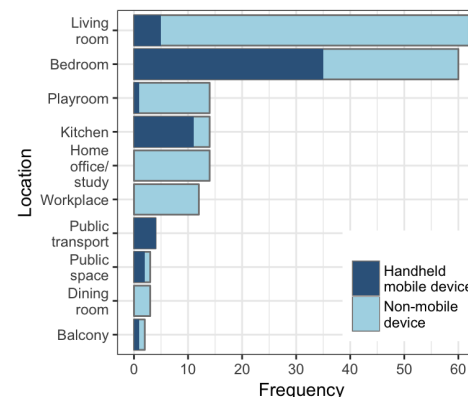
data was entered into an online form using any device with a web browser. Results were stored in a spreadsheet. For the paper diaries, custom diary booklets were created for each household. After data collection, they were digitised in the same format the digital ones for ease of analysis. Diaries were designed to make data entry as easy as possible, with checkboxes for names, locations, services, etc.

Participants completed information about each viewing session, defined as a period of viewing with at least 30 minutes of non-viewing activity either side. This allows for short to medium breaks for viewers. Participants were required to fill in basic information about their viewing: who was present, what was watched, how long for, devices and services used, location, and breaks they took. They were also asked to justify and explain their responses, where appropriate.

For this study, on-demand content is defined as that which is accessed at the viewer's convenience. This includes catch-up services (e.g., BBC iPlayer), subscription services (e.g., Netflix and Now TV), shortform content (e.g., YouTube and Facebook), and content downloaded or recorded onto computers or personal video recorders (e.g., TiVo).

#### *Procedure*

After recruiting participants, a preliminary interview was conducted to ascertain their general on-demand viewing habits and motivations. They were then briefed on how to enter data in their diaries. Participants were requested to create at least one diary entry per day (this could simply be to say that no viewing took place). For each household, one participant was nominated to be responsible for the diary, though other household members were encouraged to fill in the diary as well. During the study, participants were sent SMS reminders every evening to encourage participation. After the study was over another interview was conducted to ask them about their experiences with using the diary, as



**Figure 2:** Distribution of viewing locations

well as to explain particular behaviours.

## **Results**

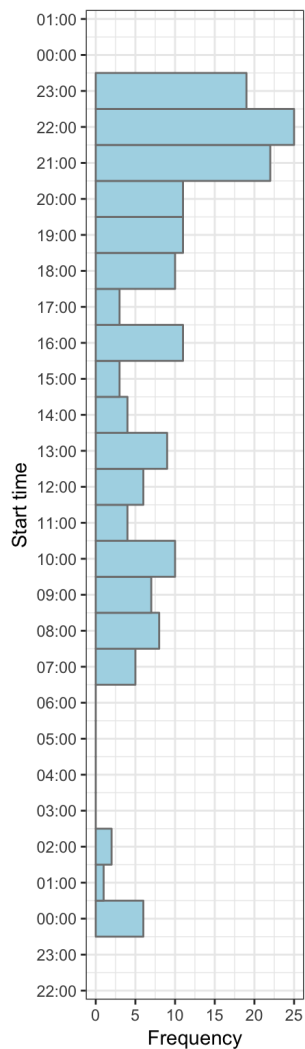
Participants created 202 diary entries in total. Of these, 24 said that no on-demand viewing occurred that day, leaving 178 entries. These recorded 188:36:00 viewing hours, with a mean of 20:57:20 per household ( $SD = 08:10:11$ ). Mean entries per household was 20.6 ( $SD = 9.1$ ).

### *Viewing Screens*

Diary entries fell into five distinct viewing device categories, shown in Fig. 1. Of the 178 entries, 59 (33.1%) contained viewing on a handheld mobile device (i.e., phone or tablet).

### *Viewing Locations*

Viewing occurred in 10 distinct locations, shown in Fig. 2. The living room and bedroom were most popular overall. However, when looking at viewing on handheld mobile devices, living room viewing was uncommon. Of the 178 sessions recorded, 160 were in the home (89.9%), and only

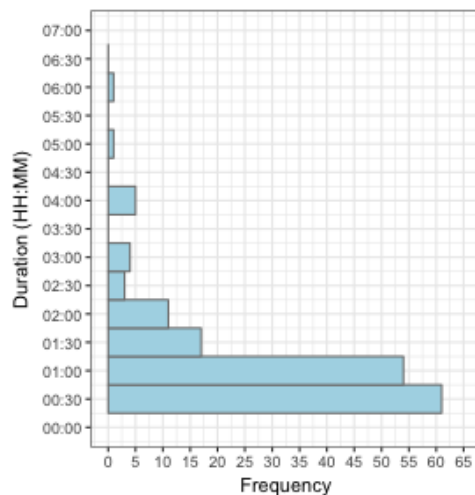


**Figure 3:** Histogram of viewing start times

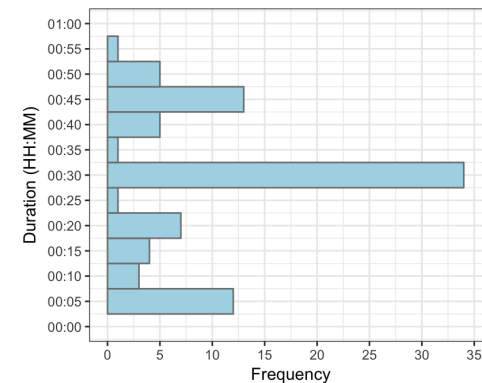
18 were outside of the home (10.1%). In 5 diary entries (2.8%), participants reported moving between two locations during a viewing session; all of which were in the home.

#### *Viewing Time of Day and Duration*

Late evening was the most popular time to start viewing. A histogram of viewing start times can be seen in Fig.3. Lower levels of viewing took place throughout the day, apart from in the very early hours of the morning. Mean viewing session duration was 01:03:00 (SD = 00:55:56). A histogram of viewing session durations can be seen in Fig. 4. Of all the sessions, 122 were 1 hour or less (69%), and 158 sessions (89%) were 2 hours or less. Fig. 5 shows a detailed view of these sessions, where the most common duration is 30 minutes (often the length of one episode). Only 22 (12%) of viewing sessions were over 2 hours. The longest session was 6 hours, and the shortest 2 minutes.



**Figure 4:** Histogram of viewing session durations



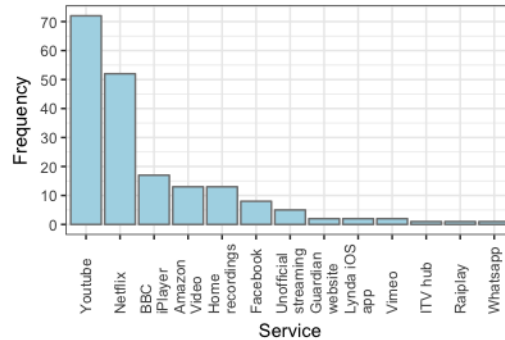
**Figure 5:** Histogram of viewing session durations for sessions less than one hour

#### *On-Demand Services Used*

Thirteen on-demand services were used. These are shown in Fig. 6 with the number of sessions they featured in. YouTube and Netflix were most popular, being used in 72 and 52 sessions respectively. We divided the services into two distinct categories: shortform services, consisting of YouTube, Facebook, Lynda iOS app, Vimeo, WhatsApp, and Guardian website; and longform services, consisting of Netflix, Raiplay, iPlayer, unofficial streaming services, home recordings, and Amazon video. Sessions featuring only shortform services (81 sessions) were on average shorter (mean = 00:42:27, SD = 00:33:52) than those using only longform ones (97 sessions, mean = 01:21:13, SD = 01:04:12).

#### *Amount of Content Viewed*

In total, 481 different items (1 item = 1 episode, video, etc.) were viewed across all sessions. Mean total number of items viewed per household was 53.4 (SD = 38.0). Mean items watched per viewing session was 2.2 (SD = 2.7).



**Figure 6:** Popularity of different services

#### *Watching Alone and Watching Together*

Watching alone was more common than watching with others (i.e., covieing). In total, 135 sessions (68.15%) were watched alone, and 43 (31.85%) by multiple people.

#### *Potential Binge Watching*

While there is no agreed definition of binge watching, if we define it as watching multiple episodes of the same content (as in [6]), with the session lasting at least an hour, 29 viewing sessions (16.3%) would qualify. Mean duration of these sessions was 02:07:41 (SD = 01:08:07). Of these 29 sessions, 9 (31% of binge watching sessions, 5% of total) were viewed on handheld mobile devices.

### **Discussion**

The findings of this study show that although on-demand video platforms have the potential to change viewing behaviour, viewers still often conform to traditional viewing habits. Most viewing occurred during the evening "prime time" slot, and the TV was still a popular viewing device. The most common session duration was 30 minutes, typically the length of one episode of content. However, changes

as a result of new technology can also be seen. YouTube was the most common viewing platform, showing how shortform content has become popular. We also found that a third of viewing happened on a mobile device, and instances of potential binge watching were recorded.

The laptop was more popular as a viewing device than the television, which may not be possible without the cross-device availability of on-demand services. This could be due to the ease of access to different services via the internet, as well as the balance of screen size and portability that laptops provide. However, for the purposes of viewing they function similarly to a TV — a fairly large screen that can be placed in a comfortable location, with the ability to watch with others. Though most viewing occurred on larger screens, a third of viewing sessions were on handheld mobile devices. This was generally seen as unfavourable, and mostly seemed to be down to necessity — in interviews, participants expressed their dislike for viewing on mobile devices, citing the small screen as a reason. This agrees with previous work showing how viewing on small screens can lead to a reduced viewing experience [8]. However, participants said that they would watch on a mobile device if no other device were available (e.g., when travelling). Most said they preferred to watch on a TV, due to large screen size and comfortable seating typically found nearby.

For this study we recruited a sample of 10 households. While we took effort to recruit participants of various ages and living in different parts of the UK, most of our participants were London-based millennials without children. This bias in the sample may have affected our results. For instance, some participants lived in shared housing without a communal living room or TV. In place of this, viewing occurred on laptops and tablets in bedrooms. Considering millennials' typically high level of interaction with technology,

we might have expected more activity that differs from our traditional notions of TV viewing. This may have seen an increase if our sample featured more teenagers and children. Viewing mainly in the evening is perhaps to be expected, as our sample was mostly adults in full-time employment. However, there was a steady amount of viewing throughout the day, resulting from one household with children being at home and people viewing during work breaks.

A limitation of diary studies is that some participants may not have recorded everything they watched. In interviews some participants said they sometimes did not record very short sessions (e.g., Facebook video) because of the effort involved. However, this was uncommon; most participants said they recorded the vast majority of content viewed.

## Conclusion

This paper extends our understanding of how on-demand viewing occurs in daily life. The results of a diary study show that this technology leads to new behaviours such as mobile viewing, viewing for long periods, and consuming shortform content. However, our sample still often conformed to traditional viewing habits. Viewing was mostly in the evening on a large screen, though this sometimes happened in new ways, such as by using a laptop.

## Acknowledgements

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## References

- [1] Louise Barkhuus and Barry Brown. 2009. Unpacking the Television: User Practices Around a Changing Technology. *ACM Trans. Comput.-Hum. Interact.* 16, 3 (2009), 1–22.
- [2] Nielsen Company. 2016. On-Demand Demographics: VOD Viewing Across Generations. (2016). <http://www.nielsen.com/uk/en/insights/news/2016/on-demand-demographics-vod-viewing-across-generations.html>

- [3] Jennifer McNally and Beth Harrington. 2017. How Millennials and Teens Consume Mobile Video. In *Proc. TXV '17*. ACM, 31–39.
- [4] Ofcom. 2015. Beyond Broadcast consumer research 2015. (2015). [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0031/76990/beyond\\_broadcast\\_uk\\_datatables.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0031/76990/beyond_broadcast_uk_datatables.pdf)
- [5] Ofcom. 2016. Linear vs. non-linear viewing: A qualitative investigation exploring viewers' behaviour and attitudes towards using different TV platforms and services providers. (2016). <https://www.ofcom.org.uk/research-and-data/tv-radio-and-on-demand/tv-research/linear-vs-non-linear-viewing>
- [6] Ofcom. 2017. The Communications Market Report 2017. (2017).
- [7] Kenton O'Hara, April Slayden Mitchell, and Alex Vorbau. 2007. Consuming Video on Mobile Devices. In *Proc. CHI '07*. ACM, 857–866.
- [8] Jacob M. Rigby, Duncan P. Brumby, Anna L. Cox, and Sandy J. J. Gould. 2016. Watching Movies on Netflix: Investigating the Effect of Screen Size on Viewer Immersion. In *Proc. MobileHCI '16 Adj.* ACM, 714–721.
- [9] Jacob M. Rigby, Duncan P. Brumby, Sandy J.J. Gould, and Anna L. Cox. 2017. Media Multitasking at Home: A Video Observation Study of Concurrent TV and Mobile Device Usage. In *Proc. TVX '17*. ACM, 3–10.
- [10] John Rooksby, Timothy E Smith, Alistair Morrison, Mattias Rost, and Matthew Chalmers. 2015. Configuring Attention in the Multiscreen Living Room. In *Proc. ECSCW '15*. Springer, 243–261.