

Digital Interface Design, Power and Control: Friction, Threshold, Transition

Abstract

This paper draws upon the example of High-Cost-Short Term Credit (HCSTC) products accessed via digital interfaces and devices to examine practices of interface design and the operation of digitally mediated power. Utilising interviews with HCSTC website designers and users of these products, the paper shows how these interfaces are designed and tested to manage frictions: practical, affective or emotional blocks that interrupt or stop users from applying for these products and entering into credit and debt. We suggest that the key role of interface design is to manage these frictions by guiding action in such a way to minimise intentional or propositional thought and negative affective states at key thresholds of the application process. The management of friction is enabled by practices of data driven design, where the contingency of human response is engineered through analytics in order to increase rates of application. Working through the example of HCSTC, the paper complicates a notion of control as a smooth or automatic operation of power, instead emphasising the necessity of both continuity and discontinuity as key to modulating action in a digital age. To understand the specificity of interface interactions and move beyond existing work on control, we offer a vocabulary of friction, thresholds, and transitions.

Key words: Digital Interface, Design, High Cost Short Term Credit, Debt, Money

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1. Introduction

‘Before...[Cash Flash]...was around you had to go to a bank and everything was really complicated...[T]here wasn't this kind of immediate response, immediate feedback... So the fact that it's online...you can literally select to the pound how much you want...We put all the controls for the loan at your fingertips so you decide how much you want and how long you need it for and then we tell you how much that's going to be... it was just a bit of a revolution’.

In the example above, a digital interface designer recounts what they see as the key role digital interfaces played in the rise of popularity of High Cost Short Term Credit (HCSTC). HCSTC refers to products such as cash and pay day loans, guarantor loans and logbook loans, where relatively small amounts of money are borrowed for relatively short periods of time at a high rate of interest. In 2014 in the UK, the market for HCSTC was estimated to be worth £2 billion pounds a year (CMA, 2014). As the designer correctly identifies, part of the expansion of the HCSTC market was enabled by a shift in how credit is accessed. In the case of cash and pay day loans in particular, customers previously had to make a phone call or visit a branch of a cash or pay day loan company to apply for a loan. But, with the rise of internet enabled devices and internet access, HCSTC companies have developed websites and mobile applications where customers can apply through automated systems and receive decisions about the status of their loan, as well as access to the money itself very quickly, often within ten or fifteen minutes. The ease and speed of using these systems has led to a situation in which 82% of all cash and pay day loans in the UK are applied for and approved online through digital interfaces and websites (CMA, 2015).

While the designer in the above quote suggests that accessing HCSTC via digital interfaces and devices works to put ‘control...at your fingertips’, which marks a positive development, ushering in an era of increased speed and freedom for borrowers, others have pointed to the harm debt can create, including

unsustainable practices of borrowing (CMA, 2014) and mental health issues (Fitch et al., 2011). Accessing HCSTC by digital interfaces can thus be understood as part of broader processes of global finance and particularly fringe finance. In Aitken's (2006: 480) words:

'Fringe finance includes a set of credit practices provided to those populations that exist on the margins of the mainstream financial world. Fringe financial practices typically include cheque-cashing services, payday loan providers, pawnshops, rent-to-own retailers, auto title loan services (credit secured by auto title), tax refund anticipation loans and other services delivered to the 'unbanked' or financially excluded'.

According to Aitken (2006: 482), fringe finance is especially problematic because so many of its negative effects are 'felt disproportionately among poor and minority populations', as they attempt to manage monetary issues through forms of both 'self-governmentality' and 'coercion' by the systems themselves (on social issues around debt more broadly, see Deville and Seigworth, 2015; Iafrati, 2014; Marron, 2012; Wilkis, 2015). As Deville (2015) has demonstrated, credit objects such as credit cards are central to the both practices of self-governmentality and coercion, operating as 'lures for feeling' that tempt people into borrowing, with digital interfaces in HCSTC proving particularly effective (Deville and Velden, 2016). In other words, digital systems and interfaces are key to the operation of fringe finance and in turn the social problems this finance generates.

Recognising the socially and economically damaging potential of HCSTC, theorising digital interfaces in relation to control allows us to better understand how people become implicated in fringe finance systems. By focusing on the specificity of how interface interactions are designed and experienced, the paper deepens and complicates an account of self-governance and coercion in relation to social issues around debt. To do this, the paper draws upon interviews with HCSTC website designers and HCSTC users¹, focusing on the techniques utilised

¹ Forty semi-structured interviews were conducted with HCSTC users and eleven with HCSTC website designers. Questions with users focused on how they used

by HCSTC designers to guide the user through the process of applying for credit, and exploring how people respond to these techniques.

Parallel to the social and political implications of better understanding digital experiences of HCSTC (in order to argue for new forms of regulation around digital access to credit for example), we use the case of HCSTC design to interrogate accounts of digital power that have become prominent in digital geographies (Ash et al., 2016) and associated fields such as sociology, science and technology and media and cultural studies beyond discussions of debt or fringe finance. Whilst this work has done much to understand how power operates in the background of digital systems, through algorithms and search engines (Amoore and Piotukh, 2016; Cheney-Lippold, 2011; Deville and Velden, 2016; Mackenzie and Vurdubakis, 2011; Pasquinelli, 2009; Striphas, 2015) and interfaces (Ash, 2015; Degen et al., 2015; Rose et al., 2014; Seigworth, 2016; Wilson, 2014), little work to date has focused on how power operates, and is enabled, through actual practices of interface *design*. As work on the sociology of design (Broth, 2008; Fariás and Wilkie, 2016; Mackenzie, 2006; Marenko, 2015) suggests, the risk is that, in ignoring practices of design, assumptions about the smooth manipulation of user action and experience creep back into analysis, reproducing conventional stories about the location and form of power in a digitalising world.

Rather than designers possessing power, which they then exert by creating systems of modulation or manipulation in relation to passive unknowing users, we argue that interface design is an experimental process of managing friction. By friction, we mean a series of bodily and technical obstacles or hesitations that

digital devices to access credit, the spaces and times where this credit was accessed and how this access was influenced by various factors from outside of the interface. Questions with designers focused on the techniques they used when designing HCSTC websites in order to maximise applications and how they used data analytics to improve applicant rates. Once transcribed, all the interviews were coded in NVivo, using a range of keywords that focused on particular parts of the interface, affective states of users and spaces and times where credit was accessed on digital devices. As part of the ethics of data collection, all the names of companies, designers, users and identifiable features and details of companies, designers, websites and users that are discussed throughout the paper have been changed.

interrupt, slow or stop a user from completing a task within a digital interface, such as choosing a service or buying a product. Friction is a matter of attempting to not only produce smooth experiences, although that is part of what is being done, but of producing the possibility of a transition between thresholds at the right time. For now, 'thresholds' can be understood as key points in an interface that need to be passed through. In digital interfaces these thresholds include, for example, decisions over data entry, purchase application and so on. By 'transition', we mean a moment in which a more or less provisional justification that overcomes or quiets worries, fears or other affective states is made, which allows people to move beyond the thresholds and the frictions they encounter in the interface.

Distinct from the smoothness of constant modulation (Deleuze, 1992), power in relation to interface design is, we argue, a matter of producing continuities and discontinuities that work together. Interface design is not about necessarily always trying to reduce friction². Rather, as we show, friction can also be productively introduced to help achieve the completion of a task, as long as this friction is carefully managed (much like the 'planned' frictions of logistics, see Gregson et al., 2017). In the practices of data driven design that are central to the making of interfaces, this process of managing frictions and enabling transitions are aided by the use of data analytics. These analytics act as catalysts for

² Alongside contributing to academic debates, this account also complicates and challenges the notion of friction as it is used by financial technology (Fintech) companies in their accounts of the positive disruption their services enable. Here Whilst not our focus here, we should note how this differs from how 'friction' is discussed in relation to fintech and its promises. Friction is a placeholder for all that interrupts a smooth and efficient flow and circulation of goods or money Davis K, 2015, "6 ways to thrive in digital disruption", <https://www.corelogic.com.au/news/6-ways-to-thrive-in-digital-disruption>. These frictions can be intra-organizational inefficiencies that need to be overcome, but more often than not is associated with transaction costs in the market and especially payment itself. Hernaes, 2017, "Fintech and the disruption of banks - where are we now? Part 1: Payments", <http://hernaes.com/2017/02/08/fintech-and-the-disruption-of-banks-where-are-we-now-part-1-payments/>. For Fintech, reducing friction is a key element of the 'disruption' that the digital economy seeks out, and key to the promises that attach to it and animate it.

experimentation with what works in interface design. Here power, for both the designer and user, is “exerted in the drawing together of once incompatible states into compatibility”, with the “agency of power work[ing]...alongside and within its subject”, rather than separate or implemented upon it (Hookway, 2014 p23). Our vocabulary of friction, thresholds and transition is offered, then, as a means of understanding how those ‘compatibilities’ between user and interface are (re)produced.

It is important to note that the techniques utilised in HCSTC website design are not unique to these sites. For instance, a whole range of digital interfaces, such as retail, rental and banking websites implement similar designs for their pages and input devices such as sliders and buttons and use analytics to hone and change their interface to drive user engagement. The vocabulary developed in the paper, thus allows us to attend to the precise forms and modalities of power coming into being in an increasingly digitally mediated world (see, for example, on control in a digital world Bogard, 2015; Franklin, 2015) and provide the ability to diagnose how this power operates and in turn better understand the harms it may cause.

The argument about interface design unfolds in four sections. In the next section, we explicitly theorise friction, threshold and transition as a means of understanding how interfaces are designed and condition action and experience without reproducing tropes of the manipulation of passive users. We connect this account to the emphasis on modulation as striation and transformation in work that has drawn on Deleuze’s (1992) arguments about ‘control’. Section two demonstrates various techniques designers utilise to attempt to manage the friction of both users and the sites they create by constructing thresholds at key points in the interface. Discussing the use of A/B and multi-variance testing in HCSTC design, this section shows how friction cannot be easily codified and questions the presumption that designers can simply or directly manipulate user actions. Section four explores how these design techniques are experienced in practice and how people transition through the thresholds of HCSTC sites. In conclusion we point to how the concepts of friction, threshold and transition can be used to understand power in relation to data driven interface design in ways

that refuse simple narratives of manipulation and complicate accounts of modulation.

2. Friction, Threshold and Transition

Much work has found resource in Deleuze's (1992) theorisations of the emergence of 'control societies' or 'societies of control' to understand power in a digitally mediated world of interfaces, in particular his emphasis on how 'modulation' replaces the 'mouldings' of disciplinary forms of power. Rather than imposing a form across diverse circumstances, as in disciplinary power, modulations work on and through movements "like a self-transmuting moulding, continually changing from one moment to the next" (ibid. 179-80). Interfaces would, on this understanding, enable the 'open circulations' that, for Deleuze, replace the closed milieus of disciplinary power and society. Leaving to one side questions of the relation between discipline and control and the risks of characterising a society according to one mode of power, it is easy to understand how the emphasis on flexibility and continuous change we find in Deleuze's account of modulation appears to fit with processes of digital mediation through interfaces, especially given the importance Deleuze affords to the digital in the transition from disciplinary power (Best, 2010; Bogard, 2015; Bratich, 2006; Cheney-Lippold, 2011; Chun, 2006; Franklin, 2015; Lazzarato, 2006; Parisi, 2012). If interfaces are understood as "autonomous zones of activities" and "processes that effect a result" (Galloway, 2013 p8), control in Deleuze's terms would be the key interface effect and modulation the name for the process that achieves it.

But, whilst it characterises a process, invoking modulation can assume a lot about those who are subjected to it. For instance, Cheney-Lippold (2011: 165) argues that web analytics enable a situation in which 'categories of identity are being inferred upon individuals based on their web use...[and]...[c]ode and algorithm are the engines behind such inference'. In this case, modulation 'marks a continuous control over society that speaks to individuals in a sort of coded language, of creating not individuals but endlessly sub-dividable

'dividuals'...[which]...become the axiom of control, the recipients through which power flows as subjectivity takes a deconstructed dive into the digital era' (Cheney-Lippold, 2011: 169). However, while the concept of modulation provides a fascinating account of new-algorithmic identity, it tell us little specifically about the relation between users and interface and how they come to experience these coded identities. In doing so, this kind of account can equate the ideal-type interface effect (dividualised algorithmic identity) and process (web browsing) with how power operates in practice.

Linked to this point, accounts of control and modulation can assume that those who design such systems have complete control over what they do, how they work and can anticipate what their effects will be. For example, Zwick and Nott (2009: 224) position digital marketers who construct and utilise databases to identify markets for clients as architects who 'manufacture...customers as valuable information commodities'. In Zwick and Nott's narrative, the failures, hesitancies and discontinuities that are no doubt involved in digital marketing are not discussed, which reinforces an account of modulation as a matter of smoothness, flow and consistency. Ignoring the specificity of practices with their attendant failures, gaps, and contestations can lead to a type of analysis that either dissolves power into the networks, assemblages or ecologies that enable relations of control (such as the database the marketers construct and use) or, often implicitly, re-centres power in the designers of manipulative algorithms or interfaces or systems (such as the software and IT engineers who manage these databases).

Distinct from these accounts, throughout the rest of this paper we utilise a vocabulary of friction, thresholds and transitions to understand modulation as a double movement or management of smoothness and striation that is fragile, continual and ongoing. As Raunig (2016) argues, modulation operates through, on the one hand, the striation of distinct modules and, on the other, constant, permanent modifications and transformations across temporary striations. On this understanding, an interface modulates by creating, albeit temporarily, relations with the user that enable distinct striations and modifications.

Developing this point, we suggest that modulation is a matter of managing the interplay of various bodily and technical frictions that emerge whenever someone or something engages with an interface. Formally stated, frictions can be defined as practical, affective and emotional contestations between bodies and interfaces. Frictions are not something that can be simply overcome or put to one side, but are a necessary part of any engagement with an interface. In Rose's (2015: 343) words: 'friction is inherent to interfaces'. Frictions might be blocks or obstacles that interrupt, slow or stop a user from completing a task within an interface, such as a password screen. But frictions can also act as sites of grip, encouraging someone to continue using or engaging with that interface because of the contestation faced by the user, such as when learning to play a videogame. In either case, friction is a key currency of digital power as modulation.

Frictions are powerful because they can activate what we term the infra-individual tendencies of user's bodies. Following Massumi (2014 p8-9), we can understand infra-individual tendencies as a range of chemical, affective, sensory, motor and memory forces that compete with one another and contribute to how a person thinks, feels and ultimately decides how to act in a situation. For instance, we could understand deciding whether to eat something, not as the outcome of a process of rational contemplation, but as a competition between the rumbling of our stomach, the smell of food in the environment, the colour or texture of food packaging, memories of when we last ate and the promises we might have made to ourselves to reduce our calorie intake in order to lose weight. In relation to interfaces, on an infra-individual level, friction can be invoked by pretty much anything, such as an off putting colour of text, an unpleasant sound effect, or a feeling that an image looks unprofessional. Although, as we shall see, some frictions are designed into interfaces, in the main frictions are interruptions that delay, stop, halt or defer some kind of desired interface effect - such as, in our case of HCSTC, the making of an online application for credit.

Whilst frictions may emerge around any aspect of an interface, they become most apparent and pronounced at specific thresholds in interfaces, where a user has to make a commitment to something. By 'threshold', we refer to a necessary moment or point in interfaces that a designer needs to encourage the user to cross or move beyond. Always involving some kind of movement, thresholds are occasions of discontinuity within an interface. A threshold is thus what Hookway terms a 'liminal condition', which both 'brings about a kind of order, stability or balance' but is 'also continuously open to the possibilities of disorder, instability, immanence, chaos, and turbulence' (Hookway, 2014 p23). In HCSTC interface design, as we shall see, there are several thresholds within any one interface - such as sliders which project the repayment costs of credit that vary according to amount borrowed and loan duration, and application forms. Each of the thresholds within the interface contributes to enabling the user to move towards the key threshold of the 'submit application' button.

In our terms, designers are faced with the challenge of managing the frictions that can intensify around the key thresholds that constitute an interface. Or, more precisely, for desired interface effects to happen some kinds of frictions must be minimised (and some enabled) by creating what we call 'transitions'. By transition we mean a moment or point at which competing infra-individual tendencies within a person are at least provisionally resolved. A transition might feel like a decision and might result in a decision being made, but this is quite different from an account of decision making in which a 'decision is a singular moment abstracted from the context within which it takes place' (McCormack and Schwanen, 2011: 2810). Rather, the idea of transition points to a notion of decision that is closer to what McCormack and Schwanen (2011: 2808) understand as space-times that 'register as transformative events felt through the displacements they generate in bodies'. In relation to interface design, the thresholds of the interface are designed to enable transitions that quiet worries, fears or other affective states that might impede or forestall people crossing the various thresholds that result in an application for credit to be made. What is crucial is that the transition between tendencies does not have to be absolute or irreversible. As long as the tendencies are resolved for just long enough for the

user to apply, then the interface designer has successfully managed the friction of the user. While resolving infra-individual tendencies in a user is not always enabled by the interface alone, the interface itself often plays an important role in resolving the infra-individual tendencies of users and enables action to continue. In the case of HCSTC, the continuation of action might be the completion and submission of an application for credit.

In the example of HCSTC, these frictions, thresholds and transitions can be analysed at three sites. First there are various infra-individual tendencies and transitions at play in the user's body before they pick up their device and access a HCSTC website. Users have some idea that they want to borrow money, usually have a specific reason for doing so and a range of concerns, worries, fears and hopes attached to what the money can do, if their application is successful. Indeed, in some cases, users might already be resolved to borrow long before they begin applying for credit online as they are convinced they need the money and will apply regardless of the cost.

Second, there is a friction inherent in the interface itself, where the designer attempts to organise the relationship between different units in the interface to create a threshold in order to help the user generate the necessary transitions which enable an application. By unit, we mean a modular piece of an interface, such as an image, text box or button. As we argue elsewhere (Authors XXXX), these units are experienced synaesthetically across multiple senses, which is how they work to influence infra-individual tendencies in the body of users. As we shall see, the designer can attempt to manage frictions through the design and testing of units that operate as thresholds and the units that surround these thresholds, both through in house testing but also through real time feedback based on user analytics.

Third, there is the specific friction between the user and the interface at the time of application, where the users pre-existing infra-individual tendencies meet the frictions and thresholds of a specific interface. Experientially, this plays out

through the expression of various bodily states, such as anticipation, stress, anxiety or excitement as users engage with the site and the friction of the thresholds themselves. Through particular design practices the interface can either help manage these frictions so as to enable a transition, which allows a user to cross the final threshold of the interface and apply for credit, or fail to manage these frictions, in which case the necessary transitions are not made and the threshold disappears. In this case, the user may hesitate to apply or not apply at all.

The vocabulary of friction, threshold and transition is designed to move beyond a theorisation of power in relation to digital technology as a matter of controlling users via a smooth or continuous modulation of action. Rather, focusing on the way frictions operates between bodies, software and hardware points to a model of modulation as a continuous interplay and management of different forces and tensions. This management is not always a case of overcoming or minimising friction, but working productively with it, in order to produce a transition or change in state (of a human user, or another object) that suits the designer or owner of that interface or technology.

Analysing friction as modulation requires an empirical focus on the specific form of relations between interface and user while recognising that the achievement of a desired change of state is always fragile and in doubt. To understand how friction is managed we turn to the particular design practices associated with HCSTC websites and interface design more generally before, in the following section, describing how users experience interface design. We organise both sections around the design and experience of the specific thresholds - sliders, buttons and forms - that constitute HCSTC interfaces.

3. Designing and Testing Thresholds

User experience designers are keen to manage the friction in their interfaces and help enable transitions that affectively pacify, allay and not unnecessarily delay

those that use these websites. To do this, the designers we interviewed employed a number of techniques organised around the construction of thresholds. In HCSTC website design and website design more broadly, practices of designing and testing these thresholds go hand in hand. These practices range from the development of personas before the interface is designed, to the design of units of the site, such as buttons, sliders and images, to in house testing with users on prototypes of the interface, through to real time testing of users drawing upon analytics of users as they engage with the websites. These practices are complex, so for reasons of space, in this section we can only focus on the design and testing of units in the interface and how these units were modified using analytics derived from real users as they visited these sites.

From the perspective of a user experience designer, the purpose of the interface design in HCSTC websites is to enable, coax and encourage the user to press, click or tap on the 'submit application' button. In this case, HCSTC websites are designed to guide the user through the stages of the application process with as minimal fuss as possible. Thresholds in the interface are designed around a logic of funnelling. The funnel is designed encourage the user to fill in the necessary amount of information needed to make a loan application, while minimising what the designer referred to as customer drop off, where the customer leaves the page and fails to complete the application. The more efficiently the user moves through this funnel, the more effective or successful the design of the interface is considered to be.

In order to minimise the number of drop offs, designers optimise their websites using real time testing with actual users as they engage with the site. Utilising cookies on their websites and software such as Google Analytics, designers can monitor almost every aspect of users' engagement with a site. These analytics measure everything from the length of time spent on a single screen, to the page at which a user leaves an application, to the geographical location of the visitor, to the operating system and browser that is being used to access the site. The designer can then use this information to alter aspects of the units of the site and then test to see how this alters engagement with these units.

Such tests take one of two forms: a/b testing and multi-variance testing. In a/b testing a certain percentage of users who access the site in question receive one version of the site and the other percentage receive the other version. Including a key design difference between each site, the designer can then use the site analytics to determine the effectiveness of a single element such as the colour of a button, by seeing if the difference introduced increases or decreases engagement. In multi-variance testing, a similar principle is used, except multiple differences are introduced and all the combinations of these differences are tested to understand which combination of units is most effective (such as two different headlines and two different images that sit alongside this headline). Beyond testing different designs, these sites are also responsive. This means that depending on a range of factors such as location or operating system, the site will present content differently to the user in order to further optimise their movement through the funnel.

Having briefly described the forms of testing employed by HCSTC designers, we can now explore how this testing influences the design of thresholds in these sites. In HCSTC websites we can identify at least three thresholds, which are organised around or linked to particular units: the slider threshold, the apply now threshold and the application forms threshold. The number and order of these thresholds are similar across a range of HCSTC websites, although there are some important differences.

Threshold 1: Slider

The slider unit is one of the first things that appears when accessing the majority of HCSTC websites. Sliders generally consist of two coloured bars with buttons that can be moved left and right. Within the HCSTC market, the prioritisation of the slider as the main element of interaction was pioneered by Wonga.com. As Wonga.com became the most successful company in the HCSTC market, competitors quickly adopted the slider as a key unit of their websites as well. In doing so, the slider has become one of the defining units of HCSTC website design

In HCSTC, the top bar usually refers to the amount of money to be borrowed and the bottom bar the length of time the money is to be borrowed for. The sliders are actively designed to minimise friction in the interface for a user who is interested in applying for a loan. As a designer for HCSTC website puts it:

‘from a pure interface perspective, it's easier than typing in a number...[I]f I'm typing in £1,000 on my phone for example, that's five taps but if I'm just dragging a slider, that's one touch and drag which is a much lower interaction cost. So...from...[a]...pure interface perspective, it's an easier way for someone to specify...information’.

As the designer argues, the slider is designed to literally ease friction by converting a quantitative bodily movement, such as typing particular numbers into a keyboard or touch screen into a smooth, indivisible qualitative movement. At the same time a quantity of money becomes a quality of motion. In doing so the movement of the body becomes directly associated with the money that is to be borrowed. Alongside ease of motion, the sliders are also designed to create a sense of playfulness that encourages the user to easily explore different amounts of money that they can borrow, beyond their original intention when visiting the site. As one HCSTC designer put it:

‘I want you to play with the sliders, I want you to slide the “how much cash do you want?” right up to the very end and I want you to slide the “how long do you want it for?” right up to the very end. So you've thought, "Great I can borrow £512," apply now’.

Beyond the playful and qualitative nature of the slider, sliders on many HCSTC websites are responsive and attempt to pre-empt what the user wants to borrow based upon information discerned from their IP address, operating system, browser and cookie files. For instance a HCSTC designer for the website CashFlash discusses the importance of the responsive nature of the slider in the following way:

'We...have...optimisation within the numbers on the sliders...[I]f you're...viewing the website from London, you'll see a different number than you would up in the north east of England...But if we can't determine where you are then...it defaults to £140....[We] also know that...an Explorer 10 user is probably going to be more short of money than someone that's got a brand new Mac Book Pro that's running Safari 10...[so we can also use this factor to optimise the default position of the slider] '.

The different default positions of the sliders act as both a threshold and seek to minimise friction by giving people the ability to both explore different possibilities for the amount of money they want to borrow, while giving them the time and space to qualify why they want to borrow that money. These movements are also recorded in real time by CashFlash. As the designer points out, the result of recording is that it enables them to optimise where to place the default location of the slider button in order to maximise the possibility of the user playing with the slider, which increases the chance of them applying for a loan. In the designer's words:

'I might come here thinking I'm only going to borrow £200; because it is automatically updating as I move, then I might be like "okay, well the interest isn't actually that much, and I can go to £300", but say you were in a drop-down and you selected £200, you might be "okay, that's the interest, I'll go with it", but with...[the slider]...people will automatically play with it; they will go left and right just to see the numbers move. It's an interaction, and...that's when people can go "okay...maybe I can go a little higher, or maybe I don't actually need to do that much"...it's the site interacting back with them, rather than...just inputting fields. There are more than two ways, there'.

The threshold of the slider is thus an attempt to manage friction and avoid forcing an immediate binary choice upon the user. Encouraging qualitative forms of experiment, increases the opportunity for users to come to qualify their engagement with the unit, which then allows them to move beyond this threshold and onto the next one. In the case of most HCSTC websites, once a user has finished

moving the sliders, the next threshold is the apply now button unit, which the user needs to press to move onto the application form itself.

Threshold 2: Buttons

Where the slider is designed to open up a space of play and experimentation, the apply now button is seemingly a more cumbersome threshold that needs to be encountered. Where the slider is a continuum, the apply now button is binary. The design of this unit is therefore based around minimising any potential friction that might encourage hesitation in the user and stop them from moving onward in the application process. The apply now button is a very simple unit, that usually sits adjacent to the slider unit on a HCSTC website. The button is normally quite large, with text stating 'apply' or 'apply now'. Despite its simplicity, serious consideration is still given to its design. The key aspects of an apply now button's design is its size, colour and the font and text used that forms part of the button, as well as the location of the button on a webpage. Indeed, these factors can directly contribute to the number of people who click on these buttons. For instance, on the CashFlash website, changing the colour of the apply now button a number of times directly increased and decreased the number of people that applied for loans. As one designer for the site put it: 'we tried a suite of colours...we tried a pink because that was in our brand a while ago, a pink colour, an orange, a green and then the traditional CashFlash yellow. The orange outperformed them all...that's why we've gone with it now'.

According to the designer, changing the colour from red to orange increased the click through rates of application by around eight percent. When asked why this was, he responded: 'I think the colour significance of the red maybe made it feel a little bit desperate'. In this example, altering the button's colour from red to orange was an attempt to minimise frictions such as hesitancy, which might cause the user to reflect on the implications of application too closely. Again, in the designers words: 'red is obviously a very powerful yet potentially dangerous colour and with the various pieces of press that were going around about the payday lending industry at the time, then that probably was a negative correlation'. In this case, the colour red acted to introduce a friction by connecting

deeply held cultural connotations around red and danger and directly link this sense of danger to broader societal concerns around HCSTC. Distinct from red, the colour orange worked to minimise friction because it was thematically consistent with the rest of the site and did not resonant with the user in a negative way. While the slider threshold is designed to generate friction to encourage playfulness and the apply now button is designed to minimise friction to discourage hesitancy, the final major threshold of the application process, the application form, attempts to distribute this friction amongst a variety of separate elements to encourage a sense of friendliness and ease.

Threshold 3: Forms

The application pages for HCSTC websites are perhaps the most varied out of all the thresholds discussed so far. Generally, they involve a series of distinct webpages that ask for the information that is necessary in order for the company to decide whether to offer a loan or not to the customer³. This information can include personal details, employment history, current employer, household expenditure and so on. One HCSTC user experience designer highlighted his desire to make the application as frictionless as possible. In their words:

‘it would be great if somebody was like, "That was a...great form. I really enjoyed using that form," but probably that's never going to happen so what you're aiming for is just someone to not be frustrated, for someone to not think, "Why is this so...difficult?" If they never even think about it because they just flow through the process, that is the perfect outcome’.

³ It is important to note here that this information is also a reflection of regulatory requirements and associated affordability checks related to HCSTC in the UK. Indeed, despite all the design work that goes into getting customers to the point of application, wider business model and decisions over creditworthiness and risk management mean that a relatively high proportion of applications are ultimately rejected. For instance, since the introduction of a price cap on the HCSTC market in January 2015, acceptance rates decreased ‘from around 50% at the start of 2014 to around 30% by the middle of 2015’ (FCA 2016 p39).

Different companies employed different techniques in an attempt to create this frictionless process. For instance, a designer at CashFlash pointed to the importance of splitting the application form into short sections over a number of pages, rather than having one long page, where all the information was required. In their words: 'more... pages with less required effort will achieve a greater conversion rate'. At the same time, the tone of these forms was also important in how they addressed the potential customers. One designers suggested a friendly tone was key to increasing application rates. In their words:

'the nicer you phrase...[the forms, the better]...So it's not just "alright, what's your name" ...[Instead]...once you've entered your name, it's "thanks for that, 'John', now we just need a few personal details from you". "What's your date of birth?" And then get the user just to fill that in and...[respond]... "oh excellent"

Beyond the tone of the wording, minimising friction around this threshold was further aided by actually obscuring the number of stages involved in the application process to the customer. Another HCSTC designer refers to analytics that:

'proved that not showing where the customer was...[in the application process]... was...beneficial because if you tell them there's six pages, most people will be like, "That's a bit long and laborious," and you don't bother applying. Whereas if you go, "Here's an application form," you don't know how long it is and they will just proceed through it...You trick them into completing the process because they always think..."Oh yes, if I just press next...it might be done"

Despite the variety of techniques used to minimise friction in the application form threshold, this threshold was still considered to be the most difficult for a transition to be produced and was thus the stage in the process with the most drop offs. Recognising this, designers regularly included a mobile phone number as the first piece of information customers would need to add to the form. In one designer's words, if they fall 'off the application process, a sales person could phone you up to go, "Did you have any problems? Do you need a hand with the

application process?' While splitting the application into distinct stages was an attempt to minimise any frictions that might stop a user from completing the form, by asking for a user's number as the first piece of information in the form, we see friction reintroduced into the process in a last ditch effort to stop the user dropping off and not completing the application. Here, a physical phone call from a sales representative reintroduces friction by creating a personal tie between the user and the company. What was at first an anonymous process that can be completed at the user's leisure and comes with no commitment, becomes an intrusion into the potential customer's everyday life. As this example demonstrates, the management of friction in HCSTC websites is not simply about creating a frictionless process for the user, but is also about introducing different frictions at key moments in an attempt to enable a transition that allows the user to move onward in the process and ultimately apply for the loan.

4. Transition and Friction

We could understand the process of designing thresholds to manage friction as one mechanism through which the doubleness of modulation is produced - frictionless thresholds allow for striations and for movements. Not only is friction an ever present problem for designers to attempt to manage, but as we have seen a relation of friction is also designed into units in order to enable the continuation in another form of a desired relation with the user. Designing interfaces is, then, best thought of as a means of producing the continuation of a relationship in order to achieve some kind of desired end. Now we have examined how friction is managed around certain thresholds on these sites, we can step back and consider how these frictions and thresholds are experienced by customers and how the process of transition did or did not take place. Again, we focus on the thresholds that must be crossed to enable the desired interface effect : the making of some kind of online application.

Transition 1: Sliders

The friction of the slider and its different design elements enabled users to resolve their decision to apply for a loan in a number of ways. In some cases, users were already quite resolved to apply. Here, the friction of the slider and its sense of possibility created anticipation for the user. In one customer's words: ' it was...exciting...thinking, "Ooh, how much shall I get?" And...in my head, thinking, "Ooh, I could get this...I could spend it on that." Not thinking of...what it's going to be like when the money comes out of the bank'.

In another case, the friction of the slider played very little role in influencing the user to transition across this threshold, because they had already decided to apply to apply for the maximum amount of money possible. As one user put it, when accessing the site, 'I didn't know how much they did, so I just went straight to...[the]...maximum and I thought well that is going to have to do'.

Despite these accounts, it would be incorrect to think that the sliders simply encouraged people to apply for more money or the maximum amount possible. In many cases, manipulating the sliders helped users resolve the competing tendencies they had about how much they wanted to borrow, even if this was not the maximum amount the site offered. One user discusses how they moved the sliders on the site when looking to borrow £100: 'I...went and seen what the most was, just out of interest, see what the interest rate was...But I...decided definitely that wasn't for me and I'm just going to borrow what I need and suffer paying whatever it was, £20, £30, interest'.

Here the friction of the slider allowed the user to resolve the amount they wanted to borrow by placing it a broader context of what they could borrow – the minimum and maximum amount displayed on the slider. Before the user visited the site, the user would have never considered borrowing £500, but moving the slider and seeing the maximum they could apply for gave them the sense that the amount they wanted to borrow was reasonable and actually relatively small in comparison to what the site was offering. As another user put it, moving the slider to the maximum and then down to the amount you wanted to borrow:

'makes you feel better because you see the split at the end and say, "Oh, I haven't maxed out." And the visual representation is a lot more appealing than just sticking numbers in. It's like, I can type 500 quid but if the maximum's 500 quid, "No, let's pull it back a bit", it makes me feel better'.

Using the maximum amount displayed on the slider and seeing how much interest they would have to pay enabled both users to resolve the issue of the amount they wished to borrow. In these cases, the designers of these sites had been successful in managing the friction of these users by designing a slider that allowed them to productively explore the competing tendencies that they might be experiencing, such as a hesitation to borrow more, and the anticipation of the ways that borrowing more might improve their lives. Giving the users something to grab and move around provided both the space and time to resolve these competing tendencies, which ultimately allowed these users to pass the threshold of the slider and move on to the next section of the application, regardless of how much credit they decided to apply for.

Transition 2: Buttons

The threshold of the apply now button enabled users to continue to resolve the competing tendencies in their bodies through the application in a number of different ways. Different users referred to the size and colour of the button, but also its location next other units in the interface as key to minimising potential friction that might occur at this important threshold. As one respondent who used the Cash Flash website put it, the 'big, orange 'Apply Now' ...[button]...[is]...in your face more than anything. And then a woman next to it, I notice her phone's actually the same colour as the 'Apply Now' button. So it's sort of drawing you to her, she looks really happy applying'. In this case the user was drawn to the apply now button by its size and successfully associated the orange colour of the apply now button with the image of a woman holding her phone that was placed next to the button. In doing so, the user's movement beyond the threshold was partially enabled by the colour of the button, which contributed to resolving the competing infra-individual tendencies in their bodies. As the user recalled to us, these

tendencies were opposing senses of worry regarding the need to pay an upcoming utility bill, and anxiety about using HCSTC, which the user had been warned against by negative press coverage. While the colour of the button or the image of the woman did not 'cause' the user to click upon it, these units did work to introduce a micro shift in the affective tone of the situation. This shift worked to minimise a sense of anxiety or worry in the user and replace it with a sense of hope in which their financial issues could be resolved by applying for the loan, no matter how temporarily.

Transition 3: Forms

The form section of most HCSTC websites require the greatest transition between a number of competing tendencies in users' bodies. While primed by the slider and button, as we mentioned earlier, designers stated the form itself saw the largest number of users dropping off in any part of the application process. This was largely because of the amount and quality of information required to complete the application, which gave the user the opportunity to ground the money they were applying to borrow in concrete terms and often introduced senses of doubt and hesitancy. In some cases, the resolve enabled by the previous thresholds were enough to help the user move through the application without thinking in concrete terms. One user, recounting their experience of applying for a loan, suggested they didn't pay attention to the form at all: 'there'll have just been, fill in your details, nothing major. I don't even know if you had to say you had a job or anything. But I remember it took less than five minutes'. For these users, the management of friction (by designers) was just a matter of minimising the time it took to complete the form by simplifying the sections and the amount of inputs required.

But in other cases, seemingly very minor changes in the application form could have major consequences on whether users could resolve the competing tendencies of worry, anxiety, fear and the desire for allaying this worry and anxiety, which the user hoped the loan would bring. For instance, one user describes visiting two different HCSTC websites and how the design of the form pages fed into the competing tendencies that they experienced, which ultimately led to him choosing one site over the other. In relation to the text of the forms on the Master

Cash site, the respondent suggested: 'it was bold, black writing... and it looked like you were signing your life away...[I]t was...as if someone had put a big contract in front of you'. Cash Flash, 'on the other hand, was...warm and friendly...the letters were nicely spread out, they had a nice little logo. It was quite a bright page, you could easily use the tools and it just felt a lot easier to use'. The font and colour of the text on the Master Cash page introduced friction into the process by creating associations between the site and other forms of formalised financial product. As the user put it, this fed into their existing worry that the loan was a serious commitment with future implications. Distinct from this, the Cash Flash site worked to resolve these fears by minimising any association between its product and formalised modes of borrowing. It did this by introducing positive and calming elements that worked to quiet negative thoughts and feelings about taking credit and reassured the user that they could and should apply for credit. In doing so, the form unit of the Cash Flash website successfully worked to manage the friction involved in this key threshold by resolving competing tendencies in the user, which revolved around equal senses of assurance and anxiety.

5. Rethinking digital interface design

This paper has examined how HCSTC interfaces are designed and experienced in the context of attempts to understand power in a digitalising world. Expanding on existing analysis of how interfaces modulate life, we have developed the concepts of friction, thresholds and transitions to understand the user-interface relations necessary for desired interface effects to happen - in our case submitting an online application for HCSTC. Designers seek to enable the transition between competing tendencies of users at key thresholds in the process leading to the completion of an online transaction. In relation to HCSTC, these thresholds were key moments in the application process that had to be completed to apply for a loan. The frictions were the various obstacles that caused hesitancy or blockages that stopped a user from applying but were necessary passage points to the application itself. The transitions were the points where infra-individual tendencies within a

user were momentarily resolved, which enabled users to convince themselves to cross thresholds in the interface.

Focusing on the concept of threshold and friction of the interface is not to say that other factors outside of the interface were unimportant. In some cases, users had already resolved to cross any threshold they were going to encounter in the interface regardless of the friction involved and were absolutely set on applying for a loan. With our respondents this was often because the loan was required for essential purposes such as to purchase food or pay bills. But in many cases, the designers did manage friction in ways that enabled thresholds to be crossed in spite of hesitation or doubt from the user. In this regard, the paper has suggested that social problems around taking credit digitally need to be understood in relation to the thresholds of the interfaces and websites of specific companies and the infra-individual tendencies of particular users, as well as analyse these companies through the type of credit they offer, such as payday loans or auto loans, and the financial mechanisms through which they profit, such as late payment charges or high rates of interest. More broadly, while Aitken (2006) suggests that fringe finance operates through a dual process of self-governmentality and coercion, the paper has suggested that accessing fringe finance such as HCSTC digitally cannot be understood as simple self-governance or coercion alone. Rather, it may be more useful to describe becoming indebted digitally in terms of active contestations between bodies and interfaces, where many of these contestations remain backgrounded and implicit to both the designers of these sites and their user's.

Beyond the example of HCSTC interfaces, this paper has provided a vocabulary for describing and analysing the operation of power in data driven design practice in digital interfaces. As we have seen, the management of friction in interfaces is responsive. Using analytics and data from users, designers can optimise the thresholds in the interface and automatically customise the interface depending on when and where the user is visiting the site from in an attempt to manipulate friction in a way that maximises application rates. But regardless of the sophistication of these analytics, more often than not designers did not know why

one optimisation was any more successful than another. What we see here is not shadowy all-knowing figures manipulating easily duped users. Rather, power becomes an ongoing negotiation between designers and users of these products through processes of experimentation. In other words, what users do with an interface folds back into the practices of design and testing.

Returning to Deleuzian inspired accounts of modulation through digital technologies (Best, 2010; Bratich, 2006; Bogard, 2015; Cheney-Lippold, 2011; Chun, 2006; Franklin, 2015; Lazzarato, 2006; Parisi, 2012), we can understand the management of friction as a kind of power that is related, but not equivalent, to control as first delineated by Deleuze (1992). Whereas systems of control are assumed to set limits that 'confine and enable' what people do, while allowing them the freedom to roam within that system, data driven interface design involves constant attempts to manage a changing set of continuities and discontinuities between entities that are ultimately irreducible to their operation in that system. Control, here, is not smooth or continuous. Instead, it is about working with and attempting to produce thresholds and transitions in interfaces and managing the resultant friction of these thresholds and transitions.

Furthermore, rather than suggesting that power is becoming increasingly exteriorised into non-human, technical systems of algorithms and AI, this empirical work cautions against an account that over emphasises the autonomy of technical systems (or the interpretative creativity of users). Instead, in relation to interfaces, we suggest that it is crucial to focus on the ongoing exchanges between human and non-human objects as key to understanding new forms of power in relation to digital interfaces. This work thus offers an important rejoinder to accounts of control in digital systems which sometimes too easily assume that power operates automatically and without human intervention and negotiation. With this point in mind, we hope that the concepts of friction, threshold and transition provide purchase for analysing other forms of power in relation to digital interface design beyond the example of HCSTC.

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