Your Money's No Good Here:
The Elimination of Cash Payment on London Buses

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ABSTRACT

As digital payments become increasingly important features of economic exchange, traditional forms of payment such as cash are becoming phased out in certain settings. We study one such context—the elimination of cash payment on London buses in July 2014. We conducted ethnographic fieldwork, interviews with drivers and collected online and social media comments before, during and shortly after the introduction of cashless fares. We explore how drivers and passengers were fearful of the change due in part to a lack of information and communication, the anticipation of negative effects on vulnerable passengers and a compromise in freedom, flexibility and surveillance. We highlight the ways cashless payments can alter the social function of money, create new forms of work for drivers and passengers, and if not carefully introduced can cause emotional stress and fears of state surveillance and control.

Author Keywords

Electronic payments; contactless; public transport; cashless.

ACM Classification Keywords

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

INTRODUCTION

'Cash takes time to get at, is riskier to carry, and by most estimates, cash costs society as much as 1.5% of GDP. Electronic payments, on the other hand, have been proven to boost economic growth, while advancing financial inclusion.' [22, p.1]

Cashless payments are becoming an important feature of everyday economic exchange. As summarised in this quote by Mastercard, in their report entitled *The Global Journey From Cash to Cashless*, the motivation and enthusiasm surrounding electronic payment is wrapped in a discourse

Figure 1. Oyster card being 'tapped in' on a London bus.

of cash being an antiquated burden and an impediment to economic growth and social progress. This perspective is shared by London's transport governing body *Transport for London* (TfL), who on the 6th of July 2014 brought an end to 185-years of allowing passengers to pay cash for bus journeys [35]. This change was heralded as a way of improving the efficiency and reliability of services, to reduce the costs of processing cash, and to give greater convenience and cheaper prices to their customers [35]. As of now, people can only pay for travel on a London bus through a prepaid smartcard (the *Oyster*), a contactless bankcard or pre-paid travel card.

In this paper, we explore the impact that the elimination of cash payments on London's buses has had on bus drivers and passengers. Following a mixed-method approach to data collection, we studied expectations prior to and experience during and shortly after the introduction of the new cashless policy. We conducted interviews with bus drivers and passengers, ethnographic fieldwork at bus depots and on buses, and collected comments from news articles and social media related to the introduction of cashless buses. Our contribution to HCI is three-fold. First, we contribute to the emerging literature on digital payments and money (e.g. [18,30,37]) by studying the impact 'cashless' systems have on the social function of money and the labour involved in their use. Second, we contribute to the study of electronic ticketing and digital technology in public transportation (e.g. [16,25,26]) by highlighting how such systems leave some passengers vulnerable through lack of awareness or lack of infrastructure. Finally, we contribute ways to improve the future introduction of cashless payments in this context.

THE OYSTER AND DIGITAL MONEY

An *Oyster* is a near-field communication (NFC) card that is used to pay for public transport in London (Figure 1). They were introduced in 2003, with the intention to replace traditional paper tickets. Instead of paying a driver directly, travellers store credit on their *Oyster* and pay per journey by tapping the card on an electronic reader when entering and exiting the bus. For over a decade the *Oyster* has co-existed with other payment methods—such as cash (coins and banknotes) and travelcards (paper cards that could be purchased at shops and tube stations but not on buses). In 2013, London buses also started to accept contactless payment cards—normal debit and credit cards that use contactless technology to pay for small transactions.

Bus passenger payment habits have been shaped over time by TfL. Over the past decade bus journeys paid by cash have become more expensive, as has the relative cost of travelcards compared to *Oyster*-paid journeys. According to TfL, as of 2013 this has lead to only 1% of all bus journeys made in London being paid for by cash [35]. However, this still equates to approximately 60,000 journeys every day. Furthermore, 86% of those using cash also have an Oyster [35]. As such the 1% figure disguises great complexity and infers that Oyster owners frequently rely on cash as a payment method in certain circumstances.

In early 2014, TfL published a report outlining plans to make all of London's buses 'cashless'. Using the above statistics to highlight the relative lack of cash payments, they noted that: 'Going cashless will remove the delays associated with cash transactions which would also benefit everyone. Cash payers would benefit from cheaper fares, saving around £1 a trip if they switch to *Oyster* pay as you go or contactless payment cards' [35, p.5]. A consultation process involving 37,573 passengers resulted in more negative (67%) than positive (32%) responses to the change, with many people noting the potential problem of being left stranded if an *Oyster* card is out of credit. TfL responded to this by providing concessionary passes to over a third of customers (young people, students, and disabled and older people). They also introduced the 'one more journey scheme' which allows passengers to make one more bus journey with their *Oyster* would allow should they have insufficient credit to travel. With these new procedures in place, the proposal to withdraw cash transaction on buses was put into place on the 6th July 2014.

Money and HCI

The *Oyster* is just one example of the ways digital money, payments and commerce has started to pervade everyday life and this is illustrated through the growth of HCI work studying this area. Areas of particular recent interest include studies of mobile payments (e.g. [19, 20]), peer-to-peer lending and alternative currencies [5] and tools to support decision making around spending [29]. However, somewhat countering these perspectives, studies of financial practices have highlighted the ways people reject technologies that manage the full range of a person's finances [18] or do not provide the necessary level of control [37] or sense of security [36] to be of value. Indeed, these latter works emphasise how the physical and burdensome qualities of cash actually can make managing finances easier than digital payment.

Also related to our work are studies of the implications of introducing cashless payment technologies in public transportation. It has been noted that dwell times can be significantly reduced with prepaid or smartcard payments [34]. A number of studies have examined the *Oyster* specifically as an emblematic example of this technology (e.g. [4, 16, 25]). In their research on public perceptions towards *Oyster*, Poole et al [25] highlighted concerns that using contactless payments may present fewer opportunities to engage in conversation and pleasantries with cashiers and reduce a sense of community. These views were echoed in [26], which highlighted how some (but few) London bus drivers missed the social interaction that disappears when passengers use *Oyster* cards. In a similar vein, Brewer et al observed how a practice of exchanging paper tickets between passengers has been eradicated by the introduction of the 'personal, permanent, and reusable' *Oyster* card [4, p.338]. It has further been illustrated how contactless ticketing systems that are bound to geographical locations can be exclusionary to visitors [25].

One of the greatest concerns surrounding the introduction of contactless payment has been the potential for privacy invasion. Not long after the introduction of the *Oyster* system, the RFID chips on the cards were hacked and instructions on how to do so were made freely available online [13]. Furthermore, there is a tension regarding the collection of data by transport companies and governmental agencies through the use of cards like *Oyster*. It has been highlighted how data from cards can be used to infer travel behaviours, and thus lead to behaviour change interventions [16] or the monitoring of movements of criminals [3]. Along with data hacking and privacy leaking scandals that have surrounded public and private sector organisations in the UK over the last decade, this has promoted underlying tensions between the British public and TfL as to the perceived benefits and costs of this technology (e.g. [40]).

While *Oysters* and similar systems have been studied, this has been done so with the availability of other forms of payment. We were specifically motivated to study what happens when a previously dominant and pervasive mode of payment (cash) was eliminated. Given the availability of cash-based transactions on London's buses for the past 185 years, this brings about a significant change—impacting upon the work of staff and the experiences of those who travel. Furthermore, this provides a rich site for studying the losses and gains presented by electronic ticketing and digital money. As such, our research set out to study the period immediately surrounding the introduction of the no-cash policy, focusing on the ways it impacted drivers' work

practices and the experiences of passengers before, during and shortly after its introduction.

METHOD

While the focus of this paper is the elimination of cash payments on London buses in July 2014, our fieldwork and data collection forms part of a larger study on bus driver work practices and use of digital technology. Fieldwork specifically focused on the new cashless policy that began 2 weeks prior to its introduction. However, we began talking informally with bus drivers about the topic when management had consulted them on the policy 15-months prior. We took a mixed-methods approach, based upon interviews with bus drivers and bus passengers, ethnographic fieldwork and online data collection related to the introduction of the new bus policy.

Interviews with drivers

To begin with, around the time of first being informed of the plans for the new cashless policy (April/May 2013) we performed interviews with 10 bus drivers. The lead researcher had pre-existing social relationships with 6 of these participants. These helped the researcher meet other drivers who were comfortable with talking to him and saw him as a 'friend of a friend'. This greatly eased access and acceptance, and participants were very keen to help the research. These initial interviews were undertaken to broadly explore and understand the work practices of London bus drivers and examine the ways in which digital technologies are impacting upon their work (insights from which are published in earlier work [26]). In the following months, the lead author had continual contact with some of these initial participants, through which he was informally kept informed of the upcoming policy change. We followed our initial interviews up with more focused data collection, looking specifically at the new initiative of eliminating cash payments. We interviewed 10 further drivers approximately 1-2 weeks before its introduction. Interviews with drivers were semi-structured, conducted in informal settings and typically lasted for an hour. During these interviews, we discussed how the changes in policy had been communicated to them and the ways in which drivers expected the refusal of cash fares to impact their work. We followed up with these drivers again 2-3 weeks later, to discuss their experiences of the change.

Ethnographic fieldwork

Along with the drivers' interviews, we conducted 3 weeks of focused ethnographic fieldwork where we observed the work practices of bus drivers and informally talked to as many of this occupational group as possible. One of the central tenets of ethnography is the importance of 'being there' [14]. For this reason we spent many hours riding bus routes around London immediately before and after the elimination of cash payment. It's important to note that in the few weeks surrounding the introduction of cashlessness our interviews, observations and fieldwork fed-into each other. As such, we were able to allow interactions with passengers and drivers to inform the focus of our

observations and vice-versa. For instance, because both drivers and the public identified tourist zones as likely 'trouble spots' we purposefully rode routes in these areas and asked tourists about their experiences. We also rode in areas on the edge of the city where there are fewer *Oyster* venders, and where TfL run routes alongside other bus operators that still accepted cash. Similarly, we knew from observations that passengers did not always enter the bus in an orderly way. We consequently purposefully engaged with drivers' perspectives about potential changes in boarding before, during and after the new policy.

One of the key considerations in approaching any group for research is the extent to which their setting is open or closed and how this influences what information can be gathered [2]. By definition, public transportation is a very 'open' setting. In contrast, social spaces where drivers can be engaged with more directly and reveal more candid perspectives are 'closed'. The aforementioned pre-established social relationships with a selection of bus drivers endowed automatic trustworthiness and meant that various cultures and conventions of bus-driving work were learnt. Writers have demonstrated how this form of cultural learning aids interaction with informants and smooth immersion into the field [24, 29]. These associations meant that we had access to organized social gatherings with drivers, which typically meant a drink in the pub after their working day. Following on from the traditional 'hanging around' approach first adopted by Whyte [38] in his ethnography of street culture and more recently by Wolf [39] in his work on Canadian outlaw motorcycle-gangs, we spent time around bus garages and depots talking to this occupational group on an informal and serendipitous basis. In all these interactions, the researchers crosschecked information and noted any contradictions. Collins rightly asserts that it is always the case that when someone's experience is incorporated into data, decisions about 'who to trust, what to believe and why something is true are of central importance [6, p. 202].

Gathering passenger perspectives

As well as drivers' perspectives on the changes, we were also interested in the impact that the cashless policy had on bus passengers and the general public. We captured these perspectives in two distinct ways.

First, during ethnographic fieldwork the researcher spoke with members of the public travelling on bus routes about the upcoming changes. These conversations would be spontaneous, serendipitous, and responsive to the context—for example, when an announcement was made on a bus about the upcoming changes, if a passenger had picked up a leaflet related to the changes or if a passenger was seen to be refused boarding due to the new policy.

Second, we compiled public comments responding to news stories on the changes and Twitter data commenting on this issue. On the days surrounding the introduction, we searched for news articles related to the new policy and

collected all comments associated with this. Our search identified 12 news reports with comment functionality, which provided us with 745 comments in total. To collect Twitter data, we harvested Tweets between the 1st and 24th of July 2014. We refined our harvesting by restricting the tweets collected to 17 search terms and to the geographical boundary of Greater London. We read through collected Tweets to discard those that were not evidently related to the study. This left us with 532 Tweets in total.

Data integration and analysis

The data presented in this paper is therefore the outcome of a mixed-methods approach. This approach is favoured when studying a complex social phenomenon, like those on display here, because it facilitates an appreciation of 'whole dimensions of social experience' [21, p.13]. Applying more than one method also endows complementarity, allowing the findings from each method to emphasise the other's qualities and incorporate different perspectives and constructions of a phenomenon [9]. This can lead to the creation of new knowledge and reveal different dimensions of a phenomenon and the complex nature of the social world [1, p.128]. This also alerts us to the need to critically evaluate the limitations of our various sources of data. For example, the interview portion of our work gave us depth of understanding but sacrificed berth in terms of number of participants, while the ethnographic fieldwork supported the observation of problematic situations but often we were unable to follow-up with specific passengers and drivers. Twitter and news articles gave us valuable insight into hundreds of passenger views specifically about the policy that would otherwise have been difficult to achieve. These sources also have significant limitations—such as being unable to identify the background and attitudes of those making comments, and comments may not necessarily represent the attitudes of those who make them. However, through combining these multiple sources we are able to mitigate somewhat against each sources limitations.

Once all fieldwork was completed, all of our collected data—anonymised interview transcripts, fieldwork diaries, and anonymised news and Twitter comments—were used as the basis of an inductive qualitative analysis. Following Glaser and Strauss [11] this corpus of data (including field note diaries) was coded at the sentence to paragraph level to develop themes [11]. We then reassembled this data using selective quoting to illustrate these themes. Coding in this manner was a highly effective way to sort all of the research data, especially in light of having gathered such a wide range of material.

FINDINGS

Our analysis highlighted four discreet themes: *communication and anticipation; susceptible passengers and places; negotiating vulnerability and giving leeway;* and *flexibility, choice and surveillance*. All data presented here is anonymised with pseudonyms, and we distinguish different data as belonging to bus drivers (BD), twitter (TW) or news articles (NA).

Communication and anticipation

The early stages of our fieldwork revealed a range of concerns in relation to the upcoming changes. This was particularly so from the drivers. Much of their anxiety stemmed from uncertainty, born from a lack of information from their employers. Initially, most didn't know precisely when cashless fares would be introduced and worried about how they should negotiate this change in practice. Ray for instance explained: *"We have to search the message boards to find these things out. We've got to search things out." (Ray – BD)*. Other drivers explained how they searched on the TfL website out of work hours to look for information related to the changes. It was clear that the lack of communication placed the onus on drivers to seek out information for themselves, which a number of the drivers found relatively stressful.

This information problem was exacerbated by a feeling that the public hadn't been adequately prepared either. One of our bus-driving participants, Gordon, suspected that a lack of publicity was motivated by economic concerns, instead of passenger experience and employee wellbeing. As a result, he and his fellow drivers would inevitably 'get it in the neck': *It seems to me that money is more important than the service for TFL…Yes. It's the drivers that get it in the neck from the passengers. (Gordon – BD).* A few weeks prior to the introduction, TfL started to produce passenger-oriented information in the form of adverts placed at bus shelters, announcements played over the bus intercom, and leaflets handed out by drivers to cash-paying passengers. These measures however did little to ally the fear from drivers that most of the public were not taking this information onboard. Ray expressed his frustration, explaining how he had diligently given leaflets to all passengers who were paying with cash only to be disappointed when he saw they had all been thrown on the floor.

There was equal fear that the audio announcements played on buses were not heard by passengers. Drivers felt that passengers would *"not take it in"*, *"not speak English"*, *"cant hear it over the bus"* or are just *"wearing headphones"*. Indeed, during fieldwork conducted just prior to the introduction, passengers were not seen to be responsive to the announcements. However, even in those instances where they were responsive, it was not immediately clear what they could do to prepare for the change. In one observed example, an older passenger approached a driver having heard the announcement. Concerned about the consequences the change would have on her niece, the driver responded with: *"you've just heard the announcement did it say ask the driver? No, it said ask TfL." (Nobby - BD)*. While she knew the driver was joking, she still wished to know more information to inform her niece—however, the driver simply repeated the announcement verbatim.

While there were clear concerns about the policy, enthusiasm was also expressed. Drivers spoke fondly of the *Oyster*, as it had sped up boarding times and made their job easier. Bob for instance, felt services now ran more smoothly: *"I relax more, yes. I also think that routes are running smoother actually; we don't waste any time with people" (Bob – BD).* The new policy was also appreciated because it was perceived as, in the long term, reducing the work and labour of the drivers. Over the last 30 years, the role of London bus driver has been transformed. Some of the more obvious changes include the removal of conductors, meaning drivers acquired the role of receiving payments and issuing tickets. Others that are less obvious relate to being vigilant about suspicious passengers and packages in light of the terrorist attacks on London buses. Trevor explained how he felt: *"There is too much work already, I have to drive, give information to passengers." (Trevor – BD).* Another driver more forcefully explained how *"we're bus drivers not fucking cashiers" (Gordon – BD).* There was also a feeling among many of the drivers—but not all—that the new policy would improve their relationship with passengers through, ironically, the need to no longer interact with them.

Problem passengers and places

While drivers had many concerns about how the introduction of cashless fares would impact their work, there were significant ramifications for those passengers who still made cash payments on buses. A primary issue raised in public comments was the potential difficulty it would cause people who only visit London occasionally: *"What happens regarding tourists or people visiting for a day? I mean if you're only going to be in the capital for a day or maybe two at max, are you really going to waste time and money in the form of unused credit getting an Oyster Card?" (JRain – NA).* The introduction of cashless travel was seen to place an unfair burden on an individual to carefully plan visits to the capital and seek *Oyster* cards in advance of arrival: *"Occasional visitors aren't going to able to access the bus network unless pre-planned. This seems a bit stupid to me." (Geoff – TW).*

Some passengers were seen to be more exposed to the elimination of cash than others. The comments sections of newspapers were full of imagined scenarios of children, older people and lone women left stranded as a result of not having an *Oyster*: *"What happens when a woman or a child from outside London does not have Oyster, or contactless card, only cash, in a dangerous area. At 8 in the evening. In winter-time?" (KarlJ – NA).* Others highlighted that non-English speakers might find it difficult to become aware of the change. Furthermore, there was an appreciation that the *"one size fits all"* approach to instigating the cashless policy failed to take into account that people may be more or less susceptible to having no credit on their *Oyster* card at different times of the day:

"I'm sure most people agree that it's a good idea during the day time because it does save a lot of time and money on many routes, especially tourist areas, which is good of course. But during the night time when there isn't a rush anymore and nobody cares if someone pays with change then I don't see why they don't allow

paying by cash. Then there's of course the safety issue of being stranded at midnight. It should be Oyster only during daytime hours, bout 7:30am - 7pm, and then after that we should be able to use cash. The night busses should at least accept cash anyway." (Jonny57 - NA).

Jonny57 offers a balanced view of the new policy. They suggest a number of benefits to the mass of service users who may be using London's buses at the busiest time of days. However, there was an appreciation that this new policy is perhaps not needed all day, every day, and that at other times there should still be scope for flexibility to account for the heightened vulnerabilities people face travelling in the city at evening time. The fear of being stranded was echoed by others who had experienced an *Oyster* failing to work or vendors closed or out of order:

"I think in 4 years I must of paid cash for a bus ticket all of 3 times. But, those times were when I was stranded 10 miles from home at 3 in the morning with an empty Oyster Card. If they want to go cashless 24 hours, fine, but then they'll need to have a way to top up an Oyster 24 hours to go with it. The alternative is people getting into dodgy cabs out of drunken desperation at 4am. That's not a story that ends well." (Barneyfrog66, NA)

This is not just an issue of time-dependence but also place-dependence, as it was difficult to buy or top up an *Oyster* in some parts of London. Ray, a bus driver in his 50s, noted: *"The problem is that some areas have no places to buy top-up. Clerkenwell for example" (Ray – BD).* These areas tend to have fewer bus routes operating in their vicinity and are predominantly in more deprived areas of the city. Such gaps in infrastructure are therefore more likely to negatively affect lower-income groups who cannot put large amounts of credit on their card at one time.

Of course, it could be argued that the types of problems Barneyfrog66 and Ray note here might be mitigated against by the 'one more journey' scheme. However, during our fieldwork we observed this scheme being unhelpful for those whose 'one' journey entails changes between buses, tube and rail services. On one occasion, a bus driver was observed denying travel to one passenger during the day. Following up with them later into the journey, it was revealed that this passenger had not realised they had already used their one more journey credit.

Negotiating vulnerability and giving leeway

The reality that some people would be more vulnerable to the new policy than others is not lost on TfL. During our fieldwork—just prior to cashlessness being introduced— bus drivers were issued with a revised operational manual called the *"Big Red Book"*. This included an instruction to refuse passage to those who didn't have an approved method of payment or lacked any 'one more journey' credit: *"Passengers who turn up and attempt to pay with cash should be asked if they have another way to pay for travel. If they have no alternative method of payment, they should be politely refused travel on your bus unless you feel they could be vulnerable."* In an accompanying letter, it was explained how 'vulnerability' should be understood and applied:

"Not everyone is vulnerable all of the time but anyone could be vulnerable at any time. […] *Do not leave anyone stranded if they are vulnerable or clearly in distress. For example:*

- *Young or older people*
- *People who could be at risk if left behind, including those in isolated places or at quieter times*
- *People who are disabled, injured, unwell or who have had an accident, assault or similar incident*
- *People who show you a travel support card and may have learning difficulties. Not all impairments are obvious."*

While this new 'vulnerability rule' was a response the types of concerns articulated during public consultation, it prompted further challenges for drivers. In particular, the endowment of more discretionary powers caused unease among some. Jack for instance was anxious that he might wrongly assess someone as 'vulnerable' and be disciplined if a revenue inspector entered the bus and disagreed:

"Yes, well, there's always a risk if Revenue don't agree with you, you can get booked and reported to your manager. Then I'll just see what the manager says and he'll probably see what I say. You can't get everyone right, can you?" (Jack – BD)

Despite these guidelines, drivers' interpretation of 'vulnerability' also differed quite considerably. During an interview, Bobby stated that it was 'common sense' that this provision is for females only: *"It is common sense. If it was a geezer, he is walking, if he hasn't got an Oyster he is walking, I don't care what time of the night it is, he is walking." (Bobby – BD)*. As well as reproducing well meaning but wrongheaded societal-wide prejudice about the fragility of females, this discretion can carry a more aggressive form of prejudice and discrimination. Bobby continued to explain: *"If it is a girl then I won't kick her off, especially if she is pretty. If she's a proper minger and a certain colour, they are fucking getting off.* […] *It depends on the people really." (Bobby – BD)*

While the above example is an extreme, a number of drivers explained their difficulty in understanding what vulnerability could or could not mean. As a result of their difficulties in interpreting the guidance, many of the drivers developed a number of pre-emptive coping strategies to be used once the policy was introduced. Despite the explicit guidance from TfL about the enforcement of the 'no cash' policy, drivers explained how they were willing to give passengers some *"leeway"*—in effect some flexibility in allowing people on the bus without payment after the no-cash policy is officially introduced. How long this period of leeway would be differed between drivers—however, it was clear that through conversations with groups of drivers at breaks and outside of work that *"1 or 2 weeks"* was broadly agreed upon. However, there was less agreement about how precisely this leeway would play out in practice. Nobby, for instance, explained the reasons why he gives extra consideration to passengers travelling at a time of day when it when it is difficult to top-up an *Oyster*.

"See, during the day you can tell somebody if it comes up as 'no cash', You can say, "Well, you can go to a shop." But when you do a night bus, at 3AM, the leniency, you can't say that. That's

why you've got to be more lenient on the night bus. I'm probably letting on, the last three days or three nights, at least five people on for free. At least. A minimum of five." (Nobby – BD)

A few of our participants also said they would be lenient towards passengers who were displaying obvious signs of distress. This consideration would be independent of perceived vulnerability: *"Well, if they were in distress, sort of panicking. Then you've got to let them on, haven't you? You don't know what problems they've had." (Alan – BD)*. There was also sympathy towards tourists. Alan retells an incident when he let visitors ride for free, feeling that they genuinely didn't know about cashless fares:

"With people who've got on, it's foreigners, European. She put a tenner down and I said, "We don't take cash any more". "Oh", she said. "What can I do?" I said, "Well you need to buy an Oyster or a Travelcard or something." She said, "We're tourists, we've just come over." So I wrote them out the little slips we've got and I said, "When you get to Wimbledon better get yourself an Oyster Card or something." I think she was genuine, you know?" (Alan – BD)

Some of our driver participants coped with refusing people entry by blaming them for being unaware of the change in policy. This tactic of emotionally distancing themselves from passengers isn't effective with tourists. In the above, Alan is not assessing vulnerability; but rather assessing morality, making a normative judgment based on whether the individual deserves passage. We see here that although TfL gave guidelines based on the notional of a 'vulnerable passenger', in practice leeway was usually dependent upon the subjective and personal views of the driver. There are benefits to this type of flexibility but as illustrated, it can lead to the discrimination of certain groups.

Flexibility, choice and surveillance

A major causes of public antagonism towards cashless fares was the perception that it removes an element of flexibility and choice in how people pay for their travel. Some of these criticisms were a matter of personal preference:

"Personally I don't like the idea of not having such simple freedom of use." (KennedyClarks - NA)

"I honestly can't see how people can have a positive reaction to this? In a commerce era where there are more and more ways to pay for things, subtracting rather than adding seems like a step in the wrong direction." (Sammonfsih86 - NA)

The sense of reliance on public transport around London made some of the city's commuters feel it unfair that fundamental changes to payment options had happened on a service that they couldn't 'opt-out' of. Other criticisms of the policy change cited more practical repercussions. Echoing the findings of prior work [36, 37], many online comments stated preferences for using cash because it facilitated a greater awareness of funds and the receipt of paper tickets which acted as records of expenditure: *"I would like to be paid in cash weekly, pay my bills weekly in person whilst receiving a receipt"(MsLelaharvey, - NA)*. In contrast to this, *Oyster* was seen as placing additional barriers to the

awareness of credit: *"People don't keep track of how much money they have on their oyster card. I finish work at around 11pm. If I'm short on my card, where can I top it up? I know I have run out a few times" (Gorddtanks - NA)*. Relatedly, some people had clearly experienced failings in the use of *Oyster*, reflecting concerns over its reliability and the perceived seamlessness of the system: *"I had too much taken off my oyster and my bank card doesn't have contactless. I was half an hour late for work" (Billyboob - NA).*

In the following interview extract, Ray describes how the system's lack of flexibility had played out in practice. Unable to pay for his partner's fare, one passenger had to leave the bus without getting a refund:

"It's very vague. Me personally, I don't think it's going to work. I worked on Monday; the first two hours I had three people on offering me cash. One guy got on with his girlfriend; he had an Oyster Card, she had money in her hand, I said, "Sorry, we don't take cash no more." "Oh, well I've just paid, and I want my girlfriend to come on." "Sorry, but there's nothing I can do about that." "Can I get my money back?" I said, "No."" (Ray - BD)

Along with removing a flexible payment option, there were some deeper concerns related to the ways in which the *Oyster* might be used for surveillance. As noted in the related work, there are concerns that systems like *Oyster* can be used to gather data for the state. This was not lost on a great many of the public comments on news sites discussing the introduction of the new policy: *"A pathetic decision by the authorities to monitor and control all movement in the capital."; "cashless means every single transaction made will be traceable. Your life will be totally open for review by those who wish to spy on the public." (COYSCOYS - NA);* and *"Cashless society is not about cost cutting or ease of cash flow it's about control of your money and spying. wake up" (ReginnaJeffrey - NA)*. The somber and cynical opinions about the potential of this technology to track and compile detailed information about passengers was bound up with a fear that this was leading to a dystopian and tyrannical future: *"The first step in getting us to accept a cashless society. Once we are all on plastic money, they can control us." (Flonius77 - TW)*

As well as questions over state surveillance, there were also concerns that personal details would be sold on to third parties. Making electronic payment involuntary allows the mass collection of passenger information that can be stored, matched, retrieved, processed, marketed and circulated:

"I pay for everything in cash because I don't want middle-men monetising my purchasing history." (PArisloves - NA)

"I frickin' hate this; I don't want my financial details known, I don't want the faceless to know where I travelled to, I don't want my life gummed up because my personal habits have been sold on." (IAmSmarten - NA)

None of the online comments we collected articulated any foreseen benefits in collecting and storing this sort of information. This is despite TfL arguing that information will allow them to better plan the transport system and protect commuters from being over-charged.

DISCUSSION

Our findings highlight the myriad of ways that the introduction of compulsory cashless payments on London buses has been negotiated by drivers and passengers. Here we reflect upon four specific issues raised by our study.

Cashless changes the social function of money

The narrative produced by TfL surrounding their elimination of cash payments emphasises the benefits for passengers—reduced boarding times, improved reliability, and efficiency savings to be spent on improving the service. Our fieldwork confirmed some of these claims. There were very few instances of passengers not boarding seamlessly, and many of those spoken to felt that the new system was a *"good idea"*. However at the same time, echoing [4] and [25], we saw occasions where *Oyster* broke social norms around money exchange—reducing engagement between drivers and passengers, and the inability to pay for others.

To gain insight on the implications here, it is useful to first reflect on the social and cultural functions of money, and the ways *Oyster* and the cashless policy undermine these. Sociologist Georg Simmel [32] has argued that the development of money economies came in place of systems of barter and was part of a move from *gemeinshaft* to *gesellschaft*—that is transitioning from a society based on personal relationships to one based on more detached interactions. Simmel viewed money as both the cause and consequence of more impersonal relations. These are ideas alluded to in other classical works in sociology—for example, Karl Marx [23] shared Simmel's understanding of money as impersonal, while emphasising the role it plays in creating and maintaining alienation. We saw the potential for increased separation in the way *Oyster* dramatically reduced the potential for interaction between drivers and passengers—and, indeed, has introduced situations where if these interactions do occur they will likely be adversarial and a result of problems to do with payment.

Perhaps more subtly we also see how the reliance on contactless systems brings with it ramifications for the value of sharing money with others. It is no longer possible to give a fellow passenger small change if they found themselves short of the amount needed for a journey—or for a passenger to pay on the behalf of a partner—or for someone to pay for a friend they owe money to. The implication here is that with the transition to cashless payments comes further qualities of individualisation and removal of spontaneous opportunities of goodness.

Cashless encourages additional emotional labour

For the drivers, there are immediately many more positives than negatives. They no longer need to carry a cash float with them, which also means they no longer have to pay money in at the end of their shift. The majority of drivers considered the reduced need to interact with passengers as a benefit—in some respects a return to the historical role of a bus driver as a driver, and not a *"fucking cashier"*. The sociological literature on work illustrates how prolonged

engagement with customers places a significant emotional and psychological strain on employees [15]. Recent studies of London's bus driver's also highlight the various performance-related concerns that heavily impact on drivers work [26, 27]—and issue illustrated in foundational ethnographies of bus driving as well [33]. Therefore, we might infer that the reduced human contact that cashlessness facilitates might actually improve driver wellbeing through reducing one of the performative burdens of this role.

However, the removal of a cash payment option came at some significant cost. First, the run-up to the cashless policy was stressful for many of our bus-driving participants. Their reaction to a lack of information—and an imagined range of negative consequences—inspired coping strategies in advance of the start date. Second, even though these tactics were rarely needed in practice, a range of new problems with passengers did emerge. This included having to gauge the vulnerability of a passenger if they didn't have correct payment, or having to more deeply interrogate *Oyster* users about the validity of their card or their lack of credit. It has been highlighted in workplace studies how the regulation of emotional expression in the duty of work can be considered a form of emotional labour [28], suggesting it is the quality of interaction, and not just its quantity, that places burdens and stresses on workers. Therefore, while the perceived reduction in interactions was seen to be a reduction in labour, those that did occur required greater thought, reflexivity and negotiation of sympathy and meant emotional labour increased.

Cashless brings work

As noted in the previous section, many of the passengers appeared to appreciate the potential efficiency savings of cashless bus payments. For many of the people we spoke to and saw during our ethnographic engagement, it was clear that—in Crabtree et al's [7] words—the *Oyster* was unremarkable. It was something they used, that they saw others using—it was everyday and mundane. This is echoed in the rhetoric surrounding TfL's elimination of cash and the quote from Mastercard that opened this paper—that cash is effortful and burdensome while electronic payments, especially those where there is no need to enter a personal identification number, are effortless, simple and invisible.

However, the narrative surrounding the everyday nature of cashless payments ignores the great amount of work and hidden labour involved in its maintenance and use. While it is not unusual for the hidden labour of employees as a result of new technologies to be highlighted (e.g. [27]), in this case it was the passengers who had to place considerably more effort into the production of this system. There is now a greater need than ever to ensure their *Oyster* is with them at all times and has sufficient credit to complete journeys. This often means that passengers have to seek locations to add credit to their card, keep track of how much remains on it, and—if they are prudent—check on the TfL website to make sure transactions and journeys had been accounted for correctly. While for the most part it appeared that this was not an issue, fear from both drivers and members of the public manifested when journeys were made at times of the day when shops may be closed, when locations around bus stops may be deserted, and when travelling to and from places that are unfamiliar. Indeed, the dangers inherent in running out of credit vividly emerge as the failsafe of cash no longer exists. In many respects, it highlights the 'problem of infrastructure' [10]. It also illustrates how *Oyster* persists into the background until it must 'first be manipulated to bring ordinary activities about' [7, p.555] making the working of *Oyster* the primary activity placing the need to travel into the background. In other words, greater work has to go into seeking places to find credit, or in engaging in dialogue with a bus driver with the hope of being assessed as 'vulnerable' in their eyes—all in order to accomplish the mundane act of using public transport.

Cashless brings fear

Some bus passengers' privacy-related concerns about the introduction of cashless fares—especially in employing the metaphor of 'Big Brother'—reveal a wider cultural fear about computer databases that store and process personal data. Glassner [12] highlights how 'cultures of fear' have become a condition of modern Western societies—a concern that is very apparent here and perhaps more so given the earlier mentioned concerns around state use of *Oyster* data. We must note that those comments discussed are likely to be extreme views—we did not come across any passengers during our journeys that raised these concerns directly to the researchers. Indeed, there are even ways to mitigate against this fear—through using 'pay as you go' *Oyster* cards that do not require registration (albeit come at slightly greater cost). Using this card means transactions are 'counted' but whom they belong to is not. Yet this would possibly not suffice for those whose concerns over surveillance are experienced as a real tension of everyday life. Perhaps in this case there is little that better design can do, but rather —as [8] highlights—to ensure companies, data brokers and governments act responsibly and transparently in the ways which data is used and safeguarded.

Implications for going cashless

While our study was focused on the specific example of *Oyster*, the types of changes being faced in London are likely to occur elsewhere around the world as other municipalities and transport providers introduce cashless payments (or eliminate cash payments). Furthermore, many of the challenges we identified in relation to the elimination of cash payments are illustrative of wider problems with digital payment systems that are increasingly prevalent in our lives. Here we address three specific areas of concern.

First, the issues related to the social function of money are reflective of thinking within the domain of digital payments and banking, which is dominated by bank cards, online

services and mobile payments that operate on the basis of a single authenticated account holder. This is, of course, at odds with research that has demonstrated how people desire to share money with those they trust [36], and share passwords with others [18, 31]. Similar sharing practices were important for transport users—couples would pay for each other's travel, parents would pay for their children, friends would pay for travel as a group. Such practices were not just habitual nor whims but often highly pragmatic—it might be easier for large groups to travel together when paying with cash at once, it might be easier for a parent to pay than rely on their child to keep hold of their card, or it's easier to take visitors out on the bus when paying by cash. As such, in line with this work, we call for future cashless systems to take seriously the social value of money and support ways for spontaneously sharing digital money with others. Technically, with some modification there is no reason why cashless payment systems couldn't incorporate flexibility around fares—for example, through the use of buttons either on the card or reader to signify an additional fare. To mitigate against abuse, this could be limited to a single additional fare, which might be changeable through an online account. However, in the specific context of *Oyster*, the primary barrier to paying on the behalf of someone else is policy—which says that all passengers must have a 'valid ticket', and the ticket being the physical *Oyster Card* in itself. As such, we call for changes to policies like this to enable people to spend credit they have purchased in a more flexible manner as they wish.

Second, we saw how the introduction of the policy, and not having a universal payment system to fall back on, placed drivers in the difficult position of assessing another person's vulnerability. Prior work has highlighted how digital technology tends to complicate the occupation of bus driving [26,27], and we see this again in the case of digital payments, although less directly. There might be opportunities here to support drivers in making assessments around passenger vulnerability. Given that drivers are now presented with a plethora of data related to their route already [26], we might imagine that localised information—which might relate the availability of card and credit vendors—would be useful if sensitively presented to drivers in aiding their assessments of the risks of refusing travel to passengers at points along a route. If information overload is a concern, then this could be presented only when stationary at a bus stop, which might communicate with the bus via iBeacons or similar. However, we would argue that a policy of assessing passenger vulnerability is not sustainable in the long term due to its ambiguity, openness to abuse and the stress and scrutiny it places drivers under.

Third, building on the above, there needs to be adequate contingency systems in place for when a person has no credit or card on their person. While the 'one more journey' system for *Oyster* was intended to provide this, we saw it fail when that 'one' journey was actually many small journeys on different buses. It also doesn't account at all for

situations where people do not have access to an *Oyster* card in the first place. While one way of resolving this might be to provide better communication channels to citizens about where 'nearby' top-up locations are, it occurs to us that there are more challenging infrastructural issues that should be accounted for prior to introducing cashless public transport. Emergency tickets purchased from basic dispensers at bus shelters that can be shown to drivers for one journey, particularly when boarding from stops known to be in vendor 'black holes', should be a standard contingency. Such tickets could also be purchased from vendors if the traveller is a one-off visitor from out of town—or enables a more regular passenger to keep a small supply of tickets in their wallet for when their credit runs out. This might sound particularly antiquated—and unoriginal, considering similar services are provided in a range of other cities across the world. However, our point is that a universal transport system requires a universal form of payment—and as with universal design this should mean being configurable, accessible and inclusive to all (as alluded by MasterCard in the quote opening this paper), not one-size-fits all.

CONCLUSION

In this paper we have explored the introduction of compulsory cashless payments on London's buses. There is much to gain from cashless technologies like *Oyster*—however, when cash is withdrawn completely there are also substantial losses in the form of the reduced social function of money, heightening the vulnerability of some citizens, and a fear of increased surveillance and control from the state. Our study provided insight into the emerging body of HCI research on the topic of digital money, and highlights the impact the changing nature of money has on a specific occupational group and their service users.

ACKNOWLEDGEMENTS

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