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Public health ethics and More-than-Human solidarity

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Abstract

This article contributes to the literature on One Health and public health ethics by expanding the principle of solidarity. We conceptualize solidarity to encompass not only practices intended to assist other people, but also practices intended to assist non-human others, including animals, plants, or places. To illustrate how manifestations of humanist and more-than-human solidarity may selectively complement one another, or collide, recent responses to Hendra virus in Australia and Rabies virus in Canada serve as case examples. Given that caring relationships are foundational to health promotion, people's efforts to care for non-human others are highly relevant to public health, even when these efforts conflict with edicts issued in the name of public health. In its most optimistic explication, One Health aims to attain optimal health for humans, non-human animals and their shared environments. As a field, public health ethics needs to move beyond an exclusive preoccupation with humans, so as to account for moral complexity arising from people's diverse connections with places, plants, and non-human animals.

Keywords: health promotion; ecosystem; animal welfare; social sciences; systems theory; ethical theory; Canada; Australia

Introduction

One Health denotes an interdisciplinary approach to research and an inter-sectoral approach to intervention, premised on intricate independence between humans, non-human species, and ecosystems. Research and practice in relation to One Health is shifting towards concern with shared causes of disease burden across non-human and human populations (Rock et al., 2009; Zinsstag et al., 2011). This shift follows from recognising that there can be no public health without animal health and ecosystem health. Yet public health ethics remains weakly articulated with environmental ethics and, to an even lesser extent, with non-human animal ethics.

Within public health, the *Ottawa Charter for Health Promotion* provides guidance for realising the World Health Organization's (1948) comprehensive definition of health as "a complete state of "physical, mental, and social well-being." Insofar as the *Ottawa Charter for Health Promotion* identifies "a stable ecosystem" and "sustainable resources" as among the

“fundamental conditions and resources for health,” the Ottawa Charter also implies that people can and should exert mastery over places along with non-human animals (WHO, 1986). Nevertheless, according to the *Ottawa Charter*, health is created through caring for others (WHO, 1986). An especially crucial passage reads:

Health is created and lived by people within the settings of their everyday life; where they learn, work, play and love. Health is created by caring for oneself and others, by being able to take decisions and have control over one's life circumstances, and by ensuring that the society one lives in creates conditions that allow the attainment of health by all its members. (WHO, 1986)

We agree that health can be “created and lived” in the context of everyday life, and would add that non-human animals as well as environments and settings contribute materially to the generation and experience of well-being for people. Indeed, people’s efforts to care for others (human *and* non-human) may reflect and instantiate their values. In this article, we expand on humanist conceptualisations of solidarity to recognise people’s efforts to assist non-human animals, plants and places, and we reflect upon the implications for public health of practicing “more-than-human solidarity.”

Solidarity amongst Humans and More-than-Human Solidarity

According to Prainsack and Buyx (2012, 346), in “its most bare-boned form,” solidarity involves “shared practices reflecting a collective commitment to carry ‘costs’ (financial, social, emotional or otherwise) to assist others.” Their definitional emphasis on practice stands in explicit contradistinction to “an inner sentiment or abstract value” (Prainsack & Buyx, 2012, 346). Further, they stipulate that solidarity may be practised in situations of mutual benefit for the recipients and providers of assistance. Prainsack and Buyx (2012) discern three “levels” or “tiers” of solidarity, representing a spectrum of institutionalisation. Nevertheless, they emphasise that the scale or degree of institutionalisation does not determine the moral worth nor ultimate importance of a given enactment of solidarity.

At the first and most basic level, “solidarity comprises manifestations of the willingness to carry costs to assist others with whom a person recognizes sameness or similarity in at least one relevant respect” (Prainsack & Buyx, 2012, 346). In settings where a particular manifestation of solidarity has become normalised and is widely regarded as proper conduct, a second level of solidarity may emerge. In such situations, solidarity comprises “manifestations of a collective commitment to carry costs to assist others (who are all linked by a shared situation or cause)” (Prainsack & Buyx, 2012, 347). If a practice of solidarity extends beyond a sociocultural norm into state-sanctioned contracts and other legal instruments, then the third and highest level of solidarity has been attained, as “legal and contractual arrangements are highly institutionalized enactments of carrying costs to assist others one recognizes sameness with...” (Prainsack & Buyx, 2012, 347). Regarding public health ethics, the second and third levels of solidarity may have the most influence on health outcomes, yet these levels typically represent a “scaling-up” of actions from the first level. Accordingly, Prainsack and Buyx (2012) maintain that the implications arising from all three levels of solidarity can be far-reaching.

Prainsack and Buyx’s (2012) discussion of solidarity as an emerging principle in public health ethics stems from an extensive literature review and from treating biobanking,

pandemics, and lifestyle-related diseases as case studies (Prainsack & Buyx, 2012). These three cases each have One Health valences, which have been explored elsewhere (e.g., Degeling et al., 2013; French & Mykhalovskiy, 2013; Haraway, 2008; Hinchliffe et al., 2013). Prainsack and Buyx (2012), however, treat multi-species coexistence matter-of-factly. Most notably, they bracket, and thereby underplay, the biopolitical dimensions and potentially un-solidaristic ‘stamping out’ practices of slaughter for non-human animals implicated in zoonotic pandemics (Prainsack & Buyx, 2011). Hereafter, we refer to the account provided by Prainsack and Buyx (2012) as “humanist solidarity,” because they emphasise human life to the point of virtually excluding consideration of non-human life as an ethical matter.

Prainsack and Buyx (2012, 348) maintain that “solidarity is embodied and enacted rather than merely ‘felt’.” We concur. Yet we expand on this insight by acknowledging people’s embodied efforts to be of assistance to non-human animals and places, which arise from the materiality of enmeshments between human bodies, non-human bodies, and places (following Ingold, 2011). More generally, Prainsack and Buyx’s (2012, 348) use of the terms “embodied” and “enacted” could serve as portals in public health ethics for deepening engagement with the social sciences and humanities.

A first step is to follow Mol (2002) in conceptualising people’s bodies as enactments. Human agency contributes to enactments, but non-human entities always contribute, too. According to Mol, then, enactments result from the dynamic distribution of agential properties across humans and non-humans; in turn, enactments continually redistribute agency across humans and non-humans. Mol (2008 [2006]) has taken up normative questions arising from theorising enactment and embodiment in this way, in relation to human diseases and populations. More recently, Law and Mol (2008, 2011) have collaboratively extended Mol’s (2002) theorisation of embodiment and enactment to diseases found in non-human animals. They attend to how such diseases can negatively impact people, but they skirt ethical questions regarding non-human lives, except to acknowledge that measures to contain pandemics can be deleterious to animal welfare (Law & Mol, 2008, 65). Unlike earlier efforts that conflated the agency of animals with that of technologies (Ingold, 2012; Risan, 2005; Rock et al., 2007 for critiques), Law and Mol (2008, 2011) attend to animality of livestock as well as of people, yet without espousing a position on the treatment of non-human animals.

We object to disregard for non-human life. Whereas Prainsack and Buyx (2012) presume that solidarity is necessarily enacted amongst human beings, we highlight that “others” with whom people recognise sameness and shared circumstances can – and do – include non-human animals or plants. What we have begun to call “more-than-human solidarity” may be practised spontaneously by individuals or groups, become inculcated into normative expectations, and undergo institutionalisation through contracts, policies, and laws. In other words, more-than-human solidarity may encompass all three levels of solidarity, as outlined by Prainsack and Buyx (2012). If we extend their definition to include non-human others, then, “more-than-human solidarity” refers to *human activity directed towards carrying costs and making trade-offs of various kinds with the intent of assisting others, whenever cared-for others include non-human animals, plants, or places.*

We emphasize that the costs and trade-offs entailed in assisting human and nonhuman others may be financial, social, or emotional in nature, as do Prainsack and Buyx (2012, 346) for humanist solidarity. Furthermore, more-than-human solidarity may be directed toward towards

nonhuman species in their entirety, towards localized populations comprised of plants or non-human animals, towards individual plants or non-human animals, or towards place-based collectivities with both human and non-human members. This extension of solidaristic praxis to non-human others is not without conceptual foundation. In particular, more-than-human solidarity builds on two existing concepts: “environmental health justice” and “multi-species flourishing.”

Environmental health justice is an emerging concept in public health ethics. According to Masuda and colleagues (2010), environmental health justice is rooted in the extent to which the *Ottawa Charter* construes ecosystems and everyday settings as the basis for health in human populations (WHO, 1986). Drawing on the *Ottawa Charter*, they observe, “It is clearly recognized in both health promotion and environmental justice literatures that marginalized populations face a double burden: inequality resulting from stratified *social* environments leads to non-random variation in the quality of *physical* environments” (Masuda et al., 2010, 454, emphasis in original).

Masuda and colleagues (2010, 260) acknowledge “varied epistemological approaches to health and place” (following Cummins et al., 2007) in highlighting that a given place may have multiple meanings and be amenable to multiple practices. In consequence, researchers and practitioners in public health must consider the consequences of their actions. For instance, Masuda and colleagues (2010, 255) write: “To achieve theoretical and practical integration, we argue that there needs to be a (re)acknowledgement of the need to work in solidarity with geographically, ethnically and socially based communities who are already pursuing environmental justice goals within their respective jurisdictions.” This orientation, in our view, is consistent with both humanist solidarity and more-than-human solidarity as ethical principles in public health.

Masuda and colleagues (2010) already recognize enactments of solidarity with places (i.e., a type of nonhuman entity) as part of public health ethics. Nevertheless, places are inhabited by non-human species (plants and animals), not just by humans. Masuda and colleagues (2010), however, are silent on the implications that may arise for public health ethics from the coexistence of human and non-human life, or from enactments of solidarity that focus on or necessarily encompass “living things” (i.e., plants, non-human animals, or both).

Non-human animals, plants, and places may be treated as person-like beings or as full-fledged persons, with profound effects for all concerned (Descola, 2013 [2005]; Ingold, 2011). In other words, we acknowledge that biological species, as a concept and as applied in practice, is not equally relevant to everyone. This situation invites further reflection on Masuda and colleagues’ (2010) discussion of solidarity as ethical practice in public health research. Especially in cultural contexts where places, plants, or animal bodies have the cultural and political status of non-human beings, it would be difficult if not impossible to practise humanist solidarity without respecting a more-than-human orientation to social life. Indeed, Masuda and colleagues (2010, 456) refer to such situations, albeit obliquely, in discussing solidarity through research in support of “traditional expertise, values and identities of First Nations and other non-western peoples.” Our conceptualisation of more-than-human solidarity acknowledges that many people care deeply about places, plants and non-human animals, to the extent of offering assistance, expecting others to provide assistance, and codifying this expectation in contracts, policies, and laws.

Whereas Masuda and colleagues (2010, 456) do not explicitly address non-human species or more-than-human collectivities in their discussion of solidarity, feminist scholarship has done so. Following on from Cuomo's (1998, 62) position that ecological feminism is characterised by a "commitment to the flourishing or well-being of individuals, species, and communities," Haraway (2008, 134) contends that multi-species flourishing is a core value that must complement any commitment to provide relief from suffering. And in keeping with how Prainsack and Buyx (2012) define humanist solidarity, and with our own conceptualisation of more-than-human solidarity, Haraway (2008, 134) contends that "[c]ompassionate action is, of course, crucial to an ethics of flourishing." Furthermore, Haraway (2008, 105) asserts that "multispecies coflourishing requires simultaneous, contradictory truths," such as the fact that nurturing may simultaneously enable and hinge on death, through direct acts of killing and by rendering others killable, whether subtly or overtly. Her examples include rendering the remains of non-human animals raised mainly for human food into pet-food, and ranching's displacement of both wildlife and Indigenous peoples in the American West. Even as she interrogates anthropocentrism and sometimes marvels in agency exerted through non-human lives, Haraway confines her assignment of ethical responsibilities to human beings, and in an asymmetrical manner: Haraway assigns a higher degree of responsibility to people with more privileges (see also Cuomo, 1998, 110).

To sum up, acting in solidarity with people implies respecting their commitments to one another as well as to places, plants and non-human animals. Interventions motivated by humanist solidarity may, therefore, extend toward assisting non-humans. Interventions may also focus first and foremost on non-humans (places, plants or animals). We propose that the term "more-than-human solidarity" denote both of these intervention types. We also maintain that accountability follows from privilege. Amongst researchers, policy-makers, and practitioners in public health, accountability extends to consideration for non-human animals, plants, and ecosystems, and to respect for other people's emotional, social, and physical interdependence with non-human entities.

Such commitments, however, often contradict one another, not least because acting with the intent of assisting others is always selective (see also Haraway, 2008; Masuda et al., 2010; Mol, 2008 [2006]; Prainsack & Buyx, 2012). Whereas the contradictions inherent to both humanist and more-than-human solidarity are cause for concern, we maintain that acknowledging such contradictions is better than ignoring them, as has too often been the case in public health. Furthermore, we maintain that more-than-human solidarity does not trump humanist solidarity in public health ethics. Rather, more-than-human solidarity can complement and deepen humanist solidarity. Even when humanist and more-than-human solidarity contradict one another, people's efforts to practice more-than-human solidarity can carry implications for public health. Below, we illustrate the innate tensions involved in reconciling humanist and more-than-human solidarity in relation to Hendra virus (HeV) and Rabies virus (RbV). Both HeV and RbV qualify as zoonoses, in that transmission of these pathogens can occur between non-human animals and humans to cause infection, disease or both in susceptible species.

Of Hendra, Horses and Public Order

Hendra virus (HeV) is an emerging infectious disease (EID) that is highly lethal to humans and endemic in Australian flying fox populations (Mahalingam et al., 2012). Generally 'silent' in the host species, which are types of bat, HeV has 'spilled over' to infect horses, and then people and dogs through their increasingly intense interactions in rural and peri-urban areas. Several hundred people have been exposed to HeV-infected horses without zoonotic transmission, but in 4 of the 7 known cases of human infection, death occurred.

Discovered in 1994, HeV was quickly recognised as a significant public health concern, not least because of the known potential of this family of viruses to evolve into pandemic strains. Since this time there have been periodic 'spill over' events (1-2 per year) during which more than 80 horses have died or been euthanised on the confirmation or presumption of a HeV diagnosis. Concerns about the risks of HeV were further heightened in 2011, when an unprecedented 18 spill-over events (equine infections) occurred during a twelve-week period and over an expanded geographic range, emphasising that HeV is a volatile and unmanaged EID (Field et al., 2012).

Like many other EIDs, changes in the incidence and cross-species transmissibility of HeV hinge on human activities. The urbanisation of coastal habitats in Eastern Australia has had a number of effects on flying fox populations. Flying foxes are highly nomadic animals that may travel more than 100 km to feed on flowering and fruiting trees. They have been considered by many to be problematic creatures – even pests – well before the emergence of HeV. As large areas once covered in flowering eucalypt trees (the bats' normal food) have been redeveloped for human use, flying foxes have been forced to live close to and encroach upon human settlements. These flying fox 'camps' sometimes comprise 10,000 or more individuals, bringing them into further conflict with human interests and, potentially, increasing the risk of zoonotic transmission (Plowright et al., 2011).

Public health responses to the emergence of HeV as a threat to human health have been widely celebrated as a One Health success story (Hazelton et al., 2013; Landford & Nunn, 2012). Realising that the eradication of flying foxes would be an almost impossible challenge with unpredictable consequences (Middleton et al., 2014; Plowright et al., 2011) – and morally questionable besides – organised responses to the threats posed by HeV have concentrated on three areas:

1. Public education campaigns targeting horse owners, veterinarians and those working in equine industries to adopt lower-risk practices;
2. Strict enforcement of legislation that protects flying fox populations from unauthorised culling or attempts to relocate their camps;
3. Development of a vaccine for horses so as to protect equine and thereby human health.

Each of these measures can be understood as attempts to promote the health and well-being of humans and are thus humanist in orientation. But each can also, to varying extents, be understood as attempts to promote the health and well-being of the non-human animals involved. Each type of intervention also involves some form of selection, whereby burdens must necessarily be borne by others – both human and non-human – in order to protect the larger collective from the risks of HeV infection, the measures that might be taken in response to these risks, or both.

In the absence of complete knowledge about HeV ecology, public education campaigns were one of the first steps taken by human and animal health authorities in response to HeV emergence. As noted above, these communications have targeted those at highest risk of exposure to a horse infected by HeV: horse owners, veterinarians, and others involved in equine industries. As further evidence about the probable modes of transmission between bats and horses has emerged, horse owners have been instructed to change the ways in which horses are kept in areas prone to HeV spillover events (Biosecurity Queensland, 2013). Practical measures that keep flying fox excreta and horses at a distance from each other (e.g., fencing off or removing flowering trees from paddocks and stable areas) are expressions of humanist and more-than-human solidarity at a basic level. These measures minimise the risk to horses, and, thereby, to the people who implement them. These practices also have the potential to extend to the second tier of humanist and more-than-human solidarity, as health authorities seek to normalise new ways of looking after horses as standard practice. Yet, establishing these practices as norms is proving difficult. Despite considerable efforts to educate horse owners about the risks to themselves and their animals, many have yet to change the ways that they look after their horses because they find the new practices to be onerous, expensive to implement, and therefore, impractical (Kung et al., 2013).

According to Prainsak and Buyx (2012), to qualify as solidaristic practice, interventions cannot be imposed without a high degree of consensus as their acceptability must arise organically from a basic recognition of affinity. We might think that horse owners who refuse to take steps to minimise risk in their everyday interactions with their animals are showing a wanton disregard toward, or even alienation from, others at risk. Nevertheless, many horse-owners have exposed themselves to HeV – sometimes in full knowledge of the potential consequences – in attempting to comfort their sick and dying horses. Such actions express attachment to that animal. It is therefore possible to claim that these horse-owners are acting out of solidarity with their horses in the face of shared threat. Rather than this response being a manifestation of an unsolidaristic lack of affinity between humans and non-human others, it shows that if biosecure practices of equine care are to become the norm in human-horse relationships, the creation and imposition of normative sanction around the new standards will likely require a long process of enculturation.

Teaching veterinarians to treat every sick horse with a fever or respiratory symptoms as a potential threat to human health has also involved a major cultural shift: from overalls to Hazmat suits, and from an easy familiarity with the bodies of sick animals to hyper-vigilance (Dowd et al., 2013). Perhaps because two of the four people who have died of HeV were veterinarians who went off to work one day and caught the disease, some veterinarians have quit equine practice (Mendez et al., 2012), and many now refuse to treat unvaccinated horses (Mendez et al., 2013). Undoubtedly, these veterinary practitioners feel compassion for the sick horses, but they are unwilling to put themselves or their staff at risk, no matter what pleas and inducements horse owners put forward.

The second response from governments and health authorities to the emergence of HeV was to become more diligent about enforcing existing legal protections for flying foxes. There have long been concerns that flying fox populations in Eastern Australia were in decline. The evidence is contested, but audits have found that even as flying foxes numbers are falling, they are congregating in larger and more visible camps. This behaviour has been interpreted to mean that flying foxes comprise a population gathering around increasingly scarce resources.

For this reason, since 1986 in New South Wales and 1994 in Queensland, flying foxes camps have been legally protected from human interference in an effort to rehabilitate these populations. In 2008, the Queensland government took the further step of refusing all applications by farmers for permits to shoot flying foxes so as to protect their crops. Once the role of flying foxes in HeV outbreaks became apparent, it was thought that attempts to disperse flying fox camps would increase the viral load and excretion into the environment (Plowright et al., 2008), and, given the lack of suitable habitat elsewhere, do little more than shift the risk of HeV exposure onto another community. Laws designed to conserve native species (inclusive of eucalypts and flying fox populations) became key instruments through which governments and health authorities sought to halt the geographic spread of HeV and to manage interactions between a population of wild animals and the broader 'at risk' collective at a time of heightened zoonotic uncertainty.

The enforcement of the legal protections described above qualify as the highest level of more-than-human solidarity because they provide assistance to flying fox populations by allowing colonies to form around human settlement, with access to the sources of food contained in commercial enterprises, public parks and people's gardens. Yet, the practices entailed by this collective commitment have provoked sustained and organised dissent amongst some segments of the public. The selectiveness and inconsistencies implicit within the practice of more-than-human solidarity became a matter of public controversy in 2011, when a pet dog found to have HeV antibodies was impounded as a biosecurity risk and then euthanised (with the owner's consent), whereas the flying foxes that spread the virus remained 'at large' and legally protected (Degeling & Kerridge, 2013). The strategy of protecting flying foxes populations so as to protect equine and human health has increasingly brought the humanist and more-than-human explications of solidarity into conflict. As people who have been negatively affected by flying foxes have struggled to carry the costs of 'living with' the growing throngs of unwelcome HeV-carrying neighbours, many have come to believe that governments and health authorities are putting the health and welfare of another species above that of their community (Degeling & Kerridge, 2013).

In the third response to the emergence of HeV, the intent of developing a vaccine for horses was to break the chain of transmission from flying foxes to horses to humans, thereby protecting horse and human health (Middleton et al., 2014). This intervention was perceived to be the most direct means of achieving the desired health protection outcomes, while also allowing equine industries to continue in affected areas. Vaccine development was funded by a coalition of human and animal health agencies, the *Horse Council of Australia* and the US Military Medical Research Services. This coalition can be construed as part of a third-tier contractual solidaristic commitment to carry costs so as to assist others. That each of these partners had their own sets of interests – e.g., health authorities wanting to nullify the threat to the public, horse owners seeking to protect equine health and equine industries, and the US military pursuing a research agenda focused on the threats of bio-terrorism – shows that altruism need not underpin solidarity in either humanist or more-than-human manifestations. It is also worth highlighting that vaccine development is not a benign process. It involves sustained large-scale biomedical research and testing that necessarily impacts upon the lives of thousands of other non-human animals.

The development of a vaccine for HeV demonstrates that both humanist and more-than-human solidarity entail selectivity, in that immunity is only afforded to some horses; its

development has required experimentation upon and the destruction of other animals; and the vaccine, at best, only indirectly provides benefit to flying fox populations by reinforcing efforts to protect them. The practice of selection and the choices that are involved mark the point where we begin to extend solidaristic concerns to other humans or to non-human others. Like other processes of 'sorting' (Bowker & Star, 1999), our choices either reflect our existing biopolitical orientations or become the means through which we seek to instantiate new forms of social and political order and make material new biological arrangements (Blue & Rock, 2011; Braun, 2007).

Of Rabies and Rescues

Whereas HeV was identified only recently and continues to evolve as a threat to domestic animals (dogs, horses) and to public health, RbV has long been recognized as a zoonotic pathogen (Pemberton & Worboys, 2013). Historically, successive interventions to control RbV could be considered precursors to the contemporary interest in One Health (Pemberton & Worboys, 2013). Nevertheless, RbV remains endemic in many parts of the world. In addition, RbV has re-emerged as a threat to public health in places with low-prevalence through increased mobility for dogs, especially through "rescues" organized by advocates for animal welfare.

RbV is fatal in humans if untreated, and dogs are the main source of human infections (WHO, 2013). Approximately 40% of those who are exposed to RbV by dogs are children under the age of 15 (WHO, 2013). RbV circulates worldwide, but human deaths are concentrated in Asia and Africa (WHO, 2013). Subsidised vaccination of dogs can be a cost-effective intervention, in terms of both animal welfare and human well-being, even in low-income settings (Durr et al., 2009). Across Latin America, human mortality from RbV has fallen dramatically since the early 1990s, and such success has been attributed to prophylactic treatment of people and to mass vaccination of dogs (Belotto et al., 2005). In North America, RbV in people and dogs is rare (Belotto et al., 2005).

Throughout northern Canada, however, RbV is endemic in several species of wildlife and thus can spread to wild canids. In turn, through both playful and predatory behaviour, wild canids can come into contact with domestic dogs, and dogs could transmit RbV to people (Brook et al., 2010). As a measure to protect public health, a government program supplies RbV vaccines free-of-charge and permits people other than veterinarians to administer the RbV vaccine to dogs in remote communities. Regardless, perhaps fewer than 1 in 3 domestic dogs in northern Canada have actually been vaccinated against RbV (Brook et al., 2010).

Meanwhile, animal welfare advocates increasingly regard the treatment of dogs in northern Canada as cause for concern, and responses include sporadic spay/neuter clinics and apprehension of dogs under the auspices of "rescue." In the absence of regular access to sterilisation surgeries and other veterinary services, and given the potential for dogs to represent a threat and nuisance within northern communities, the main intervention consists of killing dogs by shooting them (Brook et al., 2010). Dogs are also routinely tethered outdoors in northern Canada (Brook et al., 2010), a practice which is no longer legal in other parts of Canada due to concerns about nuisance and animal welfare (Rock, 2013). A recent RbV case dramatically illustrated the implications of this situation for public health and ethics.

In the latter half of 2013, RbV was diagnosed in a 5-month-old puppy after being “rescued” from a northern community and then re-homed in Calgary, Alberta, Canada (Catalina Mema et al., 2012). Within weeks of arrival, the puppy suddenly became aggressive, the owners sought veterinary advice, RbV was suspected, and the puppy was euthanised. Laboratory analysis confirmed that the puppy had contracted the Arctic fox variant of RbV. Further investigation led to identifying 14 people who could have contracted RbV from the puppy, of whom 8 were considered to have had high-risk exposures and so were offered post-exposure prophylaxis. In addition, an unimmunised dog in the Calgary area had been bitten by the puppy, and the owners of the bitten dog elected for euthanasia. Meanwhile, in the puppy’s community of origin in northern Canada, the owner of the puppy’s mother and 3 remaining littermates received a government order requiring 6 months of quarantine for these dogs (Catalina Mema et al., 2012).

The interventions entailed in this RbV case can be described meaningfully as a series of actions intended to assist human beings, non-human beings, or both. Some of these interventions aimed to protect public health, while others intended to co-promote human well-being and dog welfare. All carry implications for public health and ethics.

First of all, “rescuing” the puppy qualifies as more-than-human solidarity. Indeed, all the actions entailed by “rescue” qualify as “manifestations of a collective commitment to carry costs to assist others (who are all linked by a shared situation or cause)” (Prainsack & Buyx, 2012, 347), with the puppy as the focus of assistance and the new owners as people who were linked to the would-be rescuers by the common cause of animal welfare. Collectively, the would-be rescuers and adopters were to absorb any financial, social and emotional costs associated with re-homing, such as transportation costs and any medical or behavioural problems arising from the puppy’s early-life circumstances. Indeed, the adopters appear to have incurred financial, social, and emotional costs, including veterinary consultation, contact-tracing, and euthanasia of their puppy due to RbV (Catalina Mema et al., 2012).

The new owners’ decision to seek veterinary attention for the puppy could be interpreted as both humanist solidarity and more-than-human solidarity. As a matter of “proper” conduct, the new owners took action that could assist the puppy, and that could prevent others (humans and non-human animals) from being harmed by the puppy’s aggressive behaviour. Sample procurement and laboratory analysis leading to confirmation of RbV represents humanist solidarity at the level of official policy, for in this setting, all suspected and confirmed cases of rabies must be reported to public health authorities (Province of Alberta, 2010). Yet diagnosing, confirming, and reporting rabies could also instantiate more-than-human solidarity, insofar as the intent to assist extends to non-human animals, notably other dogs. In other words, vaccinating dogs against RbV and euthanising dogs to control RbV could be motivated strictly by humanist solidarity (i.e., protecting humans from harm) but also by more-than-human solidarity (i.e., protecting humans *and* non-human animals from harm).

Historically, rabies control provided the justification for local authorities to impound and kill free-roaming dogs (Pemberton & Worboys, 2013). Even in places where RbV is entirely absent or extremely rare in dogs, local bylaws still allow for free-roaming dogs to be impounded and killed (Rock, 2013; Wadiwel, 2009). Indeed, two littermates of the adopted puppy had been killed under local bylaws on free-roaming dogs before authorities in the community of origin had received notification of the RbV case (Catalina Mema et al., 2012).

Impounding and killing dogs because they are “out of place” is typically motivated by the intent of reducing dog-related threats and nuisances, but may also reflect concern for a roaming dog’s own welfare, concern for dogs being kept “in their proper place,” or concern for pet owners (Srinivasan, 2013). Indeed, dog-related nuisances as well as outright threats deter physical activity and fuel animosity to an extent that is relevant for equity in public health (Derges et al., 2012; Toohey & Rock, 2011). Nevertheless, as exemplified by the killing of dogs in the name of public health, or for the sake of animal welfare, or some combination of these two motivations, the sacrifice of non-human lives may be entailed by both humanist and more-than-human solidarity.

Furthermore, as illustrated by the recent Canadian RbV case, practices of more-than-human solidarity merit scrutiny. In this case, more-than-human solidarity apparently did not extend to arranging for RbV vaccinations, or to providing any other veterinary service in the puppy’s community of origin (Catalina Mema et al., 2012). Also, the ethical justification for removing a puppy whose mother had a traceable owner in that community is questionable, but information is lacking on the extent to which the “rescuers” engaged with the original owner or other residents (Catalina Mema et al., 2012). Put more sharply, the would-be rescuers seemingly acted in solidarity with the puppy and with the puppy’s new owners, but not with the original owners or with other residents of the original community (human *or* non-human).

The would-be rescuers and the eventual adopters of the rabid puppy intended for this animal to grow up in a place that is widely-regarded as a “model city” for co-promoting health for people and pets (Rock, 2013). Benefits include physical activity for dogs and dog-walkers, and a heightened sense of community among frequent dog-walkers (Degeling et al., 2012; Degeling & Rock, 2013; Lail et al., 2011; McCormack et al., 2011; Toohey et al., 2013). Thus, in adopting a puppy from northern Canada, the new owners would have had every reason to expect a high quality of life for the dog and for themselves.

RbV is almost never seen in people or dogs in this setting (Catalina Mema et al., 2012), and whereas vaccine accessibility is certainly important (Belotto et al., 2005), the history of dog-leashing also deserves consideration. As a complement to allowing local authorities to impound free-roaming dogs and kill them, the original intent of dog-leashing was to protect people and pet dogs. More precisely, in response to concerns about RbV, wealthier and better-educated segments of the English population endorsed dog-leashing over muzzling (Howell, 2012), which they viewed as overly intrusive and deleterious to the welfare of their dogs (Pemberton & Worboys, 2013). The spread of a normative expectation and legal requirement to supervise and leash dogs whenever in public has meant that free-roaming dogs are no longer allowed by law or tolerated in practice throughout much of the world, even in places where canine RbV is absent or unlikely (Borthwick, 2009; Rock, 2013).

We view bylaws on dog-leashing as an example of institutionalising both humanist and more-than-human solidarity, beginning with RbV control and continuing through to the present day in relation to infectious as well as non-infectious diseases (Christian et al., 2013; Degeling et al., 2013; Toohey & Rock, 2011; Westgarth et al., 2010). Even so, this kind of policy intervention still appears to serve privileged communities to a greater extent than disadvantaged ones (Toohey & Rock, 2011), and exemptions to leashing laws in select parks can also reinforce positions of privilege (Tissot, 2011).

To reiterate, historically and contemporaneously, humanist and more-than-human solidarity have entwined in responses to RbV. Even in places where RbV is rare or absent, policies that originated in RbV control have become instruments that protect against infections and that can also promote physical activity and mental health, for both dogs and people. Nevertheless, policies to control RbV and to regulate dogs have differential impacts. Some dogs are put to death, while other dogs thrive; some people develop grievances toward their dog-owning neighbours or avoid walking outdoors because they fear free-roaming dogs, while other people benefit from a heightened sense of community and improved physical fitness through dog-walking.

Concluding Remarks

The key contribution of this article is to highlight that people's views on and experiences with non-human animals have relevance for public health ethics. Whereas One Health is certainly broader in scope than interventions to control zoonoses, responses to zoonoses powerfully illustrate people's commitments to care for one another and for non-humans. Indeed, the threats posed by HeV and RbV are central to how One Health is being conceptualised and practised (Landford & Nunn, 2012). Nevertheless, our examination of responses to HeV and RbV has highlighted tensions between efforts to protect public health and efforts to protect non-human animals from harm; and between concern for individuals and concern for populations or species. We view such tensions as inevitable, and call for more attention to be paid to the more-than-human dimensions of such tensions in public health ethics. Anticipation of moral complexity in people's relationships with one another along with non-human animals will not only broaden the remit of public health ethics but also result in analyses that are more sensitive and more useful.

We have introduced the term "more-than-human solidarity" because people do not care for fellow humans in isolation from non-human animals, nor from places, nor do people necessarily care more about fellow humans than they do about non-human species, individual animals, particular places, or multi-species collectives. Furthermore, our analysis of HeV and RbV case examples suggests that applying the principles of humanist and more-than-human solidarity is compatible with casuistry, that is, "the analysis of moral issues, using procedures of reasoning based on paradigms and analogies, leading to the formulation of expert opinions about the existence and stringency of particular moral obligations, framed in terms of rules or maxims that are general but not universal or invariable..." (Jonsen & Toulmin, 1988, 257). Since people's values can be distilled by documenting and characterising a range of practices intended to assist others (human and/or non-human), casuistic analysis vis-à-vis the principles of humanist and more-than-human solidarity would begin by describing One Health issues from multiple perspectives. Each of these perspectives has implications for human existence and for co-existence of humans with non-human animals (Law & Mol, 2011; Mol, 2002, 2008 [2006]). Applying the principles of humanist and more-than-human solidarity to actual cases or analogous cases could aid in studying, designing, implementing, and refining interventions for One Health.

References

- Belotto, A., Leanes, L.F., Schneider, M.C., Tamayo, H., & Correa, E. (2005). Overview of rabies in the Americas. *Virus Research*, 111, 5-12.
- Biosecurity Queensland. (2013). Hendra Virus Information For Horse Owners. Queensland, Australia: Department of Agriculture, Fisheries and Forestry, Government of Queensland.
- Blue, G., & Rock, M.J. (2011). Trans-biopolitics: Complexity in interspecies relations. *Health: an Interdisciplinary Journal for the Social Study of Health, Illness & Medicine*, 15, 353-368.
- Borthwick, F. (2009). Governing pets and their humans - dogs and companion animals in New South Wales, 1966-98. *Griffith Law Review*, 18, 185-185.
- Bowker, G.C., & Star, S.L. (1999). *Sorting Things Out: Classification and its Consequences*: MIT press.
- Braun, B. (2007). Biopolitics and the molecularization of life. *Cultural Geographies*, 14, 6-28.
- Brook, R.K., Kutz, S.J., Millins, C., Veitch, A.M., Elkin, B.T., & Leighton, T. (2010). Evaluation and delivery of domestic animal health services in remote communities in the Northwest Territories: A case study of status and needs. *Canadian Veterinary Journal*, 51, 1115-1122.
- Catalina Mema, S., Friesen, B., Desai, S., Rock, M., & McIntyre, L. (2012). Rabies in a Calgary puppy adopted from the Arctic. *Canadian Journal of Public Health*, 104, 510.
- Christian, H.E., Westgarth, C., Bauman, A., Richards, E.A., Rhodes, R., & Evenson, K.R. (2013). Dog ownership and physical activity: A review of the evidence. *Journal of Physical Activity & Health*, 10, 750-759.
- Cummins, S., Curtis, S., Diez-Roux, A.V., & Macintyre, S. (2007). Understanding and representing 'place' in health research: a relational approach. *Social Science & Medicine*, 65, 1825-1838.
- Cuomo, C. (1998). *Feminism and Ecological Communities: An Ethic of Flourishing*. London, UK: Routledge.
- Degeling, C., Burton, L., & McCormack, G.R. (2012). An investigation of the association between socio-demographic factors, dog-exercise requirements, and the amount of walking dogs receive. *Canadian Journal of Veterinary Research*, 76, 235-240.
- Degeling, C., & Kerridge, I. (2013). Hendra in the news: Public policy meets public morality in times of zoonotic uncertainty. *Social Science & Medicine*, 82, 156-163.
- Degeling, C., Kerridge, I., & Rock, M. (2013). What to think of canine obesity? Emerging challenges to our understanding of human–animal health relationships. *Social Epistemology*, 27, 90-104.
- Degeling, C., & Rock, M. (2013). 'It was not just a walking experience': Reflections on the role of care in dog-walking *Health Promotion International*, 28, 397-406.
- Derges, J., Lynch, R., Clow, A., Petticrew, M., & Draper, A. (2012). Complaints about dog faeces as a symbolic representation of incivility in London, UK: A qualitative study. *Critical Public Health*, 22, 419–425
- Descola, P. (2013 [2005]). *Beyond Nature and Culture*. Chicago: Chicago University Press.

- Dowd, K., Taylor, M., Toribio, J.-A.L.M.L., Hooker, C., & Dhand, N.K. (2013). Zoonotic disease risk perceptions and infection control practices of Australian veterinarians: Call for change in work culture. *Preventive Veterinary Medicine*, 111, 17-24.
- Durr, S., Mindekem, R., Kaninga, Y., Doumagoum Moto, D., Meltzer, M.I., Vounatsou, P., et al. (2009). Effectiveness of dog rabies vaccination programmes: comparison of owner-charged and free vaccination campaigns. *Epidemiology and Infection*, 137, 1558-1567.
- Field, H., Cramer, G., Kung, N.Y.-H., & Wang, L.-F. (2012). Ecological Aspects of Hendra Virus. In B. Lee, & P.A. Rota (Eds.), *Henipavirus* pp. 11-23. Berlin & Heidelberg: Springer.
- French, M., & Mykhalovskiy, E. (2013). Public health intelligence and the detection of potential pandemics. *Sociology of Health & Illness*, 35, 174-187.
- Haraway, D. (2008). *When Species Meet*. Minneapolis, London: University of Minnesota Press.
- Hazelton, B., Ba Alawi, F., Kok, J., & Dwyer, D.E. (2013). Hendra virus: a one health tale of flying foxes, horses and humans. *Future Microbiology*, 8, 461-474.
- Hinchliffe, S., Allen, J., Lavau, S., Bingham, N., & Carter, S. (2013). Biosecurity and the topologies of infected life: from borderlines to borderlands. *Transactions of the Institute of British Geographers*, 38, 531-543.
- Howell, P. (2012). Between the muzzle and the leash: Dog-walking, discipline, and the modern city. In P. Atkins (Ed.), *Animal Cities: Beastly Urban Histories* (pp. 221-241). Burlington, VT: Ashgate Publishing, Ltd.
- Ingold, T. (2011). *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge.
- Ingold, T. (2012). Toward an Ecology of Materials. *Annual Review of Anthropology*, 41, 427-442.
- Jonsen, A.R., & Toulmin, S. (1988). *The Abuse of Casuistry: A History of Moral Reasoning*. Berkeley, CA: University of California Press.
- Kung, N., McLaughlin, A., Taylor, M., Moloney, B., Wright, T., & Field, H. (2013). Hendra Virus and Horse Owners – Risk Perception and Management. *PLoS ONE*, 8.
- Lail, P., McCormack, G., & Rock, M. (2011). Does dog-ownership influence seasonal patterns of neighbourhood-based walking among adults? A longitudinal study. *BMC Public Health*, 11, 148, doi:110.1186/1471-2458-1111-1148.
- Landford, J., & Nunn, M. (2012). Good governance in 'one health' approaches. *Revue Scientifique et Technique (International Office of Epizootics)*, 31, 561-575.
- Law, J., & Mol, A. (2008). The Actor-Enacted: Cumbrian Sheep in 2001. In L. Malafouris, & C. Knappett (Eds.), *Material Agency Towards a Non-Anthropocentric Approach* pp. 57-78). New York, NY: Springer.
- Law, J., & Mol, A. (2011). Veterinary Realities: What is Foot and Mouth Disease? *Sociologia Ruralis*, 51, 1-16.
- Mahalingam, S., Herrero, L.J., Playford, E.G., Spann, K., Herring, B., Rolph, M.S., et al. (2012). Hendra virus: an emerging paramyxovirus in Australia. *The Lancet Infectious Diseases*, 12, 799-807.

- Masuda, J.R., Poland, B., & Baxter, J. (2010). Reaching for environmental health justice: Canadian experiences for a comprehensive research, policy and advocacy agenda in health promotion. *Health Promotion International*, 25, 453-463.
- McCormack, G.R., Rock, M.J., Sandalack, B., & Uribe, F.A. (2011). Access to off-leash parks, street pattern and dog walking among adults. *Public Health*, 125, 540-546.
- Mendez, D.H., Büttner, P., & Speare, R. (2013). Response of Australian veterinarians to the announcement of a Hendra virus vaccine becoming available. *Australian Veterinary Journal*, 91, 328-331.
- Mendez, D.H., Judd, J., & Speare, R. (2012). Unexpected Result of Hendra Virus Outbreaks for Veterinarians, Queensland, Australia. *Emerging Infectious Diseases*, 18, 83-85.
- Middleton, D., Pallister, J., Klein, R., Feng, Y.-R., Haining, J., Arkinstall, R., et al. (2014). Hendra Virus Vaccine, a One Health Approach to Protecting Horse, Human, and Environmental Health. *Emerging infectious diseases*, 20, <http://dx.doi.org/10.3201/eid2003.131159>.
- Mol, A. (2002). *The Body Multiple: Ontology in Medical Practice*. Durham, NC: Duke University Press.
- Mol, A. (2008 [2006]). *The Logic of Care: Health and the Problem of Patient Choice*. London: Routledge.
- Pemberton, N., & Worboys, M. (2013). *Rabies in Britain: Dogs, Disease and Culture, 1830-2000*. London: Palgrave Macmillan.
- Plowright, R.K., Field, H.E., Smith, C., Divljan, A., Palmer, C., Tabor, G., et al. (2008). Reproduction and nutritional stress are risk factors for Hendra virus infection in little red flying foxes (*Pteropus scapulatus*). *Proceedings of the Royal Society B: Biological Sciences*, 275, 861-869.
- Plowright, R.K., Foley, P., Field, H.E., Dobson, A.P., Foley, J.E., Eby, P., et al. (2011). Urban habituation, ecological connectivity and epidemic dampening: the emergence of Hendra virus from flying foxes (*Pteropus* spp.). *Proceedings of the Royal Society B: Biological Sciences*, 278, 3703-3712.
- Prainsack, B., & Buyx, A. (2011). *Solidarity: reflections on an emerging concept in bioethics*: Nuffield Council on Bioethics.
- Prainsack, B., & Buyx, A. (2012). Solidarity in contemporary bioethics: towards a new approach. *Bioethics*, 26, 343-350.
- Province of Alberta. (2010). Public Health Act. Edmonton: Alberta Queen's Printer.
- Risan, L.C. (2005). The boundary of animality. *Environment and Planning D*, 23.
- Rock, M.J. (2013). Pet bylaws and posthumanist health promotion: a case study of urban policy. *Critical Public Health*, 23, 201-212.
- Rock, M.J., Buntain, B., Hatfield, J., & Hallgrímsson, B. (2009). Animal-human connections, 'one health,' and the syndemic approach to prevention. *Social Science & Medicine*, 68, 991-995.
- Rock, M.J., Mykhalovskiy, E., & Schlich, T. (2007). People, other animals and health knowledges: Towards a research agenda. *Social Science & Medicine*, 64, 1970-1976.
- Srinivasan, K. (2013). The biopolitics of animal being and welfare: dog control and care in the UK and India. *Transactions of the Institute of British Geographers*, 38, 106-119.

- Tissot, S. (2011). Of dogs and men: The making of spatial boundaries in a gentrifying neighborhood. *City & Community*, 10, 265–284.
- Toohey, A.M., McCormack, G.R., Doyle-Baker, P.K., Adams, C.L., & Rock, M.J. (2013). Dog-walking and sense of community in neighborhoods: Implications for promoting regular physical activity in adults 50 years and older. *Health & Place*, 22, 75-81.
- Toohey, A.M., & Rock, M.J. (2011). Unleashing their potential: a critical realist scoping review of the influence of dogs on physical activity for dog-owners and non-owners. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 46, doi:10.1186/1479-5868-1188-1146.
- Wadiwel, D.J. (2009). The war against animals: Domination, law and sovereignty. *Griffith Law Review*, 18, 283-297
- Westgarth, C., Christley, R.M., Pinchbeck, G.L., Gaskell, R.M., Dawson, S., & Bradshaw, J.W.S. (2010). Dog behaviour on walks and the effect of use of the leash. *Applied Animal Behaviour Science*, 125, 38-46.
- WHO. (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. New York City, NY, USA: World Health Organization.
- WHO. (1986). Ottawa Charter for Health Promotion. International Conference on Health Promotion. Ottawa, ON, Canada: World Health Organization.
- WHO. (2013). Rabies - Fact Sheet #99. Geneva: World Health Organization.
- Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. (2011). From 'one medicine' to 'one health' and systemic approaches to health and well-being. *Preventive Veterinary Medicine*, 101, 148-156.