

More-than-human netnography

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Abstract

Drawing on Actor-network theory (ANT), this paper develops a 'more-than-human' conception of netnography to extend current thinking on the scope, focus and methods of netnographic research. The proposed approach seeks to account more clearly for the role of human and non-human actors in networked sociality and sets out to examine the interactions of people, technology and socio-material practices. The paper critiques reductive applications of netnography, bound by proceduralism, and advocates research that embraces the complex, multi-temporal, multi-spatial nature of internet and technology-mediated sociality. It challenges researchers to examine and account for the performative capacities of actors and their practices of enactment. By synthesising insights from ANT and emerging work in marketing and consumer research that adopts relational approaches, this paper outlines the challenges and opportunities in developing more-than-human netnographies as an approach to extend current netnography.

Keywords: more-than-human, netnography, Actor-network theory, methodology, technology

Introduction

As Law states '*many now think that ethnography needs to work differently if it is to understand a networked or fluid world*' (Law, 2004:3). The over-simplification, and stripping out of complexity through reductive use (or accounts) of research methods and processes, limits our thinking about knowledge creation and the knowledge that is created. Law proposed being more generous with our conceptions and definitions of method – recognising the need to be reflexive and to conceive research as a multi-faceted, fluid activity of crafting, which is not necessarily bounded by process or procedure-based approaches.

This paper draws on Actor-network-theory (ANT) (Latour, 1999, 2005; Law, 1999, 2004; Ruppert, Law, & Savage, 2013) to provide an alternative conception of netnographic practice. The proposed approach, which we refer to as 'more-than-human netnography', recognises more explicitly the complexities of researching technology-mediated social practices and sociality that operates across time and space, involves human and non-human agency, and cannot be reduced to clinical accounts of methodological procedure. Our aims are firstly, to shift the ontological underpinning of netnographic research endeavours; secondly, to broaden the scope of what netnographic studies seek to embrace in their conceptual focus and the accompanying practical issues regarding sampling, data collection and analysis; and thirdly, to identify pressing challenges and opportunities associated with more-than-human netnography. By doing so we invite researchers to take intellectual risks in developing innovative forms of netnographic enquiry.

The more-than-human approach to netnographic enquiry we advocate is part of a broader intellectual shift in conceptions of research. Work in this growing tradition

embraces a complex, multi-dimensional, multi-spatial conception of the world, acknowledging the role of materiality and technology in shaping social practices and the possibilities for researching them (cf. Cochoy, 2008; Hoffman & Novak, 2017; Latour, 2005; Lugosi, 2014; Marres & Weltevrede, 2013; Nimmo, 2011; Whitehead & Wesch, 2012). Specifically, it is important to appreciate the role that non-human agency, including technology and technology-enabled devices play in researching internet and technology-mediated sociality (Beaulieu, 2017; Campbell, O'Driscoll, & Saren, 2010). We argue that, whilst researchers in marketing and consumer behaviour are increasingly attentive to the role of non-human agency and materiality in general (see e.g. Hoffman & Novak, 2017), and in their exploration of online behaviours specifically (Caliandro, 2017), these dimensions have not been sufficiently examined in existing conceptions and applications of netnography.

For example, commercial proprietary software and discriminating algorithms are involved in the scraping, collation and analysis of online behavioural data, which subsequently shape what information is (re)produced to consumers and how they consume it (Cheney-Lippold, 2011; Gerhart, 2004; Hallinan & Striphos, 2016; Jeacle, & Carter, 2011; Pariser, 2011). The design and configuration of computer applications and communication devices, and the 'new intimacies' (Turkle, 2008, 2011) formed between technology and its users, has redefined behaviours and interactions. Moreover, the use of bots to generate and distribute content on social-media or artificial-intelligence-created 'performers' as contributors to online interactions with human consumers are now creating a rapidly evolving panorama populated by new forms of intelligent technology (Bernius, 2012; Ferrara, Varol, Davis, Menczer, & Flammini, 2016). This creates numerous challenges for

researchers to account for this and many other forms of non-human agency in netnographic enquiry.

Temporality presents further important challenges for understanding and conducting netnographic research. Firstly, just as spaces and spatial relations cannot be considered as distinct, stable or coherent 'objects', temporality must be viewed more critically (Dholakia, Reyes, & Bonoff, 2015). Social media platforms, computerised recommendation systems and human users can (re)assemble images, videos and text generated at different times, and for diverse purposes, juxtaposing them to create narratives about seemingly coherent, contemporary trends or phenomena (Bonilla & Rosa, 2015). This assembly and curation of information is often evident in consumers' self-branding exercises (Marwick, 2013, 2015; Marwick, & boyd, 2011; Papacharissi, 2012). Moreover, technology has changed the temporal rhythms of living and thus perceptions of time, for instance, as divisions between work and leisure are blurred (Ludwig, Dax, Pipek, & Randall, 2016).

Social scientists have argued that conceptions and perceptions of time vary across cultures and societies (cf. Munn, 1992; Urry, 2000). Analysing the temporal dimensions of behaviour thus reveal broader aspects of shared norms and values (Maggetti, Gilardi, & Radaelli, 2013). Consumer interactions and representations of their activities, experiences, perceptions and evaluations operate across multiple times. For example, how they felt about a brand yesterday, how they experienced the brand today in store and how they will evaluate the branded product once bought and the comments that will be made on social media along with an image posted on Instagram. Researching the temporal dimensions of consumer behaviour or attempting to account for the temporal aspects of the data is arguably a process of sense-making that attempts to order, stabilise and rationalise a set of relations and practices that are fundamentally disordered.

Secondly, the immediacy and accessibility of data afforded by netnography requires researchers to question the currency of content and its accelerated perishability. Data that might be trending today within forums as highly influential may stimulate very limited interaction tomorrow and may be ignored next week. The challenge lies in how to accommodate and account for these dynamics and complexity in netnographic research. The blurring of time and space in technology-mediated social practice and the temporal requirements of netnography are also intricacies now requiring further enquiry to take netnography forward.

We begin by reflecting on contemporary netnographic research to identify limitations of its existing conceptions and deployment. We subsequently review ANT as a particular approach to research before outlining how existing studies in marketing and consumer behaviour have engaged with ANT-related approaches. In the subsequent section we expand on the application of ANT within more-than-human netnography, identifying particular challenges and opportunities in developing these approaches to research.

Challenges and limitations in netnography

Defining and delimiting 'netnography'

Since its introduction over 20 years ago, netnography has been applied to widening areas of business, management and consumer research, and has become a term to describe an increasingly diverse set of research activities (cf. Bartl, Kannan, & Stockinger, 2016; Kozinets, 1997, 1998, 2015; Tunçalp & Lê, 2014). The adoption of netnography within marketing and management research in particular has been relatively swift, and at times unquestioning (Wiles, Bengry-Howell, Crow, & Nind, 2013). As with all methodological

concepts, its diffusion has led to what Lugosi, Janta and Watson (2012) have called 'concept creep' – purposeful (re)articulation in its strategic use to legitimise particular sampling, data collection and analysis techniques. The widening deployment (and definition) of the concept is reflected in its use in reference to studies ranging from content analysis, unobtrusive observations as well as long-term embedded research, based on extended interactions with online communities (cf. Belz & Baumbach, 2010; Kozinets, 1999; Nelson & Otnes, 2005; Quinton & Wilson, 2016; Scaraboto & Fischer, 2013).

At the same time, and to some extent in reaction to this loosening of the term, advocates have tried to specify the techniques and processes involved in netnography to articulate its scope and application more clearly (cf. Kozinets, 2002, 2010, 2015). These reflect competing centrifugal and centripetal forces that continue to shape how netnography is defined and applied. Netnography's evolution brings with it the need to reflect on, critique, clarify and extend its purpose and potential contributions to scholarship (cf. Costello, McDermott, & Wallace, 2017; Kozinets, Parmentier, & Scaraboto, 2016). Kozinets (2015) recognised this in his attempt to construct a broader, more nuanced redefinition of netnography that simultaneously acknowledged its widening scope while attempting to conceptualise its practice as rigorous, systematic research techniques. Given the evolving nature of what has been described as netnography or netnographic, a re-appraisal is required to optimise its potential to capture the complexity of modern, technology-mediated sociality and to mitigate ossification and the relegation of netnography to the methods 'toolbox'.

The adoption of the terms 'netnography' and 'netnographic' in methodological accounts is arguably used to convey rigour, credibility and also currency to an academic readership. 'Netnographers' have seemingly tried to 'bind' the disparate actors and actions

manifested in online research into coherent wholes for the purposes of narrating and justifying their research. There is a danger that the notion of netnography is reduced to a particular type of sense-making 'device' (Law & Ruppert, 2013). Following Law and Ruppert (2013), methods can be thought of as 'patterned teleological arrangements': ways of describing, ordering and deploying techniques, behaviours, values etc. that shape future applications and thus outcomes. If the conceptualisation and application of netnography becomes narrowly concerned with describing and prescribing technical data gathering and analysis processes, and 'netnography' merely acts as a synonym for a set of procedural techniques, there is a risk that it may lead to a reduction or denial of the complexities of social scientific enquiry, thus limiting what netnography encompasses regarding concept, process and outcome. In the following sections, we explore further the challenges associated with the scope and processes of netnography. We firstly discuss how technologies and questions concerning space and time raise new issues and shifted parameters for netnographers to consider. We then examine more closely how the existing processes and techniques of netnography can accommodate these shifts.

Beyond the human in netnography: technology, space and time

Digital technologies have made hard to access groups or samples more accessible through the use of netnographic enquiry. These include specific groups such as: fandom (Corciolani, 2014; Weijo, Hietanen, & Mattila, 2014); peripheral special interest groups outside 'mainstream' culture (Pentina & Amos, 2011; Ekpo, Riley, Thomas, Yvaire, Gerri, & Muñoz, 2015; Schembri & Latimer, 2016; Scaraboto & Fischer, 2012; Figueiredo & Scaraboto 2016); leisure activity groups within mainstream culture (Hartmann, 2016;

Ertimur & Coskuner-Balli 2015; Skandalis, Byrom, & Banister, 2016); business to business networks (Seraj, 2012; Rollins, Nickell, & Wei, 2014); consumer-issue-focused collectives (De Valck, Van Bruggen, & Wierenga, 2009; Cherrier, Szuba, & Özçağlar-Toulouse, 2012); as well as otherwise peripheral 'groups' coalescing around more sensitive foci (Fernandez, Brittain, & Bennett, 2011; Janta, Lugosi, & Brown, 2014; Langer & Beckman, 2005; Sugiura, Pope, & Webber, 2012; Veer, 2013). However, this body of work has foregrounded human activity and agency rather than considering the role or agency of non-human actors, which may thus offer limited insight into the relational aspects of human-artefact and human-technology interactions. Giving further weighting to the role played by non-human actors, for example, examining how technology platforms facilitate particular forms of interaction, could strengthen the insight gained about the community and also about the data generated by the community. These considerations have been explored more recently by Hoffman and Novak (2017) in their work on the Internet-of-Things. Drawing on DeLanda's (2016) notion of 'paired capacities', the synergistic capabilities exhibited in the interaction of (smart) objects and human actors, Hoffman and Novak outline how human – non-human interactions may shape consumer experiences. The challenge lies in accounting for similar 'paired capacities', and their implications, in netnographic enquiry.

Furthermore, as the lived experiences and interactions of consumers become more integrated with digital and social media technologies, the levels of complexity of groups and membership of those groups across sites and platforms needs to be appreciated (Weijo et al., 2014; Woermann & Kirschner, 2015). Consumers are likely to have multiple roles across disparate networks, leading to diverse flows of interactions. This creates practical complexity for research regarding how these can be captured empirically; and it creates theoretical complexity regarding how to conceptualise notions of role, identity, relationship

and belonging. Even the notion of 'group' requires delineation and identification of those who sit inside and those who reside outside a group (Latour, 2005). This raises complex questions for conventional netnography regarding how we describe and research porous, non-finite, non-bounded gatherings or collections of people and their associated behaviours (see Dholakia & Reyes, 2013; Lugosi et al., 2012; Wesch, 2012).

Overly narrow conceptions and applications of netnography may also impose particular spatial and temporal limits to research. When Kozinets (1997, 1998, 2002) originally developed the notion of netnography, the emphasis was placed on distinct social media platforms or spaces. In subsequent reappraisals of netnography, Kozinets (2015) and others (e.g. Lugosi et al., 2012) have acknowledged that technology-mediated interactions may traverse specific platforms. In addition, if behaviours and interactions operate across multiple virtual spaces and technologies, this also brings into question how temporal dimensions of internet-mediated behaviour are accounted for in sampling, data collection and analysis. For example, many 'netnographic' studies delineate data sets according to space (i.e. a specific forum), and date range (see e.g. Chao, 2015). It is not clear, however, how links with other platforms, or with material created outside of the sampling time frame is or can be accommodated. Thus, as Rogers (2013) suggests, it is also useful to question how we analyse online content on a specific platform, which were created at different times. Overall, these emerging complexities require netnographers to question the scope of their enquiry as well as the processes and techniques they employ.

Scope, processes and techniques of netnography

Single and multi-sited studies involving netnography incorporate it as standalone approach (Yim, Tse, & Chan, 2008; Ferreira & Scaraboto, 2016; Bettany & Kerrane, 2016; Parmentier & Fischer 2015); or, more commonly, in conjunction with other data collection tools as a mixed-method design, sometimes referred to as blended netnographic studies (Yim et al., 2008; La Rocca, Mandelli, & Snehota, 2014; Ertimur & Coskuner-Balli, 2015; Wang, Lee, & Hsu, 2017). For example, Gannon and Prothero's (2016) paper comprising analysis of selfie images and beauty blogging practices. The layering of different methods with netnography may be an acknowledgement of its incompleteness and its focus on observable activity. In these cases, widening the scope of netnographic enquiry, by explicitly examining spatial and technological complexity, the temporal dimensions of behaviour, and the role of non-human actors, could legitimise the use of netnography as a broader, multidimensional research strategy, rather than as a supporting data collection method. Questions regarding the scope of netnographic enquiry extend to the types of data gathered in research, the processes for obtaining data, including questions of ethics, as well as the processing and presentation of data, each of which is considered below.

Although some effort has been made by researchers to use non-English-language material as the focus of the data collected, such as Italian (Arvidsson & Caliandro, 2015), Spanish and Portuguese (Guesalaga, Pierce, & Scaraboto, 2016) and Greek (Skandalis et al., 2016), the majority of published work concentrates on English language text. Non-text based material such as emojis (Hollebeek, Juric, & Tang, 2017), videos and images posted on multiple virtual platforms (Arvidsson & Caliandro, 2015; Kozinets, Patterson, & Ashman, 2016) is increasingly being included in analysis. Nevertheless, much of current research described as netnography continues to be text-centric, and is thus limited by and to what

can be committed to screen or paper via established representational formats. There is a related challenge that existing practices of academic publication cannot fully accommodate the variety and complexity of data that forms part of the analysis. Thus conventional netnography is potentially restricted by the way it is 'enacted' i.e. crystallised into fixed modes of representation.

There are practical considerations regarding how data are handled and how its collection is presented. Netnographic data is often quantified in terms of numbers of threads followed on blogs (Quinton & Wilson, 2016), the amount of typed pages of material gathered (Rollins et al, 2014), and the quantity of distilled Tweets analysed (Arvidsson & Caliandro, 2016). Providing a quantification of the qualitative material collected is one mode of justifying the use of netnography but this often foregrounds a procedural and reductionist emphasis. This pre-occupation with the application of netnography as a methodological procedure, is further evidenced by Bartl et al.'s (2016) recent literature review which illustrated the overwhelming usage of netnography to describe data gathering procedures. By taking a flexible perspective on the application of netnography, adopting it as a broader research strategy in which multiple human and non-human (f)actors are incorporated, multi-layered data could be generated regarding how and why technology mediates social relations.

The analysis of the resulting data in netnographic studies spans both the manual (Ekpo et al., 2015; Rollins et al., 2014; Skandalis et al., 2016), the use of analytical software (Hollebeek et al., 2017; Corciolani, 2014) and the combination of both (Ertimur & Coskuner-Balli, 2015; Seraj, 2012; Crawford Camiciottoli, Ranfagni, & Guercini, 2014). Employing human oversight through community members performing 'member checks' (Anderson, Hamilton, & Tonner, 2016; La Rocca et al., 2014) or the research team independently

reviewing the resultant data (Scaraboto & Fischer, 2013) or individuals detached from the research (Weijo et al., 2014) including students reviewing the data (Rollins et al., 2014) are further attempts to 'validate' netnographic material. These efforts demonstrate a willingness amongst researchers to engage in diffused practices to ensure the trustworthiness of data and its analysis. However, these efforts also point to the growing complexity and diversity of human and computational expertise required to conduct (and legitimise) netnography, which is amplified by the widening of data that may be incorporated into netnographic enquiry.

Increasing complexity regarding consumers and their (virtual) spaces, and the widening of data available to netnographers also raise ethical questions regarding how it can be obtained. Whilst many studies (Seraj, 2012; Scaraboto & Fischer, 2013) explicitly refer to Kozinets' recommendations for entrée and or disclosure to the communities within the research, studies vary in their approach to covert or disclosed observation of online behaviour. Schembri and Latimer (2016) commenced netnography through explicit disclosure and permission gathering; however, Rageh, Melewar and Woodside (2013), Xun and Reynolds (2010) and Bettany and Kerrane (2016) did not disclose at all. Pursuant to this, Corciolani (2014) and Andersen et al. (2016) amongst others started by familiarising themselves through covert observation before disclosing and continuing the study. Obtaining consent amongst fragmented networks of stakeholders across multiple digital platforms is a practical and ethical challenge for researchers. This is likely to be complicated further as online content, even that generated by users, becomes the intellectual property of the actors hosting the platform.

Some of the issues highlighted here, for example concerning consent, data complexity and credibility, are challenges for all netnographic research. Others, such as the analysis of

non-human agency, technological developments and the spatial-temporal ambiguities in social practices will require new forms of expertise and approaches to research, which are part of a more-than-human conception of netnography. In order to develop this perspective, the following section introduces Actor-network-theory and discusses how it has shaped research practice, particularly in ethnographic studies. We then move to examine how ANT and other relational concepts have been incorporated into marketing and consumer research. In the subsequent part of the paper, we will draw on ANT and relational methods to outline a more-than-human approach to netnography.

ANT in/as research practice

ANT does not represent a distinct theory or methodology per se; rather it refers to *'a disparate family of material-semiotic tools, sensibilities and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of webs of relations within which they are located'* (Law, 2009: 141). Such an approach thus seeks to interrogate the actors, actions, processes and relationships through which things come into being and the impacts they generate (Latour, 2005). ANT emerged from social studies of science (see e.g. Callon & Law, 1982; Law, 2004; Latour, 2005), but more recently has been integrated with, and thus used to conceptualise, ethnographic practices (cf. Bruni, 2005; Nimmo, 2011; Ren, 2011). ANT is also increasingly being applied to the study of consumer practices, markets and marketing (cf. Araujo, 2007; Bajde, 2013; Belk, 2014; Cochoy, 2008; Lugosi & Erdélyi, 2009; Woermann & Kirschner, 2015). Importantly, ANT's inherently more-than-human understanding of actors and agency is particularly useful in conceptualising the

complex, networked, technology-mediated nature of sociality that contemporary and future netnographic research may examine.

There are several dimensions to an ANT perspective that are relevant to (re)considering netnographic practice. We summarise these in Table 1. The first is the breaking down of the distinction between human and non-human *actors* or *actants* that perform or exert influence in a network of relationships. Instead the emphasis falls on tracing the interactions and relationality between heterogeneous actors. A key underlying ontological assumption of ANT concerns the conception of 'entities', which may refer to 'facts', artefacts, technologies, institutions etc., existing or emerging through performative practice within networks of relations. In netnographic studies, this approach prompts researchers to consider and account for how multiple human and non-human actors interact in an eco-system, leading to further outcomes. For example, it is possible to question how an app and the device on which it is used organises information by themes, times or some other algorithmically determined hierarchy. Consequently, researchers may question how these dynamics shape how users then engage with the content being displayed, which in turn can change who people interact with, and how i.e. the type of information they reveal about themselves.

There is a long history of anthropological and ethnographic work on the role of materiality in culture (Appadurai, 1988; Malinowski, 1922; Miller, 2005). Artefacts and the social practices in which they are entangled have symbolic and practical functions, for example, in displaying value(s) and status, thus underpinning transactional relations. However, anthropological studies have frequently focused on the social, cultural, political and economic functions of specific artefacts, for example, Kula rings (Malinowski, 1922), or particular cooking or eating materials (Dietler & Hayden, 2010). Within ANT-informed

ethnographic studies, the emphasis is on a wider range of non-human actors, which include but are not limited to material artefacts, as they seek to account more broadly for the performative qualities of non-human entities in networks of relations (Hess, 2001; Knorr-Cetina, 1999; Star, 1999).

The notion of performativity, as used in this context, stresses that language, behaviours, bodies, materials, artefacts and technologies all enact a 'thing' i.e. they are components of ongoing practices through which the world takes form and is made comprehensible (cf. Callon, 1998; Jensen, 2004). For example, a mobile phone operates through the configurations of technologies – software and hardware – some of which are embedded in the physical device, whilst other technologies are part of the broader data transfer infrastructure. Moreover, it becomes a communication device when its users interact with it. Importantly, therefore, entities are socio-materially constructed, indicating that, in analytical or empirical terms, they are never 'finished' but are (re)constructed or (re)assembled through performative processes.

Second, in focusing on relationality, an ANT approach is concerned with *enactments* i.e. how actors/actants and their networks of relationships perform, enact, create effects, resulting in particular outcomes. Again, there is a rich vein of ethnographic research on networks of relations, particularly with regards to materiality and transactions (cf. Malinowski, 1922; Mauss, 1990; Miller, 1998). Contemporary researchers have built on this tradition to account for the importance of value creation in networks of relations (Figueiredo & Scaraboto, 2016). Importantly, within ANT-informed studies, enactments and their outcomes may be unpredictable, unintended effects, which are themselves part of extended networks of relationships and outcomes. Moreover, such a conception recognises

that enactments may change the forms and impacts of practices (Knorr-Cetina, 1999; Law, 2004).

Third, a central focus of concern for ANT regards the practices of ordering and enrolment: i.e. how various (human and nonhuman) actors/actants are mobilised within these enactments or performances, which Callon (1986) referred to as ‘translation’. This in part involves the physical functioning or deployment of artefacts, technologies or practices. However, equally important are the values and meanings that are ascribed to or inscribed on those artefacts, technologies and practices as they are entangled in webs of relationships.

Table 1. Themes within ANT-driven enquiry

ANT Themes	Illustrative examples
<p><i>Performativity</i></p> <p>Just as actors have roles in theatrical performances, human and non-human actors have roles in networks of relations – creating, transporting, transmitting, transforming, restricting etc..</p>	<p>Social media platforms, technological devices and human actors interact to create trending phenomena, which is then consumed by others.</p>
<p><i>Enactments</i></p> <p>Human and non-human actors, with various capacities, create effects and outcomes in particular moments through acts of creation, transportation, transmission,</p>	<p>Posting, commenting, liking, relaying, blocking and ignoring content creates and shapes trending phenomena that is consumed and acted upon by other users, discriminating algorithms and systems that</p>

transformation, restriction etc..	work further to (re)package and distribute information.
<p><i>Translations</i></p> <p>Processes and practices through which human and non-human actors are brought together and deployed in networks of relations that subsequently create effects and outcomes.</p>	<p>Consumers use the features or capacities of a particular device or platform in their production and consumption of social media content to articulate narratives, assert statuses, attempt to influence trends etc..</p> <p>Devices and platforms also shape how social media content is viewed, interpreted, stored, accessed, circulated etc..</p>

Law (2004) amongst others, has sought to draw on ANT to conceptualise research practice, challenging reductionist conceptions of it as a set of neatly defined and delineated procedures (see also Law & Ruppert, 2013; Ruppert, Law, & Savage, 2013). The emphasis of ANT-informed research thus falls on following, tracing, mapping, describing and accounting for heterogeneous actors and their relationships, avoiding simplistic descriptions of cause and effect. Ren (2011), drawing on Marcus' notion of multi-sited ethnography (1998), stresses that in seeking to understand relationships, ANT follows artefacts, actors and actions across time and space (see also Burrell, 2009). This is particularly important in approaching technology-mediated relationships that operate in and through multiple (virtual and physical) spaces and involve embodied, technological and material practices.

Having outlined some key characteristics of ANT-informed research, underpinned by a relational understanding, the next section begins by considering how such approaches have been adopted in marketing and consumer behaviour research. The discussion subsequently

focuses more specifically on the application of relational methods in existing netnographic studies.

'Relational' studies in consumer and marketing research

Hill, Canniford and Mol (2014) provide an overview of marketing and consumer research that has drawn on ANT principles and assemblage approaches (see also Canniford & Bajde, 2016). More specifically, they highlight how existing studies have used relationality and relational materiality in their conceptualisations and execution (Bettany, 2007; Bettany & Daly, 2008; Epp & Price, 2010). In sum, rather than assuming that artefacts have fixed meanings, uses or even an isolated existence, relational approaches, which include ANT-informed works, seek to understand artefacts as assemblages – a network of interacting human and non-human elements with the capacity to enact i.e. create or change (cf. Cochoy, 2004, 2008; Epp, & Velagaleti, 2014; Epp, Schau & Price, 2014; Hoffman & Novak, 2017; Parmentier & Fischer, 2015). This represents ontological, epistemological and methodological challenges insofar as the world is analysed as, and thus through, relations. Researchers have to empirically trace and narratively account for the interactions and performative capacities of multiple heterogeneous elements.

Given the focus on relations, marketing and consumer research in this tradition examines the processes and practices of 'translation': how these actors and their interactions configure, enact and generate particular outcomes (Araujo, 2007; Canniford & Shankar, 2012; Chalmers Thomas, Price, & Schau, 2013). Moreover, the diffused nature of generative actions means enquiry has to acknowledge the distributed nature of agency (Bettany & Kerrane, 2011; Hill, et al., 2014; Martin & Schouten, 2014). The uses and

meanings of 'things', including their perceived success or failure to meet particular goals, are influenced by a wide array of human and non-human actors. Consequently, the research challenge is to sufficiently account for how different actors shape the outcomes of relations (Canniford & Bajde, 2016; Canniford & Shankar, 2013; Parmentier & Fischer, 2015).

The ubiquity of networked technologies and socio-material devices (such as mobile phones, tablets, computers, wearables, household appliances and other connected 'smart' artefacts) has driven the widening application of relational approaches in netnographic consumer and marketing research. Arvidsson and Caliandro (2016), for example, developed the notion of 'brand publics' to conceptualise diffused and discontinuous forms of sociality based on mediation of their common activities and interests. Brand publics thus contrast brand communities that operate (and create shared value) through meaningful, ongoing interaction between members (cf. Schau, Muñiz, & Arnould, 2009). In examining the online interactions of Louis Vuitton consumers, Arvidsson and Caliandro's (2016) work acknowledged the performative capacity of social media in giving an aggregated form to individual perspectives and experiences. Following Warner (2002), they argued that individuals become part of a "public' by paying attention to the mediation surrounding an 'artefact'", which may refer to a brand, a person, organization or even practice (2016: 730). Their work thus highlights the necessity to understand and account for how the enactments of human and non-human actors gain and sustain people's attention. Arvidsson and Caliandro's notion of brand public also stresses the diffused nature of networked sociality that are built in relation to brands and the affective relationships associated with their circulation and consumption (cf. Lury, 2004). In short, it highlights the processes of translation through which different actors are entangled in valuing a brand.

Other recent studies drawing on relational approaches, and adopting netnographic techniques have focused on the role of desire in driving consumption within food cultures (Kozinets, Patterson, & Ashman, 2016), the diverse representations of champagne brands in consumption in 'selfies' (Rokka & Canniford, 2016), the decline in the fanbase of the TV series *America's Next Top Model* (Parmentier & Fischer, 2015) and the intersections of the 'Fat Acceptance Movement' and the fashion industry (Scaraboto & Fischer, 2016). The emphasis in these studies is on the dynamics of value creation or destruction and the practices through which consumers construct and contest meanings associated with consumption. Importantly, as Scaraboto (2015) previously argued, the aggregation of individual efforts is key to the ongoing functioning of collaborative consumer networks. The emphasis within this body of research is on shifting emphasis from individuals to networks of interactions, particularly on how the efforts of disparate and potentially unstable networks of actors are enrolled and ordered to achieve particular outcomes. Technology clearly plays a role in all these empirical cases: it provides the medium through which values are enacted through consumers' objectification, transmission and representation, for example, the creation of images, commentary or other media content concerning brands, artefacts and events. In principle, the notion of assemblages acknowledges the potential role of technology, materiality and non-human agency in analysis. However, there is further scope in such studies to examine the performative qualities of the non-human actors involved, including their capacities to enact, and the processes of translation.

In exploring the Internet-of Things (IoT) and its role in consumer experiences, Hoffman and Novak (2017) similarly prompt future research to extend its scope and focus to better account for the roles of non-human agency. Drawing on assemblage theory, they explore the interwoven co-existence and multiple forms of interaction between human actors and

objects, including their potential consequences, for example for self-expression, social interaction and the mediation of consumption experiences. The object-focused approach proposed by Hoffman and Novak (2017) could well encompass the principles of more-than-human-netnography to examine how consumer-object relations operate in and across social media sites and technologies. There are opportunities within a more-than-human-netnography to explore the agency of artefacts and technologies, and to account for how these components gain, direct and maintain attention to mediation, and its subsequent impacts on consumer experiences and behaviours.

It is important to examine how socio-technological assemblages promote 'pseudo sharing' (Belk, 2014) – e.g. sharing, liking commenting etc. which does not necessitate or always assume reciprocal arrangements from other members of the 'public'. However, studies tend to focus on public and therefore visible practices e.g. liking and commenting but other, more opaque actions within valuation devices are equally important. For example, the frequency and patterning of search terms are monitored and evaluated by intelligent machines, and are used to assign value to certain topics, users etc. Such analytics are used within calculative valuation and recommendation systems to (re)present information in a hierarchical fashion, foregrounding some users, topics, sites, artefacts etc. over others (see e.g. Wilson-Barnao, 2017). This in turn drives individuals to monitor and change their behaviour but also shapes where and how people receive information on which future behaviour is based and value may be assigned (cf. Gerlitz & Lury, 2014; Lugosi, 2016; Pariser, 2011). Exploring the broader assemblage, which accounts more fully for the non-human, technological actors, and the co-existence of objects and humans as proposed by Hoffman and Novak (2017), offers new opportunities for future more-than-human-netnographies to contribute to knowledge in marketing and consumer research.

Figueiredo and Scaraboto (2016) were more overt in considering the role of technology and non-human, material actors in consumers' value-creation process. They also explored the discontinuous processes and practices of value creation through their study of 'geocaching' – a technology-mediated treasure-hunting game involving the use of global position technology to track digitally tagged artefacts. Figueiredo and Scaraboto's (2016) study focused on how different actors and actions contributed to the assignment of value in the circulation of artefacts. These included the enactment of value creation, including the objectification of achievements, and creating indexes that are used to make sense and assign value to actions, artefacts and achievement. Importantly, their account was more explicit in discussing the performative capacity of materiality in these processes. For example, the 'dents, scratches, marks and modifications' (2016: 519) on the geocached artefacts (travel bugs) reflecting their movement and thus their value. Similarly, the images of the travel bugs, the digital logs that recorded their movements and the social-media narration were all part of the socio-technological enactments of value-creation.

Complementing existing work adopting a relational approach, Figueiredo and Scaraboto's work (2016) emphasised the need to account more fully for non-human actors involved in consumer practices, including the interactions of different actors in and across virtual and physical spaces. As Latour (2005: 128) suggested, within analytical accounts all the actors should 'do something' rather than 'just sit there ... simply transporting effects without transforming them'. This broad conception of agency and its interrogation forms a substantial challenge for more-than-human-netnography. With this in mind, the next section expands on the potential scope and focus of more-than-human netnography, identifying important challenges and opportunities for future studies developing in this tradition. In Table 2 we summarise the key features of more-than-human netnography in

relation to those of conventional netnography identified earlier and offer suggestions for the considerations needed by more-than-human netnographers.

More-than-human netnography and actor networks

We previously argued that there has been a tendency to emphasise the procedural elements of netnography, which then often manifest as a reductionist mechanism, potentially oversimplifying the resulting insights, particularly in the earlier applications of netnography from the 1990s and 2000s. By taking a step back and viewing the complexity of actors and their interactions, as a cartographer would scan the landscape, broader, though no less useful, images may emerge. Kozinets describes this awareness and sensitivity as an integral characteristic of the researcher who enacts a humanist netnography in both being in touch with the individual and the group which he/she observes but also one who is mindful of the far wider social space (Kozinets, 2015). However, we would extend this further in arguing that the notion of a landscape suggests a stable, somewhat passive pre-existing entity to be surveyed and thus captured. Within an ANT informed, more-than-human netnography the notion of 'landscape' is a device, which is actively constructed in and through the research process – reflecting attempts to identify actors, delineate actions and their consequences and ascribing the interrelationships between them (cf. Burrell, 2009; Hine, 2015, 2017; Postill & Pink, 2012).

There is a risk that established accounts of netnography portray spatially fixed notions of data and actors. In contrast, more-than-human netnographers may conceive multiple interactive domains as interwoven terrains that individuals and groups occupy or (rather enact) simultaneously. Consumers' (hyper)linking of platforms and transferring data from

one technological domain to others are performative acts of coupling and de-coupling through which new geographies of online sociality are constructed. A challenge for more-than-human netnography is to assemble shards of data from across multiple socio-temporal domains of activity, and technologies, within the interpretative process (cf. Hine, 2015; Beaulieu, 2017).

Importantly, this should be seen as a fundamentally disruptive act of knowledge creation in which the researcher connects or weaves, in Ingold's (2007) parlance, a 'meshwork' of information in composing explanations regarding relationships and their implications. Consequently, it is necessary to conceptualise knowledge generation in such netnographic endeavours as a combination of perseverance, imagination as well as serendipity in which data are identified, isolated and subsequently interpreted in relation to others. More-than-human netnography should be seen to accommodate and anticipate serendipitous data gathering rather than to reduce the research exercise to a carefully planned, extraction or excavation of data from a distinct site. In sum, researchers may find it fruitful to question their current usage and practice of netnography in order to avoid research becoming bounded by overly procedural conceptions. The challenge is to embrace and foreground the 'mess' in developing netnographic enquiry, and to use accounts of messiness to legitimise dynamic, fluid, research-related choices rather than seeing them as being weaknesses.

We use the word 'mess' deliberately here. As Law (2004: 2) argued, challenges arise when researchers are forced to describe 'diffused', 'ephemeral', 'elusive' and inherently 'messy' aspects of the social world in academic conventions requiring definitive, mono-dimensional and often quantifiable methodological accounts. In part messiness is used here to highlight three interrelated issues. Firstly, the multi-dimensional aspects of human-

technological interactions, not all of which can be anticipated in the research planning or easily accommodated as and when they emerge in the sampling, data collection and analysis. Secondly, the evolving nature of these interactions, including the rapidly changing technology available to users and the subsequent shifts in consumer behaviours and experiences, which may continually present new actors, enactments, translations and outcomes. Thirdly, and most importantly, the techniques through which research, including its scope, focus, processes, techniques and its empirical 'objects' are narrated and presented.

As noted above, conventional netnography often negates to fully consider the distributed nature of agency, beyond human actors. Agentic 'artefacts' now comprise the multimodal use of communication devices through which people engage with each other. How people interact may differ according to the configuration of technological and communication devices (e.g. screen size, app functionality, memory capacity) as much as the content of interactions between the individual and or groups. Communication devices can shape the depth and richness of those interactions, and they may include or limit the deployment of visual or audio material (cf. Bálint, Klausch, & Pólya, 2016; Hou, Nam, Peng, & Lee, 2012; Hou, Rashid, & Lee, 2017). The physical configurations and technological capabilities of particular communication devices may also shape how individuals behave, interact and thus perform notions of identity in mediated, networked relationships. A significant challenge for more-than-human netnographies is to account how these forms of non-human agency in and of communication devices may shape behaviours and outcomes.

Technological actors also inscribe meanings through various enactments and forms of translation. These include algorithmic objectification – devices capturing and transforming posts, images, behaviours etc. into computer code and thus distinct packages of data. These

objectified data packages are indexed and valued, and used to segment and target consumers with information. This in turn changes what (and how) information shows up in searches or computerised recommendations. Bots and Artificial Intelligence subsequently distributing information such as trending news items, videos or images have the potential to further influence what information is presented, when, and to whom in other social media spaces.

A more-than-human netnography, underpinned by ANT's blurring of the distinction between human and non-human agency, may seek to account for how computing 'intelligence' is an actor in technology-mediated sociality. Specifically, the design and technological configuration of systems and sites shift focus, frame certain actions, foreground some activities and reward certain behaviours within valuation systems (cf. Jeacle & Carter, 2011; Lugosi, 2016; Orlikowski & Scott, 2014). Actions such as liking, reposting, following and commenting are used to create hierarchies of users and interactions, distinguishing between more active, better skilled or more highly-rated members of interactive social networks (Gerlitz, & Helmond, 2013). Through algorithmic coding, indexing and valuation, influential people may subsequently be made more visible on social media or review platforms thus reinforcing and amplifying their power in networks. Computing actors' performative potential, enactments and practices of translation are all potential factors to consider in netnographic enquiry.

However, the use of wearable technologies and sociality based on self-quantification, for example through shared fitness or activity goals (Charitsis, 2016), may also highlight achievements, distinguish between individuals' capacities, and create new forms of identification as well as drive competition between individuals (Lupton, 2016). Quantified achievements and small behaviours such as liking also generate much larger cumulative

actions as topics, discussions, or people ‘trending’ via algorithmic determination. Such discriminating algorithms are also mobilised within recommender systems (Gillespie, 2014; Hallinan & Striphas, 2016; Helmond, 2013). A more-than-human netnography may thus seek to examine more clearly how the performativity of systems and platforms that facilitate sociality also shape the enactment of belonging and the performances of self. This is made more complex as individuals switch between communication devices and networked sociality is performed and experienced simultaneously across multiple technologies (Meyer & Schroeder, 2015).

More specifically, technological mediation of the social self has arguably become a form of curation, which has a number of interrelated socio-technological, performative dimensions. Marwick (2013, 2015), Gandini (2016), Uski and Lampinen (2016) have begun to explore the complex labour involved in creating and maintaining digital identities for social and professional purposes. This often involves the ongoing use of hardware and software to self-edit visual and textual representations, and to organise them in virtual spaces. Moreover, virtual platforms and applications have various in-built performative capacities, insofar as they provide multiple ways to filter, sort, and therefore curate self-presentations and narrate experiences. For example, platforms such as Instagram enable visual information to be ordered and reordered thematically and according to time parameters by content creators. A challenge for more-than-human netnography is to account for the performative capacities of technologies and platforms for enabling and shaping certain forms of curation and narration.

The processes of technology-mediated curation can also be used within more-than-human netnography to (re)order information about individual and networks of users. This again presents further methodological challenges and opportunities. Firstly, the capacities

of platforms and media applications to access and (re)order data, such as according to time, theme or users can help to analyse different dimensions of consumer behaviours. This includes the inbuilt functions of IT platforms to search, manipulate and present data, as well as any metadata related to users. These features can offer multiple ways to interrogate data and to identify specific social-technological dimensions to online sociality.

Netnography has evolved through the dominance of sociological and anthropological disciplinary perspectives. However, the growing range of data that may be incorporated into a more-than-human netnography also raises the possibilities and challenges of technical expertise and the intersectionality of disciplines required to capture and handle information. As we stated previously, much of the analysis in existing netnographic studies focuses on visible data. However, Gerlitz and Helmond (2013), Gerlitz and Lury (2014) and others have demonstrated the multiple forms of technology and (meta) data that have fundamental roles in shaping the form and substance of technology-mediated sociality. Accounting for this will require a widening of expertise, such as the development and deployment of new forms of computing expertise to harvest and order digital data (Marres, 2012); identify and sort URL and hashtag information from large data sets (Arvidsson & Caliandro, 2015), distinguish the roles of bots in social networks (Varol, Ferrara, Davis, Menczer, & Flammini, 2017), or to understand more generally the capacity of computational code (Beaulieu, 2017). This may require increasing collaboration between other experts and the formation of team-based netnographies.

The notion of team-based research may also have other implications in and for more-than-human netnography. Ethnography has often employed knowledgeable 'insiders' and key informants (e.g. Whyte, 1993), and online ethnographies are engaging in collaborative forms of data gathering and analysis (see e.g. Wesch, 2012). Such co-created knowledge

reflects attempts to harness 'distributed cognition' (Hutchins, 1995). More importantly, knowledge generation in these collaborative, 'multi-bodied' netnographies also involve the individuals who are engaged in spatial-temporal relations, and performing the social-material practices being researched. By bringing in other members of networks or indeed even other networks themselves, as co-creators of sense-making, a more collaborative research norm can be established.

Temporality also raises interesting challenges and opportunities for more-than-human netnographic research. As outlined earlier, procedural explanations of netnographies most often consider time as a sampling variable, delineating data sets by a fixed period. However, there is scope to theorise and account for time in more complex ways within more-than-human netnography. First, this may focus on examining the temporal dimensions of data, particularly as devices, platforms and users can assemble information from different time periods, for example in narrating experiences or identifying common points of reference in social media topics (Rogers, 2013). Secondly, more-than-human netnography can use the temporal qualities of data to account for the rhythms and shifting foci of networked interactions across time. Researchers already use temporal information in their analysis, particularly to monitor topic trends in big data (cf. Uprichard, 2012; Marres & Weltevrede, 2013). The challenge is to move analysis beyond the processing of big data in trend analysis, and to draw such aspects of data into netnographic accounts of behaviours at certain points in time, but also across different time periods.

The wealth and complexity of data that may be enfolded into more-than-human netnography represent additional challenges as traditional journal publishing 'devices' place restrictions on what and how methodological processes can be explained and their outcomes illustrated. The array of additional data may include aural and visual data,

including moving images (cf. Figueiredo and Scaraboto, 2016). However, publications may also increasingly seek to include computer code and visualisation techniques that were used in the data gathering, ordering and analysis (see e.g. Marres, 2012; Marres & Weltevrede, 2013), not just research instruments and tables of summarising statistical details. This will be a growing challenge to authors and publishers alike, not just in practical terms, but also regarding intellectual property. The increasing desire or requirement to publish procedural and technical information as a way to legitimise research-related decisions may extend to divulging computer code and analytical algorithms that may have been developed for specific studies.

Linked to the previous point, the multiple types of data available within a more-than-human netnography also raises related questions of ownership and reproduction rights, especially as digital content is increasingly valued as a commodity (Gerlitz & Helmond, 2013; Petersen, 2008; Sarikakis, Krug, & Rodriguez-Amat, 2017). It is interesting to note Rokka and Canniford's (2016) use of artist-rendered version of original 'selfies' to 'preserve the integrity of images in a manner that avoids copyright or privacy violations' (2016: 1794). This technique may become a new norm in presenting this type of visual data.

Conventional netnography	More-than-human netnography	Challenges and considerations for more-than-human netnographers
Procedural emphasis; potential for reductionism.	Acceptance of messiness in research; willingness to be flexible in scope and focus; accommodation of serendipity.	<ul style="list-style-type: none"> •Conceptualise the research process, including the sampling, the ‘field site’ and the ‘empirical object’, the data collection as an open ended, exploratory exercise rather than setting restrictive boundaries at the outset. •Construct methodological accounts that outline how the research followed or enfolded human and non-human actors, questioning their performative qualities. •Critique reductive, procedural accounts of netnography.
Focus on human agency.	More than human agency, including the performative capacity of technology and materiality.	<ul style="list-style-type: none"> •In conceptualising and carrying out research, continually question the potential of non-human actors in networks of relations. •Identify what is known and not known about the performative capacities of human and non-human actors.

		<ul style="list-style-type: none"> • Question and account for how technologies, devices, algorithmic valuation practices and systems may be part of the research focus, its scope and its processes. • Examine how human and non-human actors are part of the translation process i.e. how they enact things, and how they enrol other actors in networks of relations.
Temporal considerations under-theorised; used to rationalise narrow sets of decisions related to sampling, data collection and analysis.	Explicit theorising of temporal dimensions of practice, and of the research processes used in gathering and analysing data. Accepts and accounts for nonlinear interactions and activities across time.	<ul style="list-style-type: none"> • Consider time as a unit of analysis i.e. a distinct focus and theme of enquiry. • Question and account for the temporal dimensions of actors, actions and relationships. • Critique the temporal qualities of data including the immediacy and currency of content. • Examine how content created at different times are used by actors in specific enactments, and their outcomes.
Observation and analysis of	Considers enactments more	Use the capacities of technological devices e.g. app- or site-

<p>visible behaviour though textual/visual data.</p>	<p>broadly. This may include examining computational, material and technological dimensions of practices, alongside textual and visual data.</p>	<p>specific- functionality to search, filter and sort information.</p> <p>Narrate these practices and techniques in methodological accounts.</p> <ul style="list-style-type: none"> •Draw on alternative specialist technical perspectives, e.g. from engineering, computer sciences, science and technology studies (STS), cognitive and behavioural psychology and design, to examine the unseen dimensions of technologies, sites and platforms in examining human–technology interactions. •Use a wider variety of formats in data presentation, including images, videos, audio, animations, augmented and virtual reality technologies, which may be subject to copyright.
<p>Focused on clearly defined spatially bounded research context e.g. forum or site.</p>	<p>Accepts and actively seeks to understand spatially dispersed phenomena, which may be</p>	<ul style="list-style-type: none"> •Follow the ‘empirical objects’, including users and networks of interactions across platforms, devices and spaces. •Draw on representational conventions from STS and ANT-

	discontinuous and evolving.	studies to present data and analysis to reflect the ephemeral, dispersed and discontinuous nature of the 'empirical objects', actors and field site(s).
Sociological and anthropological disciplinary dominance.	Multi, post and trans disciplinary; may be team-based, drawing on a combination lay knowledge, and specialist technical and conceptual expertise.	<ul style="list-style-type: none"> •Use concepts and methods from other disciplines and fields to conceptualise the research problem, the study's scope and focus e.g. network analysis. •Develop and deploy technology-centric approaches to data collection and analysis (this may focus on one small element e.g. the information sorting functions of a site or application, or it may inform the research more holistically). •Collaborate with multiple researchers for components of data collection and analysis e.g. harvesting of hyperlinks, emojis or hashtags. •Construct 'multi-voiced' methodological accounts that foreground how different expertise were utilised and

		<p>combined.</p> <ul style="list-style-type: none"> •Stress the translation elements, making highly esoteric and/or technical explanations of conceptualisation, data collection and analysis accessible to non-specialist audiences.
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Table 2. Features of conventional and more-than-human netnography, with future challenges and considerations

Conclusion

Building on but departing from existing work, this conceptual paper has proposed a more-than-human conception of netnography to extend the current scope and form of netnographic enquiry. Our discussion synthesised insights from three key areas of literature: Actor-network theory, with particular emphasis on its relationship with ethnographic research; contemporary applications of netnography; and marketing and consumer behaviour research applying assemblage theories, particularly in netnographic studies. By doing so we have identified important elements that conventional netnography often overlooks or under-examines. More importantly, through embedding ANT-informed thinking, this paper contributes to knowledge by articulating a novel approach to netnography, which accounts more clearly for the role of human and non-human actors and agency in networked sociality, and identifies the complex role of technology and social-material practices.

We argued that more-than-human netnography recognises that data gathering is a constructively exploratory act, which seeks to create analytical descriptions of the performative agency of actors, actions, interactions and their consequences. Furthermore it embraces the multi-temporal and multi-spatial nature of internet and technology-mediated sociality *and* the practices of researching it. More-than-human netnography thus encourages researchers to acknowledge and embrace the messy and often serendipitous intricacies of knowledge creation rather than reducing it to a set of methodological procedures.

The mapping of actors, be they human and or non-human and the networks they create across devices, platforms and technologies requires acknowledgement of the fluid

migration back and forth of people and their behaviour in relation to technology. The dynamic possibilities being adopted for interaction need to be recognised and accounted for rather than offering fixed accounts of online behaviour. Importantly, we have proposed that this may require netnographers to adopt multi, inter or trans- disciplinary approaches, working in collaboration with other technical specialists, in fields such as computer science, to better understand the technological and socio-material dimensions of interactions. These collaborative, multi-disciplinary modes of enquiry may help to interrogate how algorithmic systems trace behaviours in space and time, and across different technological devices, and potentially direct how users receive information whilst generating online content.

More-than-human netnography represents a set of possibilities rather than a fixed set of techniques – it reflects the centrifugal trend in reappraisals of netnography as its scope and potential are enriched by cross-fertilisation of concepts and techniques from other disciplines. Our intention was therefore not to construct an overly prescriptive guide, which suggests a singular, linear path to conducting research. In contrast, by identifying its potential, we invite netnographically inclined researchers to adopt and adapt the principles of more-than-human netnography to create novel research questions, new research domains and innovative techniques for sampling, data collection, analysis, data presentation and the reflexive descriptions of research endeavours. We also highlighted some of the challenges involved, including access to and the ability to analyse computer code and the workings of technical systems, ownership of user-generated data and the narration of ‘fieldwork’.

Netnographies evolving in this tradition may take a wide variety of forms, some more human-oriented, others more technological and computational in their approaches. The development of more-than-human netnographies may lead to more extensive accounts of

studies incorporating additional elements in conceptualisation, sampling, data collection and analysis. However, it may also drive the development of more narrowly focused, specialised ANT-informed accounts of specific aspects of human-technology interactions. For example, these may consider issues such screen size and/or the capacities of some applications to configure information in particular ways, which consequently leads users to integrate technology differently in their social practices. This focus can help to understand how organisations and consumers create and receive messages, for instance relating to identities, self-presentation, leisure practices or commercial transactions.

More-than-human netnographies thus have numerous potential marketing and consumer behaviour applications. They can drive a more holistic understanding of technology-enabled consumer-to-consumer and consumer-to-firm interactions, providing a deeper understanding of the agency of artefacts within networked interactions. The broadening of focus to include non-human agency, and the inclusion of computational and other forms of specialist expertise can also help to interrogate socio-material and socio-technological aspects of behaviour that would otherwise remain 'black-boxed' in sociological and anthropological analyses. More-than-human netnographic studies, adopting inherently flexible, dynamic approaches that follows, maps and interrogates the agency of artefacts and actors may be particularly useful in researching new and emerging social practices that develop across multiple virtual spaces and platforms.

Whilst we acknowledge these applications it is also important to simultaneously develop critical perspectives on the role of technology, non-human agency and algorithmic logic in society, and our studies of them. As Bettany (2015) and others have observed, it is important to remain conscious of, and to account for, how certain, more powerful, actors are included in ANT analyses whilst others are not (cf. Bajde, 2013; Law & Singleton, 2013).

This clear need for critical reflexivity extends to the development and application of more-than-human netnographies. It is therefore also important to remain attentive to how analytical techniques support or challenge the interests of certain social, market or political actors in a meshwork of relationships.

Beyond the complications and opportunities for more-than-human netnography highlighted above, one of the greatest challenges for its future development may be one of legitimisation. Within contemporary regimes of academic publishing, with the attendant pressure to show rigour through methodological proceduralism (cf. Hammersley, 2011; Bell, Kothiyal, & Willmott, 2017), the invitation to embrace the mess of research may be problematic. However, more-than-human netnography can build on existing well-established traditions of ANT in producing nuanced, critical and informative accounts of technology-mediated practices and sociality.

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