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Taser: from object to actant? How Actor-Network Theory can advance the literature on Taser

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Abstract

From police weaponry to CCTV cameras, databases to DNA analysis, technology is central to law enforcement. It is also a subject of intense controversy - not least because of the human rights benefits and risks associated with it. Yet, all too often, particular technologies remain under-theorised in the criminology literature, with serious consequences for our understanding of modern day policing. This article uses the example of the widely used electric-shock weapon the "Taser" to demonstrate some gaps in the criminology literature—which include paying insufficient attention to the technical characteristics of particular technologies and their distinct contributions, and reinforcing simplistic binary understandings of human/nonhuman and technology/society—and argues that Actor-Network Theory (ANT) can prove a useful resource in helping to correct these omissions. It provides an example of what an ANT inspired analysis of a particular technology, Taser, might look like, thus demonstrating that ANT can help construct attentive, nuanced accounts of the role of technology in policing, whilst avoiding the twin traps of social and technological determinism.

Introduction

From police weaponry to CCTV cameras, databases to DNA analysis, technology is central to modern law enforcement, helping the police to catch perpetrators of crime, make arrests and communicate with victims. Technological advances are often considered to have revolutionised policing, yet also stand accused of facilitating human rights violations and negatively impacting on public perception of the police, undermining the legitimacy that is so central to effective law enforcement (Neyroud and Disley 2008; Deflem 2002). It is thus crucial that accounts seeking to understand the role of police in contemporary society are not only cognisant of the roles that different technologies can play in various circumstances, but that they are able to account for its impact in a mature and nuanced way. However, there is evidence that this is not always the case. As Neyroud and Disley (2008: 226) note, the "issues that arise from the recent growth in the number and sophistication of technologies available to the police service.... (are) important but neglected". They point to civil liberties, and other risks, associated with new technologies, arguing that "questions of the effectiveness of these technologies cannot... be separated from discussion of their ethical and social implications" (2008; 230). For Deflem (2002), such studies--which focus on "the clash between the quest for technical efficiency and concerns of a normative nature"--whilst valuable, can only go so far. Nevertheless, he agrees there is a need for more research in this area, pointing to "clear limitations to the research on police technology", which needs to pay more attention to "describing and explaining social life" and its interaction with technology.

In this article I argue that some of these "limitations" can be overcome by a more explicit incorporation of insights from the vast Science and Technology Studies (STS) literature and from Actor-Network Theory (ANT) in particular. This literature can provide rich insights into the complex, heterogeneous nature of technology, give us a useful framework for conceptualising relationships between "technology" and "society", and the impact new technologies may have, and thus add value to the existing

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criminology literature dealing implicitly or explicitly with technological change.

As policing technologies are numerous, it is not possible to review the literature on all the different types of relevant technologies in one article. Instead I focus on one particular policing technology--the Taser—to illustrate my points. Tasers, manufactured by American company Taser International, are often described as "less-lethal", as belonging to a class of weapons which are intended to "subdue or incapacitate" rather than to cause "serious harm or death" (Bozeman et al 2005). A range of different Taser models are available—as are products produced by competitors—which, generally speaking, use wires and probes to deliver an incapacitating electric-shock to a subject at a distance of up to 10.6 meters.

The article proceeds as follows. Section 1 illustrates that, despite contributing greatly to our understanding of Taser, there are nevertheless certain omissions in how the criminology literature conceives of Taser, and shows how these omissions can detrimentally impact not only on our understanding of Taser but on our understanding of other police weapons more broadly. Section 2 introduces some key tenets from Science and Technology Studies, and from Actor-Network Theory, whilst the final section shows how these insights can improve our understanding of policing technologies using examples drawn from the Taser actor-network. First, however, I start with the rationale for focusing on Taser technology specifically.

Taser makes for a particularly interesting discussion for several reasons. As Manning (2001; 84) notes, "while many inventions in scientific technology have been adopted in policing... the greatest expenditures for technology are for weapons and transport". Moreover police expenditure on, and use of, one such weapon—the Taser—is an important public policy concern. Its use in policing is increasingly commonplace, with various forms of Taser technology in use by over 16, 000 agencies in more than 100 states (Taser International 2012: 1). Yet it is also "highly controversial" (Wolf and De Angelis in this journal 2011: 657), with controversies fuelled by high profile deaths proximate to the technology, public enquiries (Braidwood Commission 2009; UK Home Affairs Select Committee 2011) and public outrage "unprecedented" in its "intensity" and "vigorous (in its) condemnation" (Milbrandt 2012: 75).

Improving our understanding of this technology, and of the debates around it, is arguably more important than ever. Yet whilst the criminology literature has improved our understanding of certain aspects of the Taser debate—including how it is used in practice, its appropriate place on the use of force continuum, and associated injury and efficacy rates (Alpert and Dunham 2010, Crow and Adrion 2011, MacDonald et al 2009,Thomas et al 2010, White and Ready 2010, Oriola et al 2010)—it tends to suffer from certain blind spots around the conceptualisation of Taser. In line with the "reconstructivist" (Woodhouse et al 2002) work in STS, it is hoped that a focus on Taser may not only add to the criminology literature but furthermore contribute to a more nuanced and comprehensive debate around Taser *per se*, and to the development of policy solutions.

The debate around Taser also speaks to long-standing questions about the role of the police and the amount (and kinds) of force appropriate for them to use; questions which, given the police's unique legal authority to exercise force on citizens, go right to the heart of their mandate (Bittner in Crow and Adrion 2011: 366). If police legitimacy can be affected by technological change of any kind, it may be particularly sensitive to changes in weapon technologies, which can directly impact on their unique ability to exercise force.

Existing literature on Taser/technology and its omissions

Whilst the criminology literature on Taser technology has advanced our understanding in many ways, taken collectively it suffers from five key omissions. First, little attention is given to the distinct contributions that physical object of the Taser may make, and to the possibility that it may interact with, and shape the behaviour of the humans that come into contact with it.. Instead "the most common treatment of the non-human is the sheer lack of treatment" (Waltz 2006: 54). Most works in criminology note Taser and its characteristics in passing, before turning their attention to how these weapons are (and should be) deployed and used (see for example Kleinig 2007: 286, Oriola et al 2010: 115 and Ryan 2008). Other authors consider the role of Taser more closely, but proceed to dismiss it as a neutral, passive tool. Sometimes it is seen as a neutral tool in the hands of individual police officers—Alpert and Dunham (2010: 253) write that "CEDs, as any tool, can be abused by officers"—and sometimes it is seen as a tool in broader plans. Thus Oriola et al (2012) portray Taser as a tool to "terrorise the downtrodden within a neoliberal ethos". Neither are such characterisations unique to taser technology; for example, Webster (2009: 12) notes that the "technical" and

"criminological" approaches to CCTV technology also conceive of it as a neutral "tool" for various purposes.

Second, and relatedly, insufficient attention is given to the technical characteristics of the Taser, which are simply taken as given. In so doing, the criminology literature deprives itself of a key insight from science and technology studies work; that these features are, at least in part, the product of human choices. It also deprives itself of a rich literature from other disciplines, which tends to pay more attention to the weapon's technical characteristics. This includes the medical literature (for a summary see Braidwood 2009), scientific/technical papers (Comeaux 2013, Beason et al 2009) and sociological works by Rejali (2007) and Anais (2009).

Third, and relatedly, actors are seen as black-boxed, discrete entities. On the one hand, crossovers between non-human and human entities, and how the latter can affect the former, tend to be downplayed and inter-linkages between different actors seldom explored. Yet just as Taser cannot be understood without reference to the human choices made in its design, neither can police officers be understood without reference to such technology. As Latour notes, "you are different with a gun in hand; the gun is different with you holding it" (in Schulz-Schaeffer 2006). On the other hand, the role of sub-entities within given actors is also obscured. Yet, as Rejali (2007) has underscored, such entities—be they "capacitors", "high voltage" currents, or the operation of the human heart—may be important actants in their own right. By looking neither beyond, nor within, these entities, binary oppositions—human/nonhuman, active/passive, social/technical—are adopted and heterogeneity downplayed.

Fourth, in most analyses the spread of Taser is taken for granted; Gau et al (2010: 30) notes that "the prevalence of CEDs today is emblematic of the growing demand… for police to reduce reliance on lethal and otherwise severe weapons", Thomas et al (2010: 291) that "CEDs were adopted… to provide a broader range of options when handling potentially violent encounters". Few analyses have asked "how and why non-lethality came to be understood as a desirable property of some weapons" (Anais 2011: 538) or asked how and why Tasers came to be seen as delivering less force than other use of force options. Yet the ubiquity of Taser is an "incredible socio-technical achievement" (Rejali 2007) – a perspective which points to the limits of conventional social/technical dichotomies, and of referring to Tasers as mere "tools".

Finally, the criminology literature has been described as somewhat atheoretical; Gau et al note (2010: 28) "what is missing from the literature are analyses that go beyond simple descriptions to instead probe for patterns and apply theory and prior research to add depth to the study of electro muscular technologies' use in the field" and Crow and Adrion argue that "although a vast body of use of force research exists, there is relatively little incorporation of theory" (2011: 371).

The implications of these omissions

These omissions mean that the criminology literature on Taser can fail to grasp nuances critical to the debate at hand. This can be demonstrated by a literature review of the three "critical areas" (White and Ready 2007) around Taser: (i) how the weapons are, and should be used; (ii) injury rates and (iii) efficacy rates.

First, then, the literature on the appropriate role for Taser in law enforcement places a heavy emphasis on the role of the police officer. White and Ready (2007: 181) focus on the use of Taser by one police force in the States and make recommendations for its appropriate use (2007: 188). Alpert and Dunham (2010: 251) find that "CEDs are used more frequently than other less lethal weapons and appear to be the "response of choice" to control suspects or respond to resistance". Crow and Adrion's study of factors influencing Taser use find that "officers tend to use Tasers in response to lower levels of resistance...(including) verbal resistance or suspect flight" and find that "officers are more likely to use the Taser on non-White and male suspects" (2011: 381).

Whilst highly useful, such analysis may preclude any consideration of the ways in which police officers are, themselves, "configured" by Taser or, indeed, by other policing weapons. For example, whilst Crow and Adrion study whether the officer's decision to use Taser is influenced by "focal concerns"--including the "dangerousness" of the suspect (2011: 372)--they do not look at whether the introduction of Taser may have shaped perceptions of "dangerousness" in the first place. Further, whilst these studies focus on human agency in the *use* of these devices, they neglect human agency in their *design.* Yet, as I demonstrate later, many crucial decisions about the force delivered by and the likely impact of police weaponry, are taken during the design process and are thus outside of the control of individual officers. Adequately taking these issues into account necessitates opening up the "black box" of technology in order

to look in detail at the various technical features that come to be referred to collectively as "Taser".

A second strand in the criminology literature looks at injury rates to both officers and suspects. Looking at the USA, a study by MacDonald et al (2009) found that Taser reduced officer and suspect injury rates and, in the UK, Jenkinson et al (2006: 229) found that both suspect and officer injury rates were "lower in M26 (Taser) deployment than in deployment of CS spray, batons or police dogs". However these reports tend to look at the percentage of suspects injured out of the total number of suspects on whom CEDs were used, presuming that relations between officers and suspects remain unchanged by the introduction of Taser. For example the Jenkinson study (2006: 231), compares the injury rates associated with CS spray, batons, police dogs and Tasers. However, as the injury rates on Taser are taken from the Taser International database, and the rates for other weapon taken from a UK police force, it is unable to compare overall, absolute levels of injury resulting from each of these force options.

Thus these studies tell us little about how and whether Taser—or, indeed, other use of force options--may be altering the *absolute* number, and characteristics of use of force incidents, through re-shaping human behaviour. Yet there is some evidence that such a reshaping is taking place. A National Institute of Justice (NIJ)nstudy found that "some officers may turn to a CED too early in an encounter and may rely on a CED rather than rely on the officer's conflict resolution skills" (NIJ 2011: 16) and Lee et al (2009) argued that increases in firearms and in custody deaths after Taser introduction may have been due to "early liberal use of Tasers… (which escalated) confrontations to the point that firearms were necessary". Such findings point to a more complex consideration of the impact of police weapons on injury rates, one that recognises that relations between humans can be changed by non-human actants, and that binary distinctions between technology and society may be more porous than they first appear.

Third, it has been argued that there is "little controversy" in the literature regarding the ability of... (Tasers) to incapacitate a resisting subject" (Thomas et al 2010: 295). When question marks over efficacy are identified, these tend to be reflected back onto the subjects (who may be intoxicated or of heavier build) or the police officers (who were unable to ensure both probes hit the individual) (White and Ready 2010). The focus is taken off of the non-human actant (the Taser) and put onto the human actors. Yet the role of the Taser as an actant may also be significant; while Taser claims an effectiveness rate of about 95 percent (New York Times 2005), a US Department of Defence study found they were only effective "74% to 52% depending on distance to the target" (Joint Non-Lethal Weapons Human Effects Center of Excellence 2005: ii). Thus the Taser and its technical characteristics can exert a powerful influence, albeit only in association with a range of other human and non-human actants.

Having identified some omissions, how are we to remedy these oversights in a theoretically rigourous way? In order to answer this question the next two sections introduce actor-network theory within the context of STS literature more broadly—and then show the benefits that ANT can bring to a study of policing technologies—in order to demonstrate that it may provide a possible point of departure. In so doing, I am not suggesting that using an ANT framework is unproblematic; indeed, ANT has been criticised on a number of grounds, including for paying insufficient attention to human intentionality (Murdock 1998, Miettinen 1999) and promoting "symmetrical absurdity" (McLean and Hassard 2004), for its treatment of power and of the broader socio-economic environment (Kirsh and Mitchell 2004, Routledge 2008) and for its denial multiple human identities (Star 1991). However, these criticisms notwithstanding, I argue that ANT can "provide both the empirical and critical conceptual tools necessary to support practical, evidence based research into... social, ethical and policy issues" (Williams-Jones and Graham 2003: 271). Thus instead of focusing on what could be improved within ANT—an important task, but not one for this article—I now to turn my attention to ANT and the benefits that it can bring to the study of policing technologies.

Actor-network theory

ANT is a broad school of thought with considerable complexity (Neyland 2006: 38), considered by some to have overlaps with other work within STS, particularly the social construction of technology (SCOT) approach (e.g. Bijker 2010). Both approaches seem to provide a rich way of theorising about technology and its place in society. Both approaches can be used to highlight contingency in the design/writing of a technology and in its reading, yet can also look at how such flexibility can diminish over time. In so doing, both approaches stress that it is not sufficient to look at an individual artefact, per se, but the "socio-technical", whether this is characterised as an "arrangement" (Kling 1992:381), an "ensemble" (Bijker 2010)

or a network.

For some, then, the differences between ANT and the rest of STS has been overstated; indeed, for Fuller (2000), they amount to no more than "niche differentiation in… a crowded field". Yet whilst many social constructivists share an "uneasy consensus" that "technological artefacts... are socially shaped" (Hutchby 2001: 441), for actor network theorists the very categories of technology and society need to be questioned. Instead of providing social explanations of various phenomena, ANT argues that "society", and the humans within it, can only be understood with reference to the "missing masses" of non-human entities and that, as such, conventional distinctions between human/nonhuman, society/technology obscure more than they reveal. Thus ANT provides a perspective "quite distinct in one crucial and radical respect: ANT rejects the assumption that society is constructed through human action and meaning alone" (Prout 1996: 220). This insight can, in various ways, aide our understanding of Taser, and other law enforcement technologies.

The concept of the network

Actor network theory stresses that, on the one hand, technologies cannot be understood in isolation from the network of humans and non-humans that design, use, translate and interpret them. On the other hand, neither can humans be understood without reference to the technologies that not only define their sense of self (Law 1992) but shape their very behaviours and interests. Technologies may require human actors to have new, hitherto unnecessary, competencies; force them to relinquish their ability to take particular decisions, or (re)enforce particular moral values. Further, in a process known as prescription, the assumptions embedded in technologies can lead them to "configure" users in certain ways, to attempt to impose particular behaviours on human actants.

Thus the construction of what appear to be boundaries between the "technological" and the "social" become a topic for analysis, not the starting point for it. Instead of seeing discrete, black-boxed entities--"Tasers", "police officers", "suspects"--ANT sees, in their place, heterogenous "actor-networks"; networks in the sense that they are a "relational effect" (Law 2007) of complex interactions between human and non-human elements; actors in the sense that they can, in combination with others, produce effects in broader actor-networks or programmes of action.

Generalised symmetry: from actors to actants

Concomitantly, ANT stresses that all entities, whether human or non-human, should initially be treated equally, assessed on the grounds of their ability to provoke effects and to "make others do things" (Latour in Waltz 2006: 58): a key concept known as "generalised symmetry". An actor is defined as "anything doing something...(anything whose) presence or absence makes a difference" (Venturini 2010: 266). Relinquishing the assumption that actors need to be endowed with conscious will, or intentionality, to produce an effect, allows us to pay close attention not just to human actors, but to particular technologies and their features. Of course, many of the roles and effects of non-human actants can ultimately be reflected back onto human actants. In these instances, analysing non-human actants may require no more than an "analysis of what we grant to things" (Collins and Yearly 1992: 321).

Yet, in other instances, technologies are not "mere stand-ins; they surprise us and require new ways of interacting with them even as they find new ways to interact with us" (Waltz 2006: 56). ANT thus gives us the analytical space to consider the ways in which particular technologies can "change (human) worlds" (Murdock 1998: 367). If ANT, and the concept of generalised symmetry, gives us the space to take technologies and their characteristics seriously, it also stresses that these technologies and characteristics can only be understood via their relations with other actor-networks, via the "organising power of combinations" (Munro 2009: 125). Entities only gain form and agency as a result of, and in combination with, the social relations within which they are defined. Ultimately Taser can only be understood in relation to other complex actor-networks; the company that created it, the police officer that fired it, the suspect affected by it.

Programmes of action

As such each entity is both a network in its own right, and an actant in multiple other actor-networks. It is up

to the analyst, then, to choose where to put the focus, where to "cut the network" (Strathern in McLean and Hassard 2006: 449). One way of doing this is through looking at the role various actants play in other networks and in particular "programme(s) of action". The term "programme of action"--a concept which can apply to both human and non-human actants—can be used to refer both to a goal to be achieved and to strategies for the achievement of these goal (which may include, among others, the use of Taser in particular circumstances). Yet whether it is used to refer to goals, strategies or both simultaneously, the concept is useful for pointing to broader intentions, agendas and contexts which, whilst part of a given actor-network, may not simply be reducible to it. It further draws our attention to the way in which particular sections of a programme of action may be delegated from human to non-human actors, and the "political consequences" (Star 1991: 28) of this delegation.

Focusing on programmes of action also allows us to emphasise that concepts, definitions, ideas and technologies are not just *transmitted* outwards and passively received, but need to be actively negotiated and *translated.* If translation is successful, new interests, identities, roles and social groups are created, and require constant upkeep. Yet translation not only changes those who are enrolled, and "entails... a destruction of the world of the non-enrolled" (Star 1991: 49), but also results in the "transformation of speakers and their statements" . Just about every element, then, is modified; we are not so much following a "statement through a context.... (as) follow(ing) the simultaneous production of a "text" and a "context" (Latour 1991: 106) – a process which generates winners, losers and the "as-yet-unlabelled" (Star 1991).

Tasers: an ANT inspired analysis

So how can actor-network theory aid our understanding of Taser, and other policing technologies, and what points might it highlight? Whilst others have applied and demonstrated the value of actor-network theory through discussing selected concepts, such as drift and translation (Williams-Jones and Graham 2003), or through focusing on the competing translations that different groups seek to advance (Horowitz 2012), I focus here on Taser as an *actant,* then as a *network* and, finally, as part of a *broader network* or programme of action.

Taser as an actant

The tool of generalised symmetry allows us to consider the possibility that non-human entities (such as Taser, and other policing technologies) may be actants in their own right, and gives us the ability to focus on the "particular contribution(s)" (Waltz 2006: 56) that Taser and other technologies make, to see them as worthy of study in its own right. This brings several advantages. First, in allowing technologies such as Taser to be subject to analysis, ANT gives us space to analyse how their characteristics can interact with human actants to produce particular outcomes. For example, the Taser X26 was made commercially available to police officers in 2003, but in 2005 it was reported that Taser had redesigned the model "so that the gun delivers 19 electric pulses each second, instead of 19 pulses for the first two seconds and 15 pulses for each of the next three... (delivering) a 14 percent increase in power" (New York Times 2005). This alleged increase in power was outside of police officer's control but nevertheless may have impacted on use of force outcomes. In another example, Savard et al (2008: 9) assessed the performance of Taser X26 and found that some weapons generated "peak currents that are 47% to 58% higher than the values specified by the manufacturer" and that these "abnormally high output can have a significant probability of cardiac arrest when the barbs impact the chest in the vicinity of the heart". Thus use of force outcomes can usefully be understood not simply as the result of human action, but as the result of complex relations between human and non-human entities. Such outcomes call upon us to not simply dismiss Taser as just another tool at the disposal of police officers, but ask us to open up the "black box" of Taser technology and look more closely at the particular characteristics, and actor-networks, contained within.

Second, considering technologies as actants highlights that humans not only shape, but are themselves shaped by, such technologies. Instead of just concieving of Taser, and other technologies, as a simple tool which simply assist in the achievement of a range of human goals (for example, less lethal incapacitation), it is necessary to recognise that the design features of particular technologies actively require users to develop new competencies, and place on them certain responsibilities. For example, in the case of the Taser, officers carrying both a conventional firearm and a Taser must be able to differentiate between the

two; a task complicated by the Taser's design features. Whilst a variety of potential designs for the M26 Taser were considered, the design adopted was a "hand-gun shaped" design instead of more sharply differentiated design options (Torres vs Taser, 2008). Whilst most officers are capable of making this distinction, in certain notable cases, some of which have had lethal consequences (AELE 2012), officers have drawn and fired a firearm whilst mistaking it for their Taser. Thus assessing the appropriate use of Taser is not just a question of looking at how police officers use technology as a "tool". We also need to look at what demands and burdens are placed on the officers by non-human actors; demands which may be exacerbated as a result of particular design features, the existence—and contingency—of which are often ignored in the broader literature. Thus actor-network theory, and the concept of generalised symmetry, can provide us with a theoretically rich way to "take seriously" and make sense of "the significance of material artefacts" (Miettinen 1999: 171). At the same time, however, the emphasis on technologies *as a network* provides us with a way of doing so that does not simply fall back into technological determinism.

Taser as a network

Focusing on technologies as a network highlights that the technical characteristics which most studies take as a given are, themselves, the outcome of a process, of complex interactions between human and non-human actants. This facilitates analysis of choices made in the production process. For example, the Taser X26 delivers a 5 second shock once the trigger is pressed. The user can terminate the shock early by engaging the safety switch, but the weapon will continue to deliver a shock for as long as the trigger is depressed; the only limit to the length of shock is the life of the battery. However other electric-shock technologies deliver different lengths of shock and in a later Taser model, the X26P, this functionality has been modified. Users have a choice of continuing with the old design or installing a automatic shut-off performance power magazine (APPM) which "provides an audible alert at 3 seconds and shuts off at 5 seconds", whether the trigger is depressed or not (Taser International 2013).

Whilst few studies in the criminology literature literature focus on such features, the ability to deliver a continuous application of the Taser is highly contentious. Joachim (2010: 50) found that "potentially harmful conditions could occur shortly after lengthy or repeated CEW application" and an NIJ study found that, of the deaths proximate to Taser, ''many are associated with continuous or repeated discharge'' of the CEW (NIJ in Joachim 2010: 46). Focusing on the technical characteristics of Taser as network effects allows us to critically analyse these features and to recognise that the technology has particular properties built into it, even whilst these under-determine the way in which it is used. In this way, then, actor-network theory allows us to go beyond either ignoring the role of technology, or conceiving of it as a neutral tool.

Taser as part of a broader network and programme of action

If Taser, and other technologies, can be seen as an actor-network in their own right, they also form part of other actor-networks and programmes of action. Emphasising this point allows us to realise that the particular "attribution of roles and actions" within this network "is a choice" - a choice with far reaching ramifications. Latour advises us that "every time you want to know what a non-human does, simply imagine what other humans or non-humans would have to do were this character not present" (1992). This is instructive here, for without Taser officers would have to resort to techniques such as hand-to-hand combat and baton strikes, which would render highly visible the amounts of force deployed. In contrast, with Taser "the physiological consequences.. are not immediately apparent… (they) do not bear the same scrutiny as police technologies which had rendered bodies neutral by breaking them" (Anais 2009: 54). Thus, by delegating the infliction of pain to a particular kind of non-human, the suffering involved is made more palatable. This, again, helps us move beyond understandings of technologies as neutral tools, not just because it stresses that design features of certain technologies can lend themselves to particular purposes, but because it also as it forces us to ask questions about the broader networks and programmes of action they may be embedded in. If the "attribution of roles and actions" to Taser can be seen as "a choice", it opens up the conditions for asking; who has made this choice (and for whom), under what conditions and with what alternatives.

Second, looking at Taser as part of broader actor-networks and programmes of action reminds us that whilst networks are always negotiated achievements, not all negotiators are equally powerful. As Venturini notes, "actors occupying influential positions deserve special attention because, like it or not, they will have better chances to shape controversies" (2012: 798). Similarly, Rappert's work has highlighted the need for "an approach sensitive to the conditions under which interpretations are made" (Rappert 2001: 584)--conditions which may, for example, include the way in which the debates are framed, the way in which information is withheld or released, and the "systematic non-production of knowledge" (Frickel et al 2010: 446). This is particularly relevant when studying Taser, as "research supported by TASER International may... be significantly biased in favour of TASER safety", with authors affiliated to Taser 18 times more likely to find that the Taser is "likely safe" than those without such affiliation (Azadani et al 2011:533). A focus on these latter points can be useful in highlighting that the process of network building can be inherently unequal, producing winners and losers, both human and non-human.

Conclusion

This article has answered calls for more—and more sophisticated—attention to be paid to the role of technology in modern day policing, by using the example of the less lethal technology Taser to demonstrate several closely connected points. First, it has argued that whilst the criminology has greatly enhanced our understanding of Taser in many ways, it nevertheless tends to suffer from some key flaws in its conception of this technology. These include; a tendency to pay insufficient attention to the technical characteristics of policing technology, and to the distinct contributions that technology can make, and related tendencies to use binary, dualistic understandings of human/nonhuman, technology/society, to be insufficiently theoretical and to treat the popularity of a particular technology as the starting point of analysis, not as a topic of enquiry in its own right.

Second, I have argued that actor-network can provide a theoretically sophisticated way of overcoming some of these shortfalls. Specifically, looking at technologies *as an actant* reminds us that they have effects and distinct contributions that cannot just be subsumed within human intention, whilst conceiving of technologies as networks draws attention to their technical features and how these are under-determined by material constraints. It also allows us to consider how humans are shaped and constructed by technologies such as Taser. Further, conceiving of technologies as *part of larger actor-networks* and programmes of action reminds us that their popularity is not inevitable, but the result of network building processes, and of *choices* made within this network. Crucially, then, ANT gives us the space to ask which actants have made these choices (and for whom), under what conditions and with what alternatives – insights useful not just for discussions around Taser, but for less lethal weaponry and policing technologies more broadly.

Third, in highlighting the role ANT can play, I have also pointed to the advantages of paying careful and nuanced attention to the technical characteristics of technology, whether the technology in question is Taser, other less lethal weaponry or CCTV. There are, of course, limits to the importance of material features of technology (Grint and Woolgar 1991) but actor-network theory can provide us with a sophisticated way of both accounting for such features, and putting them in the context of broader actor-networks. Such accounts provide a useful counterbalance to those works which either ignore the role of technology altogether, or simply conceive of it as a neutral tool. I would thus argue that there is a need for more research exploring these insights and applying ANT to Tasers, and other policing technologies, in more detail than has been possible here. This is particularly important for, in this article, I have suggested that insights gained from analysis of the Taser actor-network may be applicable more broadly to other policing technologies. Yet, given the unique nature of Taser weaponry, there may also be important limitations to such comparisons that subsequent research can flag up.

Finally, by using actor-network theory, this article has been able to highlight issues associated with Taser use. These include concerns with design, device performance, impacts on officer behaviour and use of force and injury rates, which can have important consequences both theoretically and practically, but which are under-emphasised in the current literature. Yet at the same time as it identifies these areas of concern, actor-network theory also points to areas for optimism. For a key insight of actor-network theory is that networks are subject to continuous negotiation. ANT thus allows us to identify points "at which network stability can be contested" (Castree 2002) and progressive modifications to the network can be made. Thus

if, as Star (1991) underscores, any given network includes winners and losers, it also includes the "as-yet-unlabelled" - those who can provide an important point of departure for affecting progressive policy changes. In light of both the benefits—and the costs—that the Taser actor-network can bring, further research into this area, is more urgent than ever.

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