

The Sensuous Worlds of Domesticated Beings: Embodied Communication in Human-Horse Relationships

Written By: Lesley Tucker

Supervised by: Leesa Fawcett

**A Major Paper submitted to the Faculty of Environmental Studies
in partial fulfillment of the requirements for the degree of**

Master in Environmental Studies

**York University,
Toronto, ON**

April 2017

Abstract

When mapping the history of our relationships with horses, it is the dramatic transformation of human civilization made possible by them which, generally dominates the narrative – the changes in the ways humans travelled, farmed, and fought each other. Less likely to be noted are the changes experienced by the horses themselves, to their bodies, environments, and social worlds. And while often romanticized, this history, particularly the history of training relationships, was frequently harsh and sometimes brutal, with methods dependent on the use of force and fear. Some of the traditional horsemanship approaches to training practiced today, have carried forward these methods to greater or lesser degrees. And in answer to their experiences with such methods and the attitudes behind them, natural horsemanship (NH) practitioners (sometimes referred to as horse whisperers) based their own approaches to training on nonviolence, and communication – namely the use of nonverbal communication between humans and horses.

Embodied forms of nonverbal communication, require a sensitivity to nonverbal cues however, and the idea that humans have lost some of our sensory acuity exists both inside NH communities, and outside, where it is sometimes viewed as the result of our own domestication. Within NH communities, our relationships with horses are often presented as a way to reclaim some of our sensory acuity, as we become sensitized to their nonverbal cues. Once again, however, the experiences of horses can be overlooked - the idea that they too have lost some of their sensory acuity through their domestication, and that they continue to lose it through their environments and training relationships, is far less likely to be considered, if at all.

In this paper, I explore what it means to be domesticated, including the effects of the process of domestication for both humans and other animals, most notably, losses in sensory acuity. I look at how our relationships with horses began and how they have evolved over time, tracking the history of our training relationships and the onset of the natural horsemanship movement - emphasizing relationships based on nonviolence and nonverbal communication. I look at the potential for communication between humans and horses given our different sensory and social worlds, and the contexts of our relationships, as well as the limiting factors. I consider these in relation to the effects of confinement, social disruption, feeding practices and training methods for horses. I conclude with a re-imagining human-horse relationships moving forward, both of our training relationships and horse management practices, with an emphasis on keeping the emotional, social and sensory worlds of horses central to every practice, and each encounter.

For Mystery

Table of Contents

Foreword.....	1
Acknowledgements.....	6
Chapter 1: Domestication	8
Research Questions and Methodology.....	8
Defining the Problem – Marking the Loss.....	9
What it Means to be Domesticated	10
The Effects of Domestication	14
Sensory Acuity.....	14
Higher Thought Processes.....	16
Dependence	17
Social Organization	19
Communication.....	20
Rewilding.....	21
Chapter 2: The History of Human-Horse Relationships	24
Horse Domestication.....	24
Traditional Horsemanship.....	25
The Natural Horsemanship Movement	30
Natural Horsemanship as Part of a Wider Trend.....	31
Natural Horsemanship Principles and Practitioners	32
Bill Dorrance.....	34
Buck Brannerman.....	36
Monty Roberts	37
Alan Hamilton	40
Chapter 3: The Capacities and Limitations for Communication	42
Clever Hans.....	42
Devaluing Nonverbal Communication	43
Talking About Horses	44
Communicating Emotion.....	46

Heart Rate	48
Touch.....	49
Nonverbal Communication with Dogs	50
Facial Expressions.....	50
Trauma	53
Communicating with Prey.....	53
Leadership and Dominance.....	55
Expressing a Full Range of Emotions.....	56
Co-Creating Language	57
Experience with Horses.....	57
Lost in Translation	58
Chapter 4: Reimagining Human-Horse Relationships.....	60
The Re-imaginings of Natural Horsemanship Practitioners.....	60
Training Relationships - The Potential of Positive Reinforcement	61
Negative Reinforcement and Stress.....	62
Using Positive Reinforcement with Rescued Ponies.....	63
Using Positive and Negative Reinforcement.....	64
Natural Horsemanship Claims That Don't Correspond with Research.....	65
Imprint Training	66
The Effectiveness of Imprint Training	67
Alternatives to Imprinting.....	69
Confinement.....	69
Feeding.....	72
Stabling and Social Contact.....	73
Social Upheaval	74
Conclusion: Going Back to the Beginning: Acknowledging the Effects of Domestication.....	76
Future Research Questions	81
References.....	82

Foreword

“For too long we’ve closed ourselves to the participatory life of our senses, inured ourselves to the felt intelligence of our muscled flesh and its manifold solidarities.”

-David Abram, Becoming Animal: An Earthly Cosmology

My grade 3 classmate Owen had a captive audience in me during one show and tell when he brought in his sister’s riding and grooming gear, and pictures of her horse Oreo, a young black and white pinto. I was so thrilled to be close to objects that had touched a real, live horse, that I snuck a few strands of Oreo’s hair out of one of the brushes, put them in my pencil case, and later into a glass jar which remained a focal point in my bedroom for several years. Only when I’d started riding lessons myself was I able to part with them.

I was fortunate to have that opportunity. A colleague of my mother’s friend was a certified riding instructor, a rarity in St. John’s, Newfoundland. She taught private lessons on the side, taking on two students at a time, and had one opening. She had asked my mother’s friend if her daughter would be interested, and happily for me, she wasn’t.

My equine education would be a joint effort between my instructor and Mystery, an exceptionally tall, twenty-year-old bay roan Newfoundland Pony. When I met him, Mystery was also involved with a children’s therapeutic riding program where he was a favourite amongst the students and instructors. Needless to say, he had lots of experience with nervous green riders like myself.

On the whole, Mystery and I got on quite well. He was gentle and patient with me, especially in the beginning as I struggled through the steep learning curve of our early lessons. And in all the time we spent together he only once threw me off in the midst of his own panic at being stung by a wasp.

I gradually came to feel however, that much of what I asked of Mystery required his patience, because in no uncertain terms he made it clear that he didn't enjoy a lot of it. He tired easily of our repetitive work in the ring, slowing down and ignoring my requests as the lessons dragged on; he resisted having his girth tightened, holding in deep lungful's of air only to be released once it was done up; resisted having his bridle put on, clamping his mouth firmly shut to block the bit; and he frequently tried to step on me when I cleaned his hooves. Mystery also had an uncanny ability to be flatulent when I was bent over next to his back-end with one of his hind hooves in my hands, unable to make a quick escape. Most if not all of Mystery's acts of resistance were, and still would be, considered absolutely normal, even mild. But my trained reactions, to meet his resistance by either ignoring or correcting him, didn't always sit well with me.

The same year I started riding lessons, I also began volunteering with my local SPCA - at first with a mentor, as I was still quite young. I loved the contact that I had with the animals there. I started out working in the evenings, cleaning and feeding when the shelter was closed, and eventually moved to weekend day shifts where I interacted more with the public, went on complaint calls, and periodically took animals to be euthanized.

At that time, the shelter had a high kill rate, which I naturally struggled with, but adapted to by learning to emotionally distance myself from the animals. In turn however, I became less and less capable of empathizing with them, to the point where I felt very little when I saw them suffer.

The sense of emotional detachment that I felt at the SPCA evolved into a more general feeling of numbness, which was not isolated to my work there. In hindsight, neither were the reasons for it, but I do think that that early training in avoiding emotional engagement with the animals, at the very least contributed to it, and I felt the loss.

After ten years of volunteering, I left the SPCA, and my riding lessons ended shortly after when Mystery passed away. The sense of detachment that I now felt towards other animals did not leave me however, and for several years I focused my attentions elsewhere - to a series of jobs and travel adventures, and finally, to my postsecondary education.

I was somewhat surprised to find then, that during my first year of university (in an environmental ethics class) I was intensely curious when we reached the section on animal ethics - so much so, that I went on to make other animals, and our relationships with them, the focal point of my studies.

Entering the MES program, given my past experiences with the SPCA, I was interested to begin my studies by looking broadly at what it means to become numb within the context of human animal relationships, specifically in relation to the process of domestication. The Area of Concentration of my Plan of Study is entitled Domestication: Animal studies and Embodiment. Within my first component - involving the cultural context of human-animal relationships - one of my learning objectives was to gain an in-depth knowledge of the process of domestication. This, I expand on in my first chapter, as I discuss what it means to be domesticated, as well as the effects of domestication for humans and other animals.

Tracking a dulling of our collective senses through domestication, within my second component - meeting spaces: embodiment - I looked at how domesticated animals relate to each other, within and between species, through embodied forms of nonverbal communication. I endeavoured to understand the different forms of nonverbal communication, and the sensory worlds of the species communicating. I expand on this component further in chapter 3, by looking

at the range of capacities and limitations for nonverbal communication between humans and horses.

It was while I was researching embodied forms of communication, that I watched the documentary *Buck*, which looks at the horse whispering phenomenon and the well known trainer, Buck Brannerman. Brannerman spoke about the potential for nonverbal communication to inform and improve training relationships between humans and horses (Brannaman, 2011). Given the lingering regrets I have about my relationship with Mystery, this appealed to me. Furthermore, given what I was reading about the breakdowns in communication associated with the process of domestication, I was curious to look at this in the context of human-horse relationships.

Within my third component, horses and natural horsemanship, I focused on the natural horsemanship movement; its origins, practitioners, approaches to training relationships, and use of nonverbal communication. I build on this component in chapter 2, with an in-depth look at the history of traditional training relationships, followed by the onset of the NH movement and the different forms of embodied communication used by practitioners.

Much of the focus within the horse whispering world, is however, on humans reclaiming what we have lost by learning to listen to horses, which in turn benefits them as they become better understood. Little if any attention is paid to what the horses themselves have lost as domesticated beings, and what they might continue to lose through training processes and the ways in which they are housed and cared for.

In *The sensuous worlds of domesticated beings: Embodied communication in human-horse relationships*, as I rethink one of our closest relationships with another species, I keep the social and sensory worlds of horses central. And as I bring together and expand upon each of the components

of my Plan of Study, much of what I find is applicable to our relationships with all other animals, in a paper that is a personal labor of love.

Acknowledgements

I would like to thank my supervisor, Leesa Fawcett, for her guidance, enthusiasm and insight. And I would like to thank Ray Rogers and my advisor Peter Timmerman, for taking my research in new and interesting directions.

I would like to thank everyone in Animal People in Environmental Studies (APES) for giving me a sense of community and shared interest during my time at FES. I would especially like to thank my fellow students Ruthann Drummond and Heidi Honegger for their encouragement, advice and thought provoking conversations.

I would like to thank my dear friends Suzan Finn, Heather Finn, Allison Hall and James Fraser, as well as my yoga family - particularly, Tracy Martin, Gail Connolly, and Marivi Lacuesta - for cheering me on, pushing me forward, and helping me see the light at the end of the tunnel. And I would like to thank my former Adult Basic Education instructor (and current fellow volunteer) Donna Kavanagh – whose confidence in me led me here.

I would like to thank my niece Alice for bringing a renewed sense of wonder to my work through her unbounded enthusiasm for horses (and unicorns) – and her parents, my brother and sister-in-law Bill and Kimberly Tucker, who have always had my back.

I give my deepest thanks to my parents Marilyn and Bill Tucker for their unwavering love and support. To my mom, for walking over hot coals from time to time to see me get here. And to my dad, who did not get to see me finish this, but who was with me all the way through – I hope this paper in some way reflects you both.

And finally, I thank Mystery, for his patience and resistance, and for helping plant the questions. Equally, I thank all of the animals I have had the privilege to live with, and all of the animals I have met through the SPCA – I am grateful for each and every encounter, and I hope this paper does some justice to what you all have taught me.

Chapter 1: Domestication

Research Questions and Methodology

My research questions focus on: first, what are the range of capacities and limitations for nonverbal communication between humans and horses? And second, given what we're learning about the social and sensory worlds of horses, how might this inform future human horse relationships?

My paper consists largely of secondary research in the form of an in-depth literature review. Beginning with an exploration of what it means to be domesticated - and the idea that humans are one of many domesticated species - I look at the shared effects of domestication between humans and other animals before mapping the history of the domestication of horses and our subsequent training relationships with them. With respect to those training relationships, I reference the work of trainers themselves, as well as research coming out of the social and equitation sciences.

Focusing in on the approaches to training taken by Natural Horsemanship (NH) practitioners, I next look at the history of the NH movement, in particular their use of different forms of nonverbal communication. In order to tease out the capacity and limitations to these forms of communication, I then move on to chart the sensory worlds of humans and horses. For this section I again look at the work of trainers themselves, and consider their claims in relation to the latest research coming out of the equitation sciences, as well as from other academics who have looked critically at the natural horsemanship movement. My work here is also informed by my own experiences as a rider and more recent observations and hands on experience with horses at the clinics of natural horsemanship trainer Monty Roberts in August 2013.

Finally, starting with the most recent standards of care for horses - laid out in the 2013 Canadian Codes of Practice for the Care and Handling of Equines (Equine Canada, 2013) – and a review of problems that persist within human horse relationships, I look at how horse management practices (i.e. feeding, housing and general care practices) along with different approaches to training relationships might be improved given what we know about the sensory and social worlds of domesticated horses.

Defining the Problem – Marking the Loss

“To the extent we can engage ourselves with horses, we are returned to the home of our original, mammalian faith.”

- Alan Hamilton, Zen Mind Zen Horse: The Science and Spirituality of Working with Horses

Many of the stories told within the horse whispering, or natural horsemanship world define a collective human loss, insofar as they tell triumphant tales of reclaiming the following; a deeper sense of connection to the natural world, a sharpening of our senses, and the ability to better communicate nonverbally - all of which are said to be achieved through our relationships with horses.

Horses in these stories are seen as the victims of our loss, having suffered through relationships based on misunderstanding, ignorance, arrogance and the unnecessary use of brute force. But as the stories go, our equine teachers, who have never lost what we have, show us how to once again become more fully human, and as we are healed so is the relationship between our species.

The ability to communicate non-verbally is presented as central to this healing – the emphasis on what type differs depending on the practitioner. But the idea that we have become ignorant and inattentive to our bodily senses which are receptive to other forms of communication, is consistent, as is the idea that this can be unlearned.

“We are human only in contact, and conviviality, with what is not human”
- David Abram, *The Spell of the Sensuous*

The types of losses marked by natural horsemanship practitioners are expressed and explored elsewhere. The naturalist John Livingston and the philosopher David Abram are among those who similarly write about a dulling of human senses, of the impoverished ways in which we participate in embodied forms of nonverbal communication, and of a breakdown in the ways we relate – with each other, other animals, and the rest of the planet (Livingston 1994, Abram, 1996).

Both Livingston and Abram argue that the roots of our problems lie at least in part, with a human process of becoming – in this case, ‘civilized’ or domesticated beings. Implicated within this process is the structures of our lived environments, the evolution of our ideas about ourselves and the world, our relationships with written words and how we use them, and lastly, how we relate to our own technology.

What it Means to be Domesticated

Today the concept of domestication is most commonly understood to be a human driven process involving plants and animals other than ourselves – species we have shaped and changed to suit our needs, manipulating their biology through selective breeding, and in the case of animals, by taming and training as well. But as Cassidy (2007) cautions, the definition of

domestication is “slippery and imprecise...” and changes significantly depending on who you ask, and when (Cassidy, 2007, p 3).

Before the early 17th century, the word domestic meant, “living in or pertaining to a house (Latin domus) or belonging to a household as a family member, retainer, or servant” (Buillet, 2007, ch 2, p 11, kobo). Initially used only in reference to humans, it would be many years before the meaning was expanded to include other animals insofar as they shared our living spaces and could also be considered servants (Buillet, 2007). Leach (2003) notes that when the term was used to refer to other animals, it was because they literally shared our households. The history of the word thus came to be “rooted in the idea of animals and humans living together” (Buillet, 2007, ch 2 p 9, kobo).

When applied to other animals however, it was observed that those who lived with us were fundamentally physically and temperamentally changed by it, and there was a difference between those animals who lived with us and were born tame (or relatively so) and those who were born wild and subsequently tamed. Prior to using the word domesticated, we did not have the language to distinguish between the two groups (Buillet, 2007).

Over time, the selective breeding of the animals in our care intensified, and the physical and temperamental changes seen in these animals were increasingly attributed to their breeding - even more so when our understanding of genetics increased. And so, as Leach (2003) notes, while the shift had begun much earlier, by the mid-20th century much of the original historical meanings associated with the idea of domestication had all but fallen away, and we were left with a human driven process of artificial selection.

Despite the gains afforded to humans through the domestication of other animals, our relationship with the process itself has been filled with ambivalence. On the one hand, (both in ourselves and other animals) we value the idea of civility and being civilized, while also valuing and often romanticizing wildness. From that tension, there has been a tendency to associate domestication with a certain amount of degeneration. As noted by Cassidy (2003), other domesticated animals have sometimes been viewed as “corrupt inauthentic versions of their wild ancestors” (p 8).

Unfortunately, the history surrounding the association between human domestication and degeneration would take some dark turns. There was in fact a renewed interest in the idea of human domestication with some academics (and later political leaders) during the latter half of the 20th century and beginning of the 21st. The effects of domestication were generally posited as negative, and the concept was used to explain “what were perceived as signs of the degeneration of the human genepool” (Brune, 2007, p 2). This idea was picked up by many in the psychiatric field as a way of explaining the root causes of mental illnesses and neurological disorders. However, a variety of other consequences were also attributed to domestication, including but not limited to; “a weakening of viability and resistance, decreasing fertility...proletarianization, and moral damage due to ‘penning up people’...effeminacy, stunted growth, and debility” (Brune, 2007, p 5).

Sadly, some of the research around the idea of human domestication was to become the underpinning of the eugenics movement. Seeing domestication as a form of protection from natural selection, this line of study was used to justify the “legalisation of sterilisation and dismantling of welfare institutions to reinstitute the laws of natural selection” (Brune, 2007, p 3).

Arguing that the negative effects of domestication were impacting some racial and ethnic groups more than others, the concept was famously used to justify the extermination of the groups of people who were perceived to have these deficiencies “to the point of condoning genocide” (Leach, 2003, p 358). It is perhaps not surprising then, that the idea of human domestication all but fell off the map post 1950’s.

It appears then, that partly because of the tragic historical associations with the idea of human domestication, and partly because of our fixation on domestication through artificial selection, we went from being the original domesticates, to domesticates and domesticators, and finally, (for most) to solely domesticators. And the idea that the process could encompass more than artificial selection, that it could involve shared relationships with built environments and with each other - and that we could share some of the effects of those evolving relationships with other animals, became somewhat of a historical blind spot.

And yet there are those who still look at domestication more broadly – who view humans as one of many domesticated species, and who are interested in how our shared environments and relationships shape a process that is complex and fluid, while acknowledging and including the effects of selective breeding.

Not unlike the researchers of human self-domestication noted above, Livingston (1994) and Price (1999) argue that domestication in essence provides a certain amount of protection from many normal ecological constraints, and a relative freedom from the normal pressures of natural selection – and this is true for humans and other animals. Livingston likewise argues this can have profound physiological and psychological effects (which I explore in the next section). Allman (2000) argues that much of our protection comes in the form of our relationships with the plants and

animals we have domesticated, and as we provide a certain amount of protection to them we are in turn given food and clothing which act, along with our built environments as “major buffers” to normal ecological constraints. Together then, we are involved in an ongoing, ever evolving process of mutual domestication (Allman, 2000, p 207).

The Effects of Domestication

Sensory Acuity

*“There’s a great big, beautiful world out there that a lot of normal folks are just barely taking in”
- Temple Grandin, Animals in Translation*

The effect of domestication perhaps most marked by the likes of Livingston (1994) and Abram (1996), and the one of greatest interest to me in this paper, is that of a loss of sensory acuity – something which has been well documented with respect to other domesticated animals (see Leach, 2003, Zeder, 2012, Price, 2002, Livingston 1994) but less so with humans.

There is a growing body of evidence to indicate that as other animals go through the process of domestication, the centres of sensual perception in their brains become smaller compared to those of wild species. The degree of shrinkage differs depending on the species, and the reasons for this are not entirely clear, however it does not appear to be related to the length of time a species has been domesticated (Leach, 2003).

Low reactivity to external stimuli is in fact actively selected for in other domesticates, and per Zeder (2012) is one of the hallmarks of domestication. While it is intentionally selected for, the amount of time animals spend confined also matters in terms of sensory perception - the more time

spent in confinement the greater the losses to sensory structures in the brain (Price, 2002, Leach, 2003).

An example of the effects of confinement can be seen in horses. McGreevy (2012) writes that constant stabling may play a part in their eyesight becoming myopic. McGreevy argues that the visually limited environments of most stables prevents horses from being able to focus on distant objects and vistas, causing them to be shorter sighted than their feral counterparts, whose eyes “appear to be correctly focused with a tendency to long-sightedness....” (McGreevy, 2012, p 44).

In addition to their environments, the training processes for horses inherently involve teaching them to be less responsive to external stimuli and indeed to other horses – something I explore further in Chapter 4 (see Roberts 1996, McGreevy 2012, Hamilton 2011, and Brannerman 2001).

Compared to other domesticated animals, humans do not show significant decreases in brain size or a shrinkage of our centres of sensual perception (Leach 2003). This could be due in part to the fact we have not gone through the same intensive selective breeding processes as other domesticates. And as Leach (2003) suggests, it is “perhaps because humans have enjoyed much greater freedom and stimulation” (p 354). Our environments, while different, have nevertheless remained largely stimulating relative to those of many of our fellow domesticates.

And yet, the idea that humans have come to perceive the natural world differently and have become attuned to different things, prevails - along with a sense of loss that accompanies this shift. Abram (1996) writes of our human bodily senses (at least in most of the Western world) as having become less acute and aware of our natural surroundings, surrounded as we are by our built environments, “the incessant drone of motors...electric lights...air conditioners...offices,

automobiles and shopping malls...” (Abram, 1996, 28). Livingston claims that “reduced sensory acuity...plagues us daily whether we are conscious of it or not” (Livingston 1994, p 33). And indeed, he suggests we may only get fleeting glimpses of what we have lost, as he did on one occasion while observing a wild lioness hunting. Seeing her in a state of “total awareness” he recognized in her something he says he had “forgotten to miss” in himself as his sense of separateness from his natural surroundings temporarily lifted (Livingston, 1994, p 4).

Again, this idea is echoed in the NH community. For example, from Brannerman (2001) comes the idea that horses are acutely sensitive to the intentions and emotional states of other beings, and operate based on what is communicated through feel – while humans have become largely deaf to this form of communication. Similarly, from Hamilton (2011) comes the idea that horses are keenly aware of the emotional energy behind movement, able to determine the “nuance of tone, accent, and value behind every subtle gesture” while humans miss much of this information (Hamilton, 2011, p 4). And from Roberts (2007) comes the idea that horses are keenly aware of visual forms of nonverbal communication – what is meant by a drop of an ear, shift of an eye, flick of a tail etc. – cues that humans are familiar with on a basic level but are no longer attentive to.

Higher Thought Processes

Depending on the species in question, the centres of the brain which control higher thought processes – i.e., problem solving abilities - can also be profoundly affected by domestication (Zeder, 2012). This again depends on the species, as Francis (2015) notes, some domesticates (i.e. rats) don’t seem to show any losses in this area, and the same appears to be true of humans. Zeder

suggests these differences may be related to the amount of environmental stimulation animals receive, as he notes that domesticated mink raised in cages show much greater losses to their overall brain size than those raised in open air enclosures (Zeder, 2012).

Horses do show losses in their cognitive abilities, and Leblanc (2013) suggests - this is due in part to the broader process of their domestication, as well as to the nature of their training relationships with people. Leblanc writes that, “the more attentive horses are to humans [within training relationships] the less likely they are to succeed by themselves at a learning task, even one that is appealing” (Leblanc, 2013, p 19).

A study by Lesimple et al. (2012) similarly shows that the more focused horses are on humans during problem solving tasks (i.e. opening a box to gain access to food) the less likely they are to succeed at them. The researches concluded that the effects of the domestication process as well as past experiences with humans played a part in the level of dependence the horses had on people, and thus on their success rates (Lesimple et al., 2012).

Dependence

The type of dependence seen in training relationships is for Livingston, not unique to them. Instead he claims that dependence is the most visible “earmark of domestication” (Livingston, 1994, 14). As he puts it, “all domesticated animals depend for their day-to-day survival upon their owners” (Livingston, 1994, p 14). There is some truth to this statement, but it is also arguably an overgeneralization. As Fijn (2015) points out, with horses, the level of dependence varies significantly – from those who fit the mold Livingston describes – dependent on humans to meet all of their basic needs for survival, to most Mongolian and Icelandic horses who are, for much of their

lives, free to roam in their natural environments, not dependent on humans for food, shelter or protection from predators. And yet these horses are certainly domesticated (Fijn, 2015).

Livingston goes on to argue that humans have also become dependent through our domestication, but in our case, it is on our own ideas and technology (Livingston, 1994). First, he speaks to our culturally conditioned ways of thinking that act as a filter through which we perceive the world. These are all of the “beliefs, givens, and assumptions” that we inherit, that help us understand the world and our place in it (Livingston, 1994, p 10). But many of these ideas also serve to deny the reality of “our animalness, our biologic being”, and so place us apart from the rest of the natural world and skew our understanding of it (Livingston, 1994, p 11).

Livingston goes on to argue that we are further dependent on (and preoccupied with) our own technology, which he describes as “bodies of knowledge of how-to -do it...or technique” (Livingston, 1994, p 11). It was of course because of such transmissible bodies of knowledge that we were able to farm, build shelters, villages, and later cities – elements that reduced natural selection pressures. As Wright (2005) says, our technologies “moved [us] beyond the environments that had made us, and began to make ourselves” (Wright, 2005, p 13).

Wright claims, that “our main difference from chimps and gorillas is that over the last 3 million years or so, we have been shaped less and less by nature, and more and more by culture. We have become experimental creatures of our own making” (Wright, 2004, p 30). Livingston suggests that while other animals can retain a balance between nature and nurture, with their culturing processes are kept in check – to our detriment, this has not been the case for our species (Livingston, 1994).

Social Organization

The dependence inherent to other domesticated animals (to greater or lesser degrees) is for Livingston partly responsible for breakdowns in their natural social organization. He writes, that through the domestication process,

“interdependence is transformed into unilateral dependence on the owner or proprietor. For the natural organization, which was maintained in the wild by a shifting web of lateral relationships, domestication substitutes a one-way flow of order, and the flow is downward, from above. In nature, group cohesiveness is maintained by mutualistic energetic bonds. In domestication, order is imposed from a linear, vertical hierarchy.” (Livingston, 1994, 17).

The social relationships between domesticated horses are often dramatically interrupted through the ways they are managed, housed and trained. As one example, when trainers (including NH trainers) consider horses to be too focused on other horses and not enough on the humans working with them, they are commonly labeled as herd bound. This is identified as problematic and dangerous, and something that requires remediation (see Brannerman, 2001, Parelli et al, 2013, Roberts, 2004). Roberts suggests the only thing you can do with herd bound horses is to separate them entirely from the horses they are bonded with, until they learn to survive on their own (Roberts, 2004), while Parelli proposes all horses must go through two weaning processes in their lives - once from their mothers, and secondly as adults, from their “best buddies” the horse or horses they have become overly bonded to (Parelli et al, 2013, p 55).

Communication

With respect to communication, Roberts (1996) and his close associate Hamilton (2011) see differences in the ways in which feral and tame domesticated horses communicate. Roberts spent time in his youth observing feral mustang herds, and claims any one of those horses would deliver “fifty signals with his body to every two by his stabled counterpart.” Roberts goes on to argue that domesticated horses are “far more inclined to communicate by nickering” but in general, are “far less inclined to communicate at all” (Roberts, 1996, p xxv).

Livingston (1994) and Evernden (1993) see a similar pattern of communication differences between all domesticated animals relative to their wild counterparts. Evernden refers to domesticated animals as being made “functionally illiterate” which he suggests is a result of inbreeding – and which is arguably an exaggeration (Evernden, 1993, p 93). For Livingston, a reduced capacity in the ability to communicate may be a result of “both the deterioration of the social structure and reduced sensory acuity, or indeed it may be one of the causes. More likely, the three phenomena evolved together, in feedback fashion, over thousands of generations of captive procreation” (Livingston, 1994, 24).

“Like all neuroses, mine is rooted in the problem of metaphor, that is, the problem of the relation of bodies and language”

- Donna Haraway, Simians, Cyborgs, and Women: The Reinvention of Nature

For Abram (1996) the limited ability of humans to communicate nonverbally, stems in part from how we relate to the written word. He takes this relationship back to the beginning with our very foot and handprints, followed by petroglyphic images of animals and elements carved into the rocks of pre-Columbian North America, then pictographic systems like the hieroglyphs of Egypt and finally ideographic scripts such as those found in China and Mesoamerica. While he acknowledges

that each of these writing systems has the potential to turn our attention inwards “toward our own human made images” – with their pictorial characters directly reflecting the rest of the natural community they also “continually remind the reading body of its inherence in a more-than-human field of meanings” (Abram, 1996, p 97).

With the advent of the Greek aleph-beth, however, that reminder disappears. Whereas written characters once retained a close association with the things they referenced, the alphabet “no longer refers us to any sensible phenomenon out in the world, or even to the name of such a phenomenon...but solely to a gesture to be made by the human mouth” (Abram, 1996, 101). But Abram offers hope that by being conscious of the ways we use our language to talk about the rest of the natural community, we do not have to be quite so isolated from it. This is explored further in chapter 3.

Rewilding

Livingston claims that “the capacities of wild self-sufficiency [has] long since been subtracted from [domesticated animals]...” (Livingston, 1994, p 14). This total subtraction of self-sufficiency is also arguably an exaggeration, and Livingston himself later states that some domesticated animals, namely different bird species, are capable of being somewhat self-sufficient given the chance (Livingston, 1994). Depending on the species, breed, individual and context, some domesticated animals can do quite well outside of the care of humans and can successfully return to a wild state, while others cannot. Domesticated horses - at least some breeds and individuals - are among those that have proven they can break free from their dependence on humans. There are feral, or free ranging horse populations all over the world – in the prairies of the Argentinean

pampas, the swamp estuaries of the Camargue, in Cape Toi in Japan, the New Forest of southern England, the Kaimanawa range in New Zealand, in various areas of the western US, in Sable Island off the coast of Nova Scotia, and in the Namibian desert – just to name a few (Leblanc, 2013).

And yet while some animals are able to return to a wild state, it is clear humans leave a mark on them, as certain effects of domestication – namely changes in brain size and function “may well be irreversible” (Zeder, 2012, p 237). Numerous studies have shown that domesticated animals living in feral states for many generations, do not recover their losses in brain size (see Bruford et al, 2006, O’Regan et al, 2005).

Despite being left with some of the marks of domestication however, the fact that some animals are able to return to a wild state speaks to the fluid nature of the process, as is proposed by Cassidy (2007). Both she, and Fijn (2015) argue against there being any clear separation between domesticated and wild beings, and instead they claim that all animals are somewhere along the continuum, that neither state is an entirely fixed one, and that there is more crossover between the traits of animals considered domesticated and wild than is often acknowledged.

As for the fluid nature of our own domestication, there is again the narrative from within the NH community which suggests that through our relationships with horses – specifically by becoming sensitized to various forms of nonverbal communication with them - we can, to some degree re-wild ourselves.

To what degree we can communicate nonverbally with horses given our different sensory worlds and experiences within the process of domestication I explore in the following chapters, along with how we should use that knowledge to inform our training relationships and horse management practices. But first, a look back at the history of our relationships with horses,

beginning with their domestication, and the beginning of the NH movement which formed in reaction to a long history of so called traditional horsemanship methods.

Chapter 2: The History of Human-Horse Relationships

Horse Domestication

The domestication process for horses is believed to have begun in the grasslands of the Eurasia Steppes, sometime after the introduction of domesticated cattle and sheep to that area around 8000 years ago, and all modern domesticated horses alive today derive from the now extinct Eurasian wild horse (also known as the tarpan). Based on what people in this area were learning from keeping other domesticated animals, and what they already knew of the horses (which they had been hunting for thousands of years) it is believed they began to practice some degree of horse management at around this time (Francis, 2015; Levine, 1999). For thousands more years after the start of their domestication however, horses remained primarily an important source of meat for the people of the Eurasian steppes – the management practices were simply used to make them a more reliable one (Francis, 2015).

Around 5500 years ago, the Botai people (living in what is now northern Kazakhstan) developed the skills to ride horses, and it is widely believed that they were the first to do so (Francis, 2015; Levine, 1999). The Botai, lived in an area that was largely inhospitable to other domesticated animals, and so they used their newly acquired riding skills primarily to hunt wild horses. They also relied heavily on milk from their domesticated horses (Levine, 1999).

As the use of horses for transport spread however, they shifted into a more prestigious status quite rapidly. Francis (2015) suggests that unlike the Botai, most horse riding peoples were already keeping other domesticated animals as their primary sources of meat, and so the need for another was not great relative to that of a new mode of transport. This role, and the subsequent

uses of horses in military campaigns and agriculture would prove to be fundamentally world changing (Waran 2007).

Traditional Horsemanship

Today the roles of horses have shifted once again. Few work in agriculture or are kept solely as a means of transport, and horses used by militaries now almost exclusively fill ceremonial roles – although many police forces keep horses in active service (primarily for crowd control and patrolling duties). The horse meat industry is thriving by its own standards but is still modest relative to that of other domesticated animals – Canada happens to be one of the largest global players in this market, with close to 70,000 horses slaughtered here in 2015. Most horses killed for meat however, start their lives in sport industries or are kept for pleasure riding, which are now the two most common roles for horses (Agriculture and Agri Food Canada, 2015, McGreevy, 2012).

And yet the basic approaches to training taken with modern domesticated horses are still rooted in the past - with many techniques coming from trainers who developed their methods centuries ago. The best known of these early trainers honed their skills as they prepared horses for war. The horses they trained were expected to show complete submission to their riders, and were essentially taught to “lose all sense of self-preservation” (McGreevy, 2007, p 494). Training necessarily became a practice in desensitization – horses were taught not react to the stimuli in their environments as they normally would. And while the techniques used to achieve this were often successful, with the exception of a few trainers, the primary focus was not the welfare of their horses (McGreevy, 2012). Instead, Waran (2007) argue that historically even outside of a military

context, attitudes towards horses were “fundamentally utilitarian” and ripe with examples of practices that ultimately caused harm and suffering (p 152).

Interestingly, the first trainer credited with writing a book about horsemanship was the soldier and Athenian historian Xenophon, who published *On Horsemanship*, in 350 BC. Xenophon is regarded as somewhat of a curiosity in the modern horse world because of his relatively humane approach to training. He recommended experienced and kind handling of foals, and encouraged trainers to reward their horses with kindness when they did well - although he was not averse to physically punishing horses when they did not comply (Waran, 2007). Unfortunately, Xenophon’s approach to training was not followed by more of the same.

Towards the end of the 15th century for example, trainer Laurentius Ruisius wrote a guide that would be a best seller across Europe for nearly two hundred years. In it, he advised trainers to, “apply a scorching piece of iron between a horse’s tail in order to train [him] to move ahead swiftly” (Ruisius as cited in Nevzorov, p 156, 2011). He also suggested beating horses with whips wrapped in hedgehog skins (Waran, 2007).

In another popular training guide published in the mid 16th century - one that received the official benediction of Pope Julius III - author Frederico Grisone advised trainers on how to get horses to position their hind legs further beneath their bodies. He famously suggested they place someone behind the horse holding a stick with a wild cat tied to it (with the cat’s stomach facing up), and told them to “hold the stick to the horse’s legs from behind so that the cat can bite and scratch as it might...” (Grisone as cited in Nevzorov, p 157, 2011).

Some training techniques were both cruel and ineffective - based on false ideas about horse behaviour and/or anatomy. Across Europe, Africa and Asia, for example, the practice of slitting

horses' nostrils was popular for centuries. Horses cannot breathe through their mouths, and it was incorrectly assumed that by slitting their nostrils it "enabled them to take in more air and work faster or for longer" (Waran, 2007, p 157-158). This practice was later picked up by the North American plains Indians, and was used by the Hungarian military in the eighteenth century - however the Hungarian trainers (again falsely) believed "it would prevent horses from vocalising and ruining surprise attacks" (Waran, 2007, p 157-158). To that end, other armies more effectively resorted to cutting their horses' vocal cords (Nevzorov, 2011).

Other techniques achieved desired results, but at great cost to horses. Instilling a sense of learned helplessness, for example, was proven to quickly reduce or eliminate resistance from them. The trainers of early Turkey achieved this by hobbling the legs of newly caught wild horses while restraining them with neck ropes. The panicked horses were then saddled, bridled, mounted, and ridden (on three legs) until they "stopped all attempts to escape or unseat the rider" (Waran, 2007, p 153). This basic approach was also widely popular within the cowboy culture of the US, and is still common there and in parts of South America - albeit with varying degrees of violence (Waran, 2007).

Natural horsemanship trainer Monty Roberts credits seeing his father performing a similar method referred to as 'sacking out' with leaving him searching for alternative approaches to training. Robert's described the corral his father had built with 6 posts fixed around the perimeter so that he could 'break' up to 6 horses at a time. The horses would be tied to the posts via their halters while Robert's senior walked from one to the other throwing a weighted sack over their backs and around their legs, while the panicked horses tried to pull away from their posts. Next, each horse would have a leg hobbled, and the sacking out would commence again, this time with their ability to resist having been further reduced. Roberts Junior said this form of training could

continue for up to ten days, until the horses had well and truly given up any attempts to resist, and in the end most would have “blood tracks on their pasterns where the ropes had worn through the skin; in places friction had burned off the hair. Bruising and more serious leg injuries were common” (Roberts, 1996, p 40).

Sacking out was a common practice in the US, and as Waran (2007) relates, even after the initial breaking in process by cowboys, further methods of training were frequently harsh. Teaching horses to ‘neck rein’ (i.e. to respond to the pressure of the rein against their necks) often involved beating them on each side of their necks so that it was sore and swollen and therefore responsive to the light touch of a rein the next day (p 161- 162).

It wasn’t until the Enlightenment period that a significant shift in training ideologies took place in Italian and French equitation schools. Where previously, if horses failed to meet the expectations of their trainer there was a general attitude that blame lay with the horse, during this period the idea arose that resistance from horses might come from misunderstanding rather than “an inherent viciousness that needed subduing by force” (Waran, 2007, p 160). This shift, while not universal, was in some training circles followed by subtler uses of different forms of negative reinforcement – for example, leg pressure alone was used without spurs and whips (Waran, 2007, McGreevy, 2007).

And yet, as McGreevy (2007) notes, controversial training practices continue into the modern day. As I edit this chapter in January of 2017, the USDA has only now announced changes to the Horse Protection Act to finally put an end to the practice of soring (U.S. Dept. of Agriculture, 2016). Used primarily with Tennessee walking horses and racking horses, soring involves intentionally causing these horses pain in their front hooves in order to create the exaggerated,

high stepping gaits they are famous for. Some trainers take a chemical approach, using “kerosene, diesel or croton oil, hand cleaners, WD 40, oil of mustard, cinnamon oil, or other caustic substances” which are applied to the pastern and coronary band region (just above the hoof) before chains are attached around the front of the pastern to “rub against the skin and exacerbate the pain caused by the caustic agents” (American Association of Equine Practitioners, 2015, p 2). A variety of other tactics are used to achieve the same effect, including “grinding down the sole to expose sensitive tissue” and “inserting hard objects between the shoe and the pad” including nails (American Association of Equine Practitioners, 2015, p 2). Numerous animal rights and welfare organizations have been working for years to put a stop to the practice – including the Humane Society of the United States which has been calling for a ban for over 45 years - however, following the announcement from the USDA, the president of the Tennessee Walking Horse National Celebration – which holds the largest horse show for the breed - has stated he plans to challenge the change in regulations (Humane Society of the United States, 2017). On a positive note, the Canadian Code of Practice for Horses (2013) requires that horses “must not be subjected to training methods which are abusive or intentionally injure the horses” and this “includes but is not limited to, soring...” (p 43).

The resistance to change surrounding the practice of soring is not unique in the horse world. For example, while ‘gadgets’ like whips and spurs have fallen out of fashion in some circles, they are still common in others. And an underlying attitude that resistance from horses must be met with more pressure and/or force is still reflected in common training practices. McGreevy (2007) points to the way bits are often used; trainers will start out with milder or softer styles, but if they fail to get their desired response, their solution is to move on to increasingly more severe ones. If harsher bits don’t work, still more pressure can be added to other parts of the head with the use of gadgets

like curb chains (which apply pressure to the chin) gag bits (which add backwards pressure to the mouth and poll and which force horses to raise their heads up) and chambons (which add downward pressure to the mouth and poll and prevents horses from raising their heads past a certain point). Unfortunately, McGreevy says these tools, which are designed for short term training use, regularly become part of day to day equipment, and this can result in undue discomfort and in some cases severe injuries to horses (McGreevy, 2007).

The Natural Horsemanship Movement

Hence the NH movement has grown in reaction to practices being used in modern traditional horsemanship circles, particularly those coming out of the cowboy culture of the 'old West.' The main criticisms of traditional horsemanship practitioners are as follows; that they fail to understand the 'true' nature of horses and their behaviour, that they subsequently fail to communicate with and teach horses in ways they can easily understand, and thus they rely on techniques that are often coercive, cruel, ineffective and unnecessary (Miller, 2007, Roberts, 1996, Brannerman, 2001, Dorrance et al, 2007).

When it comes to the use of gadgets for example, there is an emphasis on developing better communication skills between horses and trainers, instead of resorting to the use of potentially harmful tools and techniques. Latimer et al (2009), note there is "powerful social pressure" within NH circles to abandon devices like whips and spurs (and to a certain extent bits) and in cases where gadgets are still used, they are rebranded as being more natural and gentle (p 18).

Monty Roberts for example, has developed several of his own products including his own bits and halters – marketed as gentle alternatives. Roberts has also designed a whip replacement,

which he calls the “Giddy-Up rope” (Roberts, 2007, p 174). The rope is a length of soft braided white yarn that is meant to be swung back and forth by riders so that horses can see the movement in their peripheral vision, rather than hearing the crack of the whip or feeling it on their bodies. This gentle non-whip is meant to be perceived by horses as a potential threat – like seeing a predator in their peripheral vision - this is what motivates them to move forward and move faster (Roberts, 2007).

Natural Horsemanship as Part of a Wider Trend

The NH movement has not, of course, evolved in isolation. Its beginnings can be traced to the increasing popularity of keeping horses for pleasure and recreation purposes, and as Birke (2008) notes, a time when attitudes about other animals were beginning to shift from one of “instrumentality to a growing empathy...” (p 109). The movement also came at a time when training relationships with other animals were being reconsidered, with an increase in the use of gentler methods and positive reinforcement, especially with dogs (the use of positive reinforcement is still relatively rare with horses, even within NH). And as Waran (2007) notes, the appearance of NH also coincides with our increasing “scientific awareness of animal’s feelings and consciousness” (p 151). Interestingly however, there is still a limited amount of research being done around the emotional worlds of horses (McGreevy, 2012).

Like those at the forefront of the NH movement, many if not most who come to follow it, arrive from more traditional horsemanship backgrounds. In her research, Savvids (2012) questioned NH practitioners on what drew them away from the methods they knew. The majority cited poor communication with the horses they worked with, and subsequent “conflict, danger, and violence” – along with the hope that better communication would resolve these problems (p 88).

Coming from their traditional horsemanship backgrounds, those introduced to NH often report profound emotionally charged interactions with horses using their new communication and training skills. Birke et al, (2009) note that many of the NH practitioners they interviewed spoke “evangelically” and “ecstatically” of the ideas and experiences they were exposed to through NH, and of the newly formed relationships of “total harmony” between themselves and their horses (p 116 & 192). In fact, it is so common to hear practitioners report a sense of epiphany, and of having a “seeing the light” moment, that there is a degree of pressure within NH circles to relate having had this kind of experience in order to feel accepted into the community” (Birke et al, 2008, p 16).

Communities of NH practitioners are still relatively new however, and this means knowledge in the NH world is acquired differently than it is in traditional horsemanship communities. Birke (2008) notes that for the former, education comes from top NH practitioners, the experts who offer workshops, publish books and distribute videos. Many in the NH community will be loyal to one expert, while others will apply the methods of several. Within traditional horsemanship circles however, knowledge is primarily gained through engagement with local horse centered communities – from family, friends and local pony club members. Individuals in these groups tend to look to outside expertise far less often.

Natural Horsemanship Principles and Practitioners

There are several key organizing principles within the NH world. The first, and perhaps most universal, is that cruel training practices are a result of poor communication, and communication problems between humans and horses begin when trainers fail to appreciate the true nature of horses as “the ultimate prey species” (Miller, 2007 p 1). Equally important, is the idea that the true

nature of humans is as “the consummate hunter” and all interactions between our species are said to be informed by this dynamic (Miller, 2007, p 1, Skeen, 2011).

Secondly, effective leadership is central to the NH universe – the inspiration for which, usually comes from a practitioner’s interpretation of leadership within the herd (See Brannerman, 2001, Rachid, 2011, Roberts, 2002, Miller, 2007). As herd animals, practitioners argue that horses instinctively look for leadership, and are therefore willing to accept it from humans (if they are able to lead effectively). As Birke (2008) notes, while the idea of trainers being leaders is not at all unique to NH, it is framed differently insofar as it should never be forced, and instead should be established in such a way that horses accept it naturally.

Lastly, there is an equally compelling narrative within NH, that humans and horses are equal partners – with both parties “free to make their own decisions” (at least to a great degree) (Birke, 2008, p 110). As effective communication is central to NH, horses are seen as being ‘heard’ and understood for the first time, by trainers who want to work with them, as partners. There is an obvious tension here however, between the leader/follower vs equal partner narratives. Birke (2008) suggests that in order to reconcile this, practitioners will sometimes argue that if a trainer works well with horses, the horses will “want the same things as their human partner[s]” (p 117). Humans and horses are essentially seen as equal then in their desire to achieve the same goals, but in order to achieve those goals, one partner must lead.

From these starting points, NH trainers go on to have slightly differing takes on how best to communicate nonverbally with horses. Some practitioners like Bill Dorrance (2007) and Buck Brannerman (2001) rely on communication through feel, which can, but does not necessarily include direct physical contact. Others like Monty Roberts (1996) and Alan Hamilton (2011), rely

predominantly on visual cues in the form of body language (although Hamilton also looks more closely at the communication of emotions through energy). There are other NH practitioners who claim to communicate with horses through spirit and dream worlds and through the use of telepathy, but as my research is focused on sensory perception I will not look at these trainers further here (See Kohanov 2001, Blake, 1975).

The Dorrance brothers, Tom and Bill, are widely credited with founding the NH movement, and their student and fellow practitioner Ray Hunt then took their methods and helped popularize them (Miller, 2007). Both Roberts (1996) and Brannerman (2001) claim the Dorrance brothers and Ray Hunt as important mentors, although each has gone on to develop his own approach to training.

Bill Dorrance

At the age of 93, Bill Dorrance co-authored a book with the trainer Leslie Desmond about his methods. In it, he said the most important thing he had learned about working with horses, was how to communicate with them through feel, which he said can come in the form of either direct or indirect contact. Dorrance suggested that feel can be best understood as involving an acute familiarity with horses, a 'knowing' based on years of experience, as well as a deep sense of empathy for them. As he writes;

“Empathy for the horse is the capacity of a person to be able to feel what the horse feels, to read a situation the same way, and to have an understanding of what the horse is going to do in response to that situation. That’s empathy, or feeling with the horse, and it’s a real effective way of learning from the horse. Even before the horse

does whatever he's about to do, a person who's this way is going to understand the reason a horse does something" (Dorrance et al, 2007, p 22).

Dorrance describes his approach to horsemanship as an art form that cannot be learned from a book, but that requires a great deal of time and commitment from a trainer. It also demands a heightened sense of awareness – of one's equine partner, and working environment and the ability to adapt to a fluid situation. (Dorrance et al, 2007).

As with other NH practitioners, Dorrance argues that most trainers rely too heavily on equipment to "operate" a horse, rather than clearly communicating with them what their expectations are, and this leaves horses feeling confused (Dorrance, 2007, p 4). He claims, that trainers get stuck in a mindset of needing to "make [horses] do things" which causes them to be unnecessarily firm, which he says, is "exactly what the horse can't understand" (Dorrance, 2007, p 16).

Interestingly - given how central the theme of the predator-prey dynamic would become in the NH world - Dorrance himself does not see it as terribly important. He notes that it is a topic that frequently comes up, and suggests it can help people understand horses better, but "to my way of thinking, it's a lot more valuable to spend time learning how to feel of your horse, and to teach that horse to learn to feel of you, because there's sometimes a big gap there between what a person wants the horse to do and what the horse has in mind" (Dorrance, 2007, p 344).

Buck Brannerman

Brannerman describes an NH practitioner as someone, who, “through experience and study...learns how really sensitive a horse is and how sensitive they need to be in order to accomplish things with the horse” (Brannerman, 2001, p 252). Much of Brannerman’s approach to horsemanship (and the language he uses to describe it) comes directly from Bill Dorrance and Ray Hunt. Again, he uses the word feel to refer to the main form of nonverbal communication between humans and horses. And he too notes that it can be in the form of either direct or indirect contact (Brannerman, 2001).

As Brannerman puts it, “you cannot conceal anything from a horse: he’ll respond to what’s inside you – or he won’t respond at all” (Brannerman, 2001, p 178). For him, when a horse and human have a feel for each other, they are communicating their internal, emotional and mental states with one another. But feel needs to be developed between two parties, and creating it starts with movement.

Brannerman give the example of working with a troubled horse who is trying to avoid human contact, “by causing him to move, and then moving in harmony with him, you will slowly form a connection, as if you’re dancing from a distance” (Brannerman, 2001, p 122). Once the horse gets a little more comfortable with that distance, Brannerman says you can “start to draw him in. You do this by moving away as he begins to acknowledge you with his eyes, ears, and concave rib cage (middle of rib cage arched away from you). At this moment, you and the horse are ‘one.’ The farther you move from him, the closer he moves to you. This is known as ‘hooking on,’ and it’s an amazing feeling” (Brannerman, 2001, p 123).

Unlike his mentor, Bill Dorrance, Brannerman suggests the predator-prey dynamic provides valuable insight into the dynamic between humans and horses insofar as it can hinder or help one's capacity to 'hook-on' with a horse. On the one hand, being a prey species makes horses inherently wary of humans, a barrier not present if for example, one is trying to hook-on with a dog. On the other hand, once separated from the herd, horses will look for comfort and security, and this is what makes them willing to communicate with a person (Brannerman, 2001).

Monty Roberts

Roberts Credits Ray Hunt and the Dorrance brothers with introducing him to a gentler approach to horsemanship, however he describes breaking away from their teachings to a certain extent when his focus shifted primarily to the visual nonverbal signals made by horses. Roberts claims he began to pick up on these signals while observing a herd of feral mustangs in Nevada. He came to see each gesture the horses made as being part of a predictable nonverbal language. Interestingly, Roberts credits being colour blind (he sees no colour) with being able to tune into the subtle gestures the horses were using to communicate (Roberts, 1996).

Roberts was particularly taken with the interactions he saw between a mustang mare and a 'troublesome' colt, who was pestering other members of the herd. The mare eventually disciplined the colt by temporarily driving him away from the rest of the herd. In response, the colt paced back and forth with his head down, licking and chewing, a sign Roberts later took to mean "I'm no threat to you" (Roberts, 1996, p 19). This was the beginning of Roberts' endeavour to decipher what he calls the 'language of equus' which he says consists of 170 gestures and involves "whole phrases

and sentences that always mean the same thing, always have the same effect” (Roberts, 1996, p 24).

Amongst traditional horsemanship practitioners, the use of vocal cues is common - clicking, clucking, word cues like walk-on, trot, or the classics giddy-up and whoa. Roberts argues that it's not natural for horses to communicate vocally. Being prey animals, the only form of communication safe for them in the wild is nonverbal (Roberts, 2007).

Roberts also incorporates his understanding of horses as prey animals (as well as the use of nonverbal communication) in his 'join-up' process, which he says is used to communicate with horses that you will be relating to them in a language they understand (Roberts, 2007). Join-up is based on the idea that horses will flee from would be predators for “between a quarter and three-eighths of a mile” before stopping to reassess the threat (Roberts, 2007, p 17). The join-up process itself begins when Roberts enters a ring with a horse, and uses his body language to send the horse away from him (running around the perimeter of the ring). He uses direct eye contact, and squares his shoulders with the body axis of the horse, following the horse as she circles the ring. He then has her run between 8-10 laps around the ring (in both directions) until she has travelled the equivalent of a quarter to three-eighths of a mile and has reached the point where Roberts' says she is naturally ready to reassess the situation (Roberts, 2007).

Roberts responds at first, by increasing the pressure on her, using what he sees as the body language of a predator; “I make a sweeping movement in the air with my arm and extend [my] fingers in an aggressive manner” (Roberts, 2007, p 45). This is followed by a decrease in pressure, where he starts to round his shoulders, drop his gaze to a lower point on her face, and take deep breaths. He then waits to see the same “non-threatening” body language from her that he observed

in the feral mustang colt in Nevada - for her to have her inside ear “locked on” to him, to try to come off the fence and get a little closer to him, to start licking and chewing, and finally, to drop her head down – which Roberts interprets now as meaning “I’ll let you be the chairman of the meeting” (Roberts, 2007, p 46). Again, taking his cues from the mare in Nevada, Roberts then casts his eyes “slightly downward and away from the horse” takes a passive stance, and relaxes his shoulders, placing them on a 45-degree angle to the axis of the horse (Roberts, 2007, p 47). Each of these gestures is meant to signal to the horse that he is ready to invite her in, and if she is ready, she will walk toward him and the moment of join-up can occur – Roberts will turn and gently rub her between her eyes (Roberts, 2007).

The join-up process is not unlike the dance Brannerman describes – it involves adding pressure and then drawing the horse in when the pressure is removed. When the horse begins to show interest in Brannerman, similar to Roberts, he releases the pressure by turning or moving away – thus drawing her in to ‘hook-on’ (Roberts, 2007, Brannerman, 2001).

While Roberts frames the join-up between trainers and horses as being a very moving moment of connection, the communication of emotions between humans and horses does not feature prominently in his work. He views the emotional lives of horses as being very limited relative to humans, with only fleeting attachments possible, and basic emotions like fear and anger. And when it comes to training relationships Roberts advises people to “keep human emotions out of the scenario” (Roberts, 2007, p 84).

Alan Hamilton

Alan Hamilton, (2011) builds on Roberts' understanding of the 'language of equus' and on the idea of communication through feel as described by Dorrance and Brannerman. He looks at how horses communicate their emotional states through movement, which he describes as being "infused with emotional meaning" (Hamilton, 2011, p 4). Through every slight gesture, Hamilton says emotional energy is communicated, and horses are highly sensitized to it. And, he argues, horses, are not just communicating with each other - they are also able to "feel the palpably sharp energy emitted by a stalking predator, eyes locked intently on its prey" (Hamilton, 2011, p 4).

Once again, the predator prey dynamic is presented as essential to understanding horses and our relationships with them. And for Hamilton, a successful trainer is one who can step outside of his own predatory mindset (and the energy that carries), and instead learn to think like a prey species. As it is with Dorrance and Brannerman, Hamilton says empathy is needed in order to get a sense of what it is like to live in the world in a constant state of fear (Hamilton, 2011). Empathy is the starting point for feeling what the horse is feeling.

As it is similarly argued by Brannerman and Roberts, Hamilton believes a good trainer can capitalize on the fundamental need of a horse to find the security of the herd. Horses he says, seek the "protective awareness" offered by the sheer number of sensing bodies around them. So many animals "sampling the enormous volumes of space" (Hamilton, 2011, p 37).

Hamilton presents the idea of loss and gain with respect to human sensory worlds more directly than the above trainers. While Brannerman and Roberts talk of becoming more sensitive to nonverbal communication, Hamilton, like Abram (1996), describes a loss in sensory acuity, and likewise argues that our relationship with language is partly to blame. As Hamilton argues, our

sensitivity to nonverbal communication has been “forfeited...for the benefit of language” (p 5). Like Roberts, he argues that horses have not had the luxury of using their voices for fear of detection by predators, so their sensing bodies are still finely tuned to give and receive nonverbal cues. Humans on the other hand, have evolved into communicating largely through our written and spoken words (Hamilton, 2011).

Through our interactions with horses, Hamilton, like Dorrance, Brannerman and Roberts, argues we can become more sensitized to nonverbal communication. Horses, he writes, “provide us with detailed feedback about how adept (or clumsy) we are” at communicating using their nonverbal language (Hamilton, 2011, 42).

The history of human horse relationships has left a lot to be desired, and the NH movement, bringing with it an emphasis on improved communication and the welfare of horses, has brought about significant shifts in attitudes towards the relationships between our species. Neither of the NH trainers appear to consider the potential limitations for nonverbal communication between humans and horses however, nor do they write about any potential losses to the sensory worlds of horses. Just what the capacity and limitations for nonverbal communication are between our species, will be explored in the next chapter.

Chapter 3: The Capacities and Limitations for Communication

“As extraordinary as nonverbal communication can be, it is also ordinary. Its lifelong, work-a-day function is to regulate social relationships.”

- C. F. Keating, *The developmental Arc of Nonverbal Communication: Capacity and Consequence for Human Social Bonds*

Clever Hans

The story of an Orlov Trotter named Clever Hans is a good starting point for looking at the capacity for communication between humans and horses. Towards the end of the 19th century, Clever Hans – who lived in Germany with his owner Wilhelm von Osten – became a sensation when he was seemingly able to answer complex questions in front of crowds of onlookers across the country. Hans tapped one of his front hooves to indicate his answers to mathematical equations, questions about music theory, the time, and to demonstrate “other cognitive feats” (Brubaker et al. 2016, p 121).

For some time, Hans stumped horse experts and scientists who observed him, until it was finally determined that he was in fact reading the subtle (and by all accounts unintentional) cues given to him by his questioner, Osten. It is believed these cues (in part) took the form of a slight head nod and a shift in gaze which indicated to Hans that “the correct number of hoof stomps had been reached” (Brubaker et al, 2016, p 122).

The story of Clever Hans is often told as a cautionary tale to animal behaviourists lest they fall into the same trap of believing that other animals possess “complex cognitive faculties” comparable to our own (Tyler, 2003, p 271). And yet, this conclusion ignores the fact that Hans was actually demonstrating an astonishingly keen awareness of the nonverbal cues of humans and the

ability to determine the meanings behind them (Tyler, 2003). In fact, when Oskar Pfungest – a psychologist charged with looking into Hans’ abilities - realized what was happening and tried to suppress his own cues, “Hans was still able to ascertain the correct answers” (Tyler, 2003, p 271).

Devaluing Nonverbal Communication

The story of Clever Hans stands as a good illustration of the privileged status of spoken language. Hans was credited with intelligence while onlookers believed he understood and responded to the spoken word. When they determined he was responding instead to nonverbal cues however, he became just another dumb animal.

Brandt (2006) argues that spoken language “continues to occupy privileged status of subjectivity in much research and theory” (p 141). And this means that animals (and arguably people) who do not communicate via spoken language can lose some of their perceived subjectivity through this bias. Brandt goes on to note while verbal language is unquestionably important to trainers and riders, they primarily come to know horses through their bodies drawing on “the experience of pre-linguist somatic sensations as a resource to guide [their] interactions” (p 142). Brandt refers (specifically to female) bodies as “a site for transacting information, ideas, emotions, and knowledge” within these relationships (p 142). She notes that in viewing embodied forms of communication in this way, she is challenging the idea that the mind, and spoken language are the only sources of intelligence and subjectivity (Brandt, 2006).

Talking About Horses

How we talk about animals can also serve to affirm or deny their subjectivity and intelligence. The trainer and philosopher Vicki Hearne (1986) was interested in this topic, and while she is not typically associated with the NH movement, she nevertheless wrote about nonverbal communication between humans and horses, largely through the sense of touch. Hearne was also immersed in both academic and training communities, and was struck by how differently horses were talked about in each. The animal behaviourists she spoke to talked about horses in generic, instinct-driven terms, whereas the trainers did not hesitate to refer to the personalities and characters of the horses they worked with. The trainers, Hearne argued, knew the horses based on their engagements with them – and to use the distancing, objectifying language of the behaviourists would have denied what they knew of horses based on their relationships with them.

Interestingly, within NH communities, trainers themselves use scientific (or quasi-scientific) language when talking about horses (Birke, 2008). Birke et al, (2009) argue that this makes sense, given NH practitioners strive to understand the “natural behaviour [of horses] and how they learn” (p 194). And so, not unlike the animal behaviourists Hearne encountered, NH trainers will sometimes refer to the irrational instincts of horses, and talk about them as “abstract and objectified others” (Birke, 2008, p 114).

On the other hand, knowing horses as they do, through their personal relationships with them, NH practitioners also use the language of trainers, and talk of “partnerships” with “named individuals, possessing subjectivity” (Birke et al, 2009, p 194). Horses are also seen as “highly intelligent, problem-solving animals – having a high degree of agency in their interactions with people” (Birke, 2008, p 114).

Using both the language of the trainer and scientist however, creates real tension for NH practitioners. Birke argues, that in trying to gain a scientific understanding of equine behaviour, the language practitioners encounter through this pursuit often does not line up with their lived experiences of horses as being “intelligent, thoughtful, and loving” (Birke, 2008, p 114).

David Abram (1996) wrote about his own experiences first communicating with, and then talking about, other animals after a trip to the jungles of Bali and Java. While he was there, Abram said he started paying attention to the natural world for the first time in his life. He said he felt his senses heighten as he encountered the world and the wildlife surrounding him, and these meetings taught him about the intelligence of nonhuman animals. At one point, Abram found himself suddenly face to face with a bison, and subsequently became; “caught in a nonverbal conversation with this Other, a gestural duet with which my conscious awareness had very little to do. It was as if my body in its actions was suddenly being motivated by a wisdom older than my thinking mind...” (p 21).

Upon his return to the US however, Abram began reading books and articles about animals, and engaging in conversations with other people about them. These readings and discussions led him to conclude that, other animals did not possess the awareness and intelligence that he had assumed based on his experiences with them – experiences that clearly did not match the cultural narrative that he encountered in the US. And he writes that, “the more I spoke about other animals, the less possible it became to speak to them” (Abram, 1996, p 25). Being back home led Abram to gradually lose his “new sensibilities” and the “newfound awareness of a more-than-human world” and consequently, his ability to communicate with other animals (p 24).

For his part, Abram suggests that the problem isn't that we talk about animals, it is how we talk about them that has the potential to shut down communication. He argues for example, that many indigenous peoples do not deny the agency and intelligence of the world around them (Abram, 1996).

Communicating Emotion

When it comes to the capacity for humans and horses to communicate their emotions – there is, to begin with, very little consensus surrounding the emotional worlds of horses. Within the equitation sciences for example, there is still a distinct lack of research in this area. Professor Paul McGreevy – who until recently was the president of the Equitation Sciences Society and who has published several foundational books on equine behaviour - defends this lack of research. He writes that, “when we have a scientific way of measuring these qualities – and that time may not be too far away – I will be its strongest advocate, but until then I make no apology for confining myself to what we sometimes call the facts” (McGreevy, 2012, Preface).

Outside of the equitation sciences, there is considerable interest around the emotional lives of horses in relation to equine assisted therapy. Here, to a certain extent, as with training relationships, an understanding of equine emotions has been built on the direct experiences of therapists and clients – and the outcomes of their therapy. The proof is in their pudding as it were.

As in the NH world, there is an emphasis on the fear based realities of horses as a prey species (Lentini et al, 2009, Johansen et al, 2014). This is seen on the one hand as nonthreatening for people who might find therapy work with predatory animals (like dogs and cats) more

challenging. It is also seen as relatable, for people who experience a lot of anxiety and fear (Viridine et al, 2002).

And similar to the claims of NH practitioners like Brannerman (2001) and Hamilton (2011) the idea that horses are able to mirror not only the body language, but the emotions of people serves as the foundation for therapy work with horses (Viridine et al, 2002, Quiroz Rothe, 2005). The ability of horses to reflect the emotional states of those around them is once again depicted as adaptive – necessary for their survival in the wild. Johansen et al, (2014) argue horses have merely “transferred this skill to their relationships with human beings” (p 324).

Roberts et al, (2004) describe horses as being so sensitive, they “in essence, give us living biofeedback because they show externally our inner processes” (p 33). Horses in equine assisted therapy are seen as capable of sensing how people are feeling, even when they are trying to hide it – and therapists use this to their advantage. They argue that horses respond best to people who are connected to, and honest about, their emotional states (Roberts et al, 2004). For example, in their 2004 study, Roberts et al, referred to a child who, with the help of her therapist, was trying to ask a horse - Katie - to stop, using nonverbal cues. When she struggled with the task, the young girl was asked if she was feeling anxious and/or afraid, to which she responded in the negative. She was then asked what she was thinking about, and she began talking about a group of boys in her class. As soon as she spoke out loud about the boys and connected to how she was really feeling (i.e. anxious), Katie responded to her nonverbal cues and stopped.

Heart Rate

One potential method for the communication of emotional states between humans and horses, is through our heart rates. In both our species, an increased heart rate is associated with fear and/or excitement, and a slower heart rate is associated with calm positive experiences – for example in horses, it is often seen during allogrooming (Wathan, 2015, p 40).

In his work, Monty Robert's stresses to would-be trainers that they must learn to control their own heart rates when working with horses, because horses will sync their heart rate to the trainer they are working with. He suggests this is an adaptive trait – that horses in the wild benefit from syncing their heart rates to other members of their herd, and to potential predators to gauge their emotional states and respond accordingly (Roberts, 2007).

If a trainer is frightened and has an elevated heart rate, Roberts says the horse will respond by matching it, and will subsequently be more challenging to work with. This is one of the reasons Roberts strongly discourages inexperienced trainers from working with very fearful and or potentially aggressive horses – as a fear response in a trainer (and corresponding elevated heart rate) will be reflected in the horse. Conversely, if a trainer can remain calm, their slow heart rate will have a calming effect on the horse (Roberts, 1996, Roberts, 2007).

Brunbaker et al, (2016) support Roberts' claim, noting that horses' heart rates will indeed "increase in response to a rider's increased heart rate, regardless of outside stimuli" (Brubaker et al, 2016, 122). Brunbaker et al, do not look at how horses respond to a slower heart rate.

Touch

Increased heart rates also appear to be influenced by touch between humans and horses. Hausberger et al, (2008) note that when people with negative feelings towards horses stroke them, “they induce an increase of heart rate in the animal in the first few minutes. “Neutral” or “positive” persons do not have such an influence (Hausberger et al, 2008, p 4).

Communication through touch, was of special interest to Vicki Hearne (1986). She argued that communication between humans and horses starts to break down when trainers rely too heavily on visual cues. She believed that trainers had to become “kinaesthetically literate” and learn to “read what [their] skin tells [them]” (p 110). Hearne encouraged trainers to start “hearing” horses through their skin, and be conscious of what they were in turn communicating through their own skin (Hearne, 1986, p 111).

The ability of horses to make sense of the “subtle language of touch” is to a certain extent evidenced by their ability to discern what is meant by the subtle shift in a rider’s seating position, a slight increase or decrease in rein pressure, the degree of tension or relaxation in a rider’s body. And experience does seem to matter here. Evans et al (2010), argue that “like learning any language, this too requires repetition and iterative learning” (p 10). Brandt (2004) also notes that time is needed for both humans and horses in order for each species to become familiar with the “micro movements’ of the other (p 307).

And humans have demonstrated the capacity to discern the meaning behind touch as well. Keating (2016) notes that when it comes to the touch of other humans at least, people are adept at telling the differences between touch that conveys “anger, fear, sadness, disgust, love, gratitude, and sympathy” (p 110).

Nonverbal Communication with Dogs

In a study which looked at nonverbal communication between humans and dogs, Meyer et al, (2014) found that people “vary in their ability to detect and interpret [nonverbal] signals from dogs” (p 554). They noted that signs of fear, stress and emotional arousal in dogs are “especially likely to be overlooked...” (p 554). Ultimately, the researchers found the greater a person’s sensitivity to nonverbal communication in other humans – as measured by the Profile of Nonverbal Sensitivity (PONS) test – the better their communication skills with dogs (Meyer et al, 2014).

The dogs in Meyer et al.’s study displayed more signs of insecurity - i.e. “panting, shuffling, body-shaking, vocalization, and locomotion” - when interacting with people who had low levels of nonverbal sensitivity and no experience with dogs (p 563). When they interacted with people who were more sensitive to nonverbal communication, regardless of how experienced they were with dogs, the dogs were calmer. The researchers note that experience does count however. People who were less sensitive to nonverbal signals but who did have caretaking experience with dogs, were nearly as good at communicating with (and calming) the dogs as those with high levels of nonverbal sensitivity (Meyer et al, 2014).

Facial Expressions

According to Wathan (2015), until recently, it was widely believed that only primates could produce complex facial expressions – something she attributes to a lack of research. While there has been a limited amount of research looking at the facial expressions of plains zebras, similar

studies have not, until now, existed for domesticated horses. And yet, facial expressions can be good indicators of emotional states, and “potentially provide clues to [a horses’] likely intentions and motivation” thus making their subsequent behavior more predictable (Wathan, 2015, p 18-19). Certainly, the facial expressions of horses feature prominently in the work of Roberts (2007) and Hamilton (2011).

Wathan began her own research by creating a coding system to map the facial expressions of horses. She used the model of the Facial Action Coding System (FACS) which is used to code human facial expressions. Wathan created a FACS for horses, and through a series of studies, looked at the range of facial expressions made by horses, which are measured in Action Units - the individual, observable components of facial expressions. Wathan then compared the equine AU’s with those made by humans and other species. She discovered that horses possess “a rich facial repertoire,” with 17 defined AU’s; less than humans, who have 27, but more than many other species, including dogs, who have 16 – and, interestingly more than chimpanzees, who have 13. (Wathan, 2015, p117).

Wathan discovered that horses and humans share many similar Action Units, including but not limited to; a “widening of their eye aperture in fear responses,” an “increase in the amount of visible white sclera in fearful and stressful situations,” a “raising of the skin above the eyes in negative situations in horses – seen as similar to the raising of eyebrows in fear and sadness in humans,” a “tightening of the eyelids and reduction of the eye aperture in aggressive and painful situations,” a “lifting and wrinkling of the skin around the nose when in pain, along with a retracted/raised lip,” as well as “pursed lips and a raised chins associated with anger” (which may also be associated with pain in the horse)” and finally, a “play face featuring an open mouth with relaxed lips that often cover the teeth” (Wathan, 2015, p 38).

It is commonly acknowledged in both traditional and NH worlds, that ears are a good indicator of attention and emotional states of horses. Wathan suggests ear perking in mammals may in fact be “an evolutionary ancestor of brow movements in humans” (Wathan, 2015, p 53).

Wathan proposes the similarity of facial expressions amongst different species may be adaptive in the sense that they “enable cross-species as well as intra-species communication” (p Wathen 2015, p 205). For horses, she suggests it benefits them to be able to detect the intentions and emotional states of potential predators (Wathen 2015).

In her final study, Wathan tested the ability of horses to discriminate between human faces in photographs – and then to associate the people pictured with real people. The horses proved very adept at this task. She noted that horses have also been shown to have lasting memories of people, and can remember whether their experiences were negative or positive – which informs their future interactions (Wathan, 2015). Unfortunately, there is no research to date on just how skilled humans and horses are at recognizing facial expressions in each other – however Wathan’s suggests that there are more commonalities in the ways we communicate emotions through our faces than was originally thought.

One last note about how horses perceive facial expressions. In one of her studies, Wathan (2015) discovered that when horses view photographs of other horses, they typically viewed pictures displaying a negative facial expression with their left eye. Brubaker et al (2016) similarly note that horses “tend to use their left eye to investigate negative stimulus” and furthermore, they “appear to prefer to view humans with their left eye” (p 128).

Trauma

Interestingly, trauma has been shown to influence the ability of people to correctly identify the emotions behind facial expressions – at least in other people. Children with histories of abuse show “abnormalities in their responses to emotional displays by peers” (Keating, 2016, p 118). Studies of both children and adults who have lived in war-torn countries indicate that they “most often mistook sad expressions for anger, happiness expressions for anger, and fear expressions for sadness” (Keating, 2016, p 118).

Both Roberts (1996) and Brannerman (2001) write of being abused by their fathers. Brannerman and his brother were removed from their father’s care when evidence of his abuse surfaced, and Roberts claims he suffered many broken bones at the hands of his father. Both trainers credit these early experiences with giving them a better understanding of fear and an added empathy for horses, and they frequently work with horses that have histories of abuse. It would be interesting to know whether trauma in humans influences how we read facial expressions in horses, and whether trauma in horses influences how they read facial expressions in other horses and potentially humans.

Communicating with Prey

Having traumatic backgrounds appears to have informed Roberts’ and Brannerman’s understandings of horses as a prey species as well. Both trainers write of knowing what it is like to fear for their lives at the hands of their fathers, and they see the emotional worlds of horses as being dominated by the same fear – which they see as the inherent state of being for a prey

species. Both men say the fear they experienced in childhood helps them relate to and communicate with horses more effectively (Brannerman, 2001, Roberts, 1996).

The animal scientist Temple Grandin similarly argues that her ability to understand cattle stems from her own experience as someone with autism who has suffered with anxiety and panic attacks. Grandin describes herself as someone with the “nervous system of a prey species” (Sutton, 2006). Not unlike many NH practitioners, Grandin sees a failure to understand the fear based realities of prey species as being at the heart of miscommunications (Grandin, 1999).

And yet there are critics of NH who argue the human-horse relationships are “more complex than the one described as a traditional prey/predator relationship” (Brubaker et al, 2016, p 127). It is important to note that the majority of the horses NH practitioners work with, are born and bred in captivity, and are around humans from the time of their birth. To suggest that the emotional worlds of these horses are dominated by a fear of would be predatory humans, is likely a gross oversimplification. Furthermore, when NH practitioners talk about the fight or flight response in horses, the fight response receives very little if any attention. This serves to deny the ability of horses to fight and defend themselves – something every NH practitioner encounters if they work with horses long enough, but which is largely overlooked in the NH narrative.

Val Plumwood further contends that humans have lost touch with the reality that we are both predators and prey, and it is only when we acknowledge and embody this reality, that we can truly come to see other prey species as our kin (Plumwood, 2000). Plumwood argues that humans have falsely positioned ourselves “outside and above the food chain, not as a part of the feast in a chain of reciprocity, but as external manipulators and masters of it: animals can be our food, but we can never be their food” (Plumwood, 2000, p 294).

The fact we are both predators and prey, should arguably bode well for trainers if being able to identify with the feeling of being prey is important for communication. The idea that it is a stretch for most humans to imagine ourselves as prey however, (when it is part of our biological reality, if not cultural narrative) creates a false dichotomy that can potentially further separate us from horses. And to reduce the dynamic between our species down to one of predator and prey, and to filter all communication through that lens, could lead to misunderstanding both parties involved.

Leadership and Dominance

Ideas about leadership and dominance from within the NH community also receive criticism. Practitioners like Roberts (1996) and Brannerman (2001) claim to have taken their cues about leadership from horses themselves. Both write of being inspired by the natural leadership qualities of matriarchs they have observed. But Birke (2008) suggests that dominance in ethology is still a highly-contested concept “that should not be taken to mean a fixed social relationship between individuals but rather a fluid and changing kind of behavior” (p 112).

Birke further contends that the narrow understanding of dominance between horses that exists within NH, has been criticized by some in the horse world who argue it should not be extended to relationships with humans. One trainer Birke interviewed, Jan, suggested that NH is called natural because, “...instructors believe they really are interacting as another horse might. [but] dominance related behavior between horses is highly salient to the human mind because it is probably the most overt social interaction made between horses and so sticks in the mind. But extrapolating to human/horse is to take it out of context” (Birke, 2008, p 112). Jan argued the way

dominance is understood by NH practitioners, “leads to misunderstanding the animal” (Birke, 2008, p 112). Which arguably, could lead to miscommunication.

Expressing a Full Range of Emotions

Birke (2008) and Patton (2003) note that the nature of the conversation between NH practitioners and horses, is still, essentially one of communicating orders - “control of the horse is still the name of the game” (Birke, 2008, p 120). The question remains how communication between horses and riders is shaped, when it is so task oriented and command driven, and when, as Patton argues, “there remains a fundamental asymmetry at the heart of the relationship (Patton, 2003, p 90).

As the training process is ultimately about gaining control, even within NH training relationships, Birke (2008) argues horses have to “learn not to display a full range of emotional expressions – to learn to manage emotions when working with a human” (p 123). Expressions of anger or frustration are particularly strongly discouraged (Birke, 2008). With respect to the use of horses in equine assisted therapy programs, Birke points to the irony of humans working with horses in a therapeutic setting “to express their emotions more fully” when the horses they work with are “effectively denied such expression” (p 123).

There is also the issue of horses intentionally hiding their emotional states. As Wathan (2015) points out, there are adaptive benefits for horses (and many other species) to being able to mask certain emotions, particularly those related to feelings of pain and discomfort. She cautions that consequently, “outward behavioural signs may not necessarily reflect [their] emotional state (pp 40-41).

Co-Creating Language

And yet, while horses are arguably unable to express themselves fully (or are at least can be strongly discouraged from doing so) in their interactions with humans, Maurstad et al, (2013) and Brandt (2004) frame this as (for better or worse) being part of a process of shaping each other and indeed, of how to “co-create a language” (Brandt, 2004, p 307). Maurstad et al, suggest that learning to adapt to each other involves “co-being...a form of co-shaping and co-domesticating each other” (p 324). Both humans and horses, they argue, must learn to adapt how they communicate. For example, horses, learn “that they should not bite the human” a form of expression they would sometimes use when interacting with other horses (Maurstad et al, 2013, p 334). Humans on the other hand, learn they should “not wave too much with their arms” an action they might not censure if interacting with other humans (Maurstad et al, 2013, 334).

Experience with Horses

Within NH communities, there is often a portrayal of “an innate connection” between humans and horses – particularly between women and horses, that makes communication between our species seem natural and instinctive. This is true despite the claims of NH practitioners like Dorrance (2007) and Brannerman (2001) that learning how to communicate effectively, takes time. The ease with which top NH practitioners seem to communicate through nonverbal communication however, can reinforce the idea that it is innate. And as better communication is depicted as bringing about harmonious relationships and an end to conflict between humans and horses, those new to NH often enter into it expecting a quick fix to any problems they are experiencing (Savvides

(2011). Similar to the above NH practitioners however, Savvides (2011) contends that human-horse relationships, while inherently embodied, also require a “great amount of effort, training, and patience” (p 61). She writes that women’s lived experiences with horses often “contradict the romanticized view many hold about their abilities and connections with [them]” (p 67). She claims there is more conflict within these relationships than is often acknowledged or expected by practitioners who subsequently don’t know how to respond to it when it arises.

As many trainers come to NH from traditional backgrounds, there is often a long and steep unlearning and learning curve. Birke (2008) suggests it can take years for trainers to accurately read the body language of horses, particularly “signs of comfort or discomfort” (p 113). She notes that critics of NH claim horses are often left “bewildered, unsure what’s expected of them” when their confused trainers send them mixed messages, and misread their horses in return. As practitioners transition to NH, communication can suffer, and unless they are diligent in their own training the situation does not necessarily improve over time (Birke, 2008). Birke quotes one experienced NH trainer, Jan, as saying:

“[Those new to NH can] drive the horses literally mad by changing from one method to another using their horse to experiment on. Horses become confused, unmanageable, unpredictable, depressed, reluctant, sometimes aggressive, often agitated and uncooperative” (Birke, 2008, p 113).

Lost in Translation

To a certain extent, NH practitioners- and anyone describing experiences with embodied forms of communication, are challenged both by the fact that such forms of communication are

undervalued, and by the limitations posed by using verbal language to articulate them. Brandt (2006) suggests, "...it must be acknowledged that some meaning will be lost in 'translation' when putting into words a phenomenon that is non-linguistic" (p 145).

That said, what horses are communicating can potentially get lost in translation as well, when interpreted by practitioners who sometimes use language that denies their agency and intelligence, and whose understanding of horses is based on simplified ideas of predator prey dynamics, and dominance.

Communication between humans and horses can perhaps be further limited if the human in question scores low in their ability to pick up on nonverbal cues, and/or if they lack experience with horses – or the horse they are working with lacks experience with humans. As well, communication can be limited by the inherent power imbalance within training relationships and the predominantly task oriented and command driven nonverbal cues coming from trainers, who can discourage horses from expressing the full range of their emotions.

And yet, while we are arguably still scratching the surface of the potential for nonverbal communication between our species, horses like Clever Hans show an incredible capacity for reading the nonverbal cues of humans. And research around communication through nonverbal cues such as facial expressions and touch, as well as the lived experiences of NH practitioners and those involved with equine assisted therapy, suggest a great deal of understanding can be shared between our species.

Given all of the limitations, the known capacities for communication and all of the unknowns - and what each tells us about our relationships with horses – we're left with the question of how we might reimagine these relationships moving forward.

Chapter 4: Reimagining Human-Horse Relationships

The Re-imaginings of Natural Horsemanship Practitioners

“Research on equine well-being is still embryonic.”

- Michel-Antoine Leblanc, *The Mind of the Horse*

It’s important to acknowledge first, that there has already been a significant re-imagining of human-horse relationships - and to a certain extent a challenging of the status quo - from within NH communities. NH practitioners have shifted the focus in (at least parts of) the horse world towards a better understanding of equine behaviour and communication – and this has translated into tangible improvements for equine welfare.

Monty Roberts’s methods, for example, have been shown to cause fewer signs of stress during initial training sessions when compared to the use of traditional methods. Fowler et al, (2012) looked at the heart rates of horses who, over a twenty-day training period, were started and exposed to their first saddle and rider. The horses were trained either by Roberts himself, or by an experienced trainer using traditional methods. Those trained by Roberts displayed significantly lower heart rates when introduced to both a saddle and rider compared to those in the traditional group. The horses trained by Roberts also performed better than the traditionally trained horses in a series of tests at the end of the training period. The researchers suggested this was because the horses trained by Roberts were more relaxed and better able to learn during their training sessions (Fowler et al, 2012).

In a similar study, Visser et al, (2009) looked at the effects of sympathetic (i.e. NH) and conventional (i.e. TH) training methods on horses in the early stages of training. The researchers noted that over a 5-week period during which horses were started, those trained using traditional

horsemanship methods showed more fear and stress related behaviours in the form of increased body tension, heart rates, and teeth grinding. The horses trained using the sympathetic methods showed fewer signs of stress, and yet performed equally as well in a series of given tasks at the end of the training period.

Horses trained using NH methods, also appear to have better associations with humans after interacting with them. In their 2009 study, Fureixa et al, found that horses trained using NH methods were more likely than those handled by trainers using traditional methods, to approach unknown humans after a period of initial handling. The more horses were handled by TH trainers in fact, the less likely they were to 'spontaneously' approach an unknown person.

And yet, there is arguably room for improvement. To begin with, there is room to look at areas where NH practitioners might reconsider the some of their methods – their heavy reliance on negative reinforcement and practice of foal imprinting for example. There is also room to question what we know about the effects of confinement for horses, and the types of built environments we place them in - to question how and what horses are fed, and how their social lives are managed and disrupted. There is room to build on what we know of each of these areas, and to take what we have learned about the effects of domestication and the capacities and limitations for communication to further improve on equine welfare.

Training Relationships - The Potential of Positive Reinforcement

Natural horsemanship trainers rely predominantly on the use of negative reinforcement when training horses (Miller, 2007). Roberts once again, refers to the prey instincts of horses, and leadership styles of matriarchs to explain why the use of negative reinforcement is the most

effective approach to take with them. He describes it as “instinctual in the horse’s makeup” (p 96).

When a horse is being chased by a predator, he says they are experiencing pressure from a negative stimulus (i.e. a lion). And when they (hopefully) escape capture, they are rewarded by the release of that pressure, not “with a trophy” (p 96).

The same is true if a matriarch sends a colt outside of the safety of the herd – the pressure she puts on him with her body language is the negative stimulus, and the reward is the removal of that pressure and his return to the herd. Hence, it makes sense he argues, for a trainer to take a similar approach – of adding pressure to get a desired response and releasing it when a horse complies (Roberts, 2007). Roberts does not recommend using food rewards with horses, nor do Brannerman (2001) or Dorrance et al (2007) – each of whom also relies predominantly on the use of negative reinforcement. Similar to Roberts, Dorrance suggests the use of pressure and release is a more natural form of communicating with horses – an approach to training which they can clearly understand (Dorrance et al, 2007).

Negative Reinforcement and Stress

When compared to the use of negative reinforcement and punishment (as is still used by some traditional horsemanship trainers) the use of negative reinforcement alone, has been shown to cause less stress in horses (McGreevy, 2012). There is also research to suggest however, that when compared to negative reinforcement, positive reinforcement may again cause less stress in horses. In a (2011) study for example, Hendriksen looked at the use of positive and negative reinforcement when loading horses into trailers – a frequently challenging task for handlers and trainers. The negative reinforcement consisted of pressure (pulling on the lead rope and light whip

tapping) followed by the release of that pressure when the horses complied. The positive reinforcement consisted of the use of a clicker to direct the horses into the trailer. The horses trained using negative reinforcement displayed “significantly more discomfort behavior and avoidance...suggesting a higher stress response...” (Hendriksen, 2011, p 265). Those trained using positive reinforcement, while having an equal number of training sessions, required less time during those sessions to enter the trailers, and displayed fewer signs of stress (Hendriksen, 2011).

The use of negative reinforcement was also found to be associated with an “increased emotional state” and avoidance of humans, in a study of a group of ponies being trained to back up (Sankey, 2010, p 9). In this case ponies either received negative reinforcement in the form of a voice command and a riding stick waved in front of their faces (the pressure) - or positive reinforcement in the form of the same voice command and a food reward. The horses in the latter group actively sought out human contact when training was finished, and they learned more efficiently, “perhaps due to [their] greater motivation to obtain the food reward than to avoid the stick” (Sankey, 2010, p 9).

Using Positive Reinforcement with Rescued Ponies

As was noted in chapter 3, NH practitioners sometimes work with horses who have had troubling histories with humans. Innes et al, (2008) looked specifically at how a group of young rescue ponies - seized on the grounds of “abandonment and starvation” would react to training using either positive or negative reinforcement (p 358).

Working their way through a series of tasks, in this case the positive reinforcement consisted of ponies learning through “trial and error” with the help of a clicker paired with a food

reward. The negative reinforcement involved the application of pressure in the form of the light touch of a riding whip, followed by the release of that pressure (Innes et al, 2008, p 359).

The rescued ponies trained using positive reinforcement were more apt to make contact with their trainers, and to perform “exploratory trial and error” behaviours. And at the end of the study, a higher number of them were considered immediately ready for re-homing (Innes et al, 2008, p 367). Innes suggested that the negative reinforcement did not pose a threat to the welfare of the ponies, however the use of positive reinforcement may in fact have “conferred active benefits” to them (Innes et al, 2008, p 367).

Using Positive and Negative Reinforcement

Warren-Smith et al, (2007) suggest that combining positive and negative reinforcement can have beneficial effects for horses. In their study, horses were asked to stop, using either negative reinforcement alone i.e., pressure and release on the bit, or a combination of pressure and release on the bit as well as a food reward. In this case the food consisted of molasses, which was fastened to the backs of the horses and released into their mouths via a tube.

The horses who were asked to stop using both positive and negative reinforcement shook their heads vertically less – which is noteworthy as this type of head shaking is considered a possible indication of “discomfort or an expression of conflict behaviour” (Warren-Smith et al, 2007, p 485). These horses also displayed a more favourable, rounded head position, a position which horses are often forced into “by inhumane pressures” (Warren-Smith et al, 2007, p 486).

In a similar study, horses were trained to walk over a tarp (something which is quite often met with fear and resistance) again, using either negative reinforcement alone or with the addition of positive reinforcement. The negative reinforcement consisted of pressure on the halter as horses were led to the tarp, which was released when they complied. The added positive reinforcement consisted of verbal praise and a food reward of oats (Heleski et al, 2008).

The same handler worked with both groups of horses. The horses in the negative reinforcement only group required more pressure on the halter (to the point of fatiguing the handler) when they hesitated to walk over the tarp. The horses in the NR plus PR group required less pressure on the halter and were also less reactive during the training and therefore considered safer to handle (Heleski et al, 2008).

Natural Horsemanship Claims That Don't Correspond with Research

Equine behaviourists often report facing challenges in having the results of their work reflected in training and management practices. Brubaker et al, (2016) suggest, this may explain many common and longstanding misconceptions about horses by handlers and trainers. For example, the idea “positive reinforcement training cannot be employed effectively with [horses]” which (as is shown above) is “not consistent with the findings of modern scientific research on horse behaviour” (p 129).

Within NH communities there is an effort to have training techniques and management practices reflect scientific research. There are times however, when the claims of NH practitioners are not supported, and the promotion of imprint training is one example.

Imprint Training

Imprint training, has, in recent years “become fashionable” in the horse industry (Lansade, 2004, p 144). Monty Roberts (2007) and NH enthusiast and equine vet Robert Miller (2007) are strong advocates for foal imprinting, as is the well-known NH practitioner Pat Parelli (Parelli et al, 2006).

Roberts and Miller take a similar approach to the process of imprinting. Both suggest there is a short window of opportunity of about an hour after a foal is born in which to start imprinting (Roberts, 2007, Miller 1991). Roberts suggests imprinting is possible after the one hour point, however it will not be as effective. He insists imprinting should only be attempted when a foal is born “under normal circumstances, and it is not interfering in any way with the mare” (Roberts, 2007, p 197).

Both Roberts and Miller break the process of imprinting into several sessions, beginning either while the foal is being born, or within that first hour after birth. The trainer/handler starts by systematically stroking the foal all over his body, starting inside his mouth and nostrils. Roberts writes that foals will eventually “come to accept the motion” but it may take up to fifty strokes on any given area for him to relax into it (Roberts, 2007, p 198). The process of imprinting is presented by Roberts and Miller as a way for foals to become accustomed to humans, and to become desensitized to our touch (Roberts, 2007, Miller, 2007). There is an exception to this however, as Roberts writes that, handlers should definitely not “stroke the sides of the foal. Leave them alone. It is important that the sides of the foal remain sensitive because they are where the rider’s legs will

go” (Roberts, 2007, p 198). Furthermore, Miller (2007) cautions that it is possible to “overdue this desensitization procedure” and leave foals “numbed to stimuli” (p 70).

The initial imprinting session is meant to take between ten to fifteen minutes. Roberts recommends that it be immediately followed by the introduction of a hair dryer, so as to get the foal used to the sound of a motor. Miller further introduces foals to other potentially fear inducing stimuli, including hair clippers, plastic bags and halters (Miller, 1991).

Once finished, the first imprinting session is followed by several others – when the foal is three days old, when he is seven, eight, nine and ten days old, and finally when he is fifteen days old (Roberts, 2007).

The Effectiveness of Imprint Training

In a study specifically following the imprinting approach of Miller, Lansade (2005) looked at the short and long-term effects of handling on a group of twenty-six Welsh foals, measuring their “manageability, general reactivity and learning ability” (p 143). In the short term (i.e. 2 days after the end of the handling period) the foals were “significantly easier to handle than controls” and showed fewer defensive reactions when, for example, they had halters fitted on them, and their feet picked up. The difference in manageability dropped off however at the 3 and 6 month marks, and 1 year after the end of the imprinting sessions, there were no differences found between the handled foals and the controls. At fourteen-months of age the foals were further tested in terms of their spatial and discriminative learning abilities, and again, no differences were found between the two groups (Lansade, 2005).

Miller and Roberts do not suggest that foals be separated from their mothers for imprinting, however this is an approach advocated by some trainers (Henry et al, 2009). Here, the results appear to have lasting negative effects for foals, even after only one hour of separation at birth. In their study of sixteen newborn foals, Henry et al, (2009) found those separated from their mothers directly after birth (for one hour), initially showed “strong defense reactions” when handled by trainers, followed by what the researchers interpreted to be reactions akin to learned helplessness, the “foals remained lying motionless, but presented high muscle tone” (p 4). The foals in the experimental group showed further signs of short term distress, including “trembling...fast-breathing...and abnormal sucking patterns prior to nursing...including excessive chewing” (Henry et al, 2009, p 2).

At 6 months of age, the foals in the experimental group were less likely to play with their peers, were less likely to explore their environments, and were less likely to approach an unfamiliar human. Up until the end of the study period - which coincided with the onset of puberty for the foals - they showed “behavioral and social disturbances, including insecure attachment to their mothers” (Henry et al, 2009, p 1).

Robert’s and Miller’s approach of keeping foals with their mothers for imprinting is arguably less intrusive, however by Robert’s own account, it is met with resistance from foals, and it is still arguably disruptive for mares and foals, especially in that first hour of life (Roberts, 2007). The study by Henry et al (2009) shows just how critical this first hour is for foals and their mothers, and perhaps how cautious NH practitioners should be about promoting any unnecessary handling or intrusions during this period – especially given there may indeed be no long-term benefits (for handlers) from the process (Lansade, 2005).

Alternatives to Imprinting

Human relationships with foals, might instead be best served by taking a more hands-off approach and allowing for strong bonds to develop between foals and their mothers - rather than trying to be “part of the bonding” (Henry et al, 2006, p 717). Hausberger et al (2008) suggest the best time to start more intensive handling of foals - resulting in “easy and calm yearlings and young horses” – is around the time they are weaned, or even as late as the year following weaning (pp 11-12).

Prior to being handled, foals can still gain experience with humans, but experience from a distance. Henry et al, (2005) recommend trainers focus on having positive interactions with mares, something as simple as “softly brushing” them and “feeding them by hand” while the foals are present (Henry et al, 2005, p 341). Foals pick up on how their mothers respond to humans, and when they witness their mothers being relaxed and calm around them, it has been shown to have long lasting, positive effects for future human-foal bonding. It is also a far less intrusive approach for both mares and foals (Henry et al, 2005).

Finally, when handling does occur, Henry et al, (2006) suggest that rather than foals being “passive receivers of stimulation,” they should be afforded a more “active part” in any bonding interactions with humans (p 717). The researchers recommend handlers take their cues from how each foal responds to new stimulations (Henry, 2006).

Confinement

We know that built environments have the capacity to shape the lives of domesticated animals in meaningful, and potentially harmful ways. As noted in chapter 1, too much confinement

for horses is associated with their eyesight becoming myopic (McGreevy, 2012). Interestingly however, the fact that horses are domesticated, may work against them in terms of the emphasis put on the effects of their confinement.

Documentaries like *Blackfish* (2013) and *The Elephant in the Room* (2010) reflect and contribute to a growing sense of unease about the effects of confinement for wild animals. When people witness caged tigers and bears pacing back and forth in zoos, for example, they are increasingly likely to express concern or even outrage. And yet, similar behaviours are performed by domesticated horses confined to stalls and paddocks everyday (McGreevy, 2012). Unfortunately, in horses these behaviours are seen as more of a matter of course, and according to McGreevy, “tend to cause more embarrassment than concern” (McGreevy, 2012, p 23).

As is the case with captive wild animals, stereotypies in horses (which were historically referred to as ‘stable vices’) are thought to be coping mechanisms to help them with the “suboptimal environments” in which they find themselves (McGreevy, 2012, p 24). Typical stereotypies in horses include repetitive; “chewing, lip-licking, licking [of the] environment, wood-chewing, crib-biting, wind-sucking, box-walking, weaving, pawing, tail-swishing, door-kicking (front feet), box-kicking (hind feet), rubbing self, self-biting, head-tossing, head-circling, head-shaking, head-nodding, head-extending, ears back and nodding, kicking stall (hind feet)” (McGreevy, 2012, p 23-24).

McGreevy (2012) suggests certain stereotypies “retain a function within the motivational system from which it is derived” (p 25). For example, depending on their environment, feral horses will spend thirteen to seventeen hours a day grazing (Leblanc, 2013). McGreevy suggests that

horses that are unable to forage as they would in the wild, might resort to wood-chewing and crib-biting in order to express some form of their normal behaviour (McGreevy, 2012).

Stereotypies is an area of equine research that has been well developed (Leblanc, 2013). Confinement and social deprivation (especially at a young age) are known to be strongly correlated with their onset (Hausberger et al, 2008). And yet the barns, stalls and paddocks used by NH practitioners still largely resemble what you find elsewhere in the horse world. Tradition, and convenience for people, still strongly informs how horses are housed and for how long. In the UK for example, where there is a growing interest in NH (Monty Roberts trains the Queen's horses after all) there is also a growing trend to stable horses all year long – not just in the winter as has commonly been the case (Hockenhuil et al, 2015).

And there are a number of reasons why increasing the amount of stabling is an attractive, even practical option. Of course, stables offer protection from the elements – from potential predators, parasites, and severe weather conditions. It is easier to monitor stabled horses in terms of their overall health and food and water intake, and easier to access stabled horses quickly vs those at pasture. Limited areas for grazing can spell trouble for overused pastureland which can quickly turn to mud (an especially persistent problem in British Columbia) which can itself threaten the health of horses. And for performance horses, stabling means trainers can control how much they exercise, and presumably conserve their energy for practice and competition (McGreevy, 2012).

And yet there is ample evidence to show that horses that spend more time in pastures with other horses are more content – they are less likely to exhibit stereotypic behaviours, are less likely to display aggression towards other horses and people, and, they are quicker to learn than horses

housed for longer periods (Brubaker et al, 2016, Leblanc, 2013). And when it comes to stereotypic behaviours, prevention is key. Once developed, they can be very challenging, and sometimes impossible to reverse (Leblanc, 2013, McGreevy, 2012).

Feeding

As is noted above, feral horses, and horses at pasture, will spend the majority of their waking hours foraging – again, as much as thirteen to seventeen hours a day, and they have never been observed to fast voluntarily for any more than 3-4 hours (Leblanc, 2013). The ways horses are fed in captivity however, rarely reflect this. In stabled conditions, many horses will spend as little as 10% of their day feeding, have long gaps between feedings, and may have little choice as to when they eat (McGreevy, 2012).

Having large spans of time between feeding can potentially affect horses physically, as it appears to make them more prone to gastric ulcers. It has been associated with an “increased frequency of stereotypic behavior, such as cribbing (Codes of Practice, 2013, p 22). McGreevy notes that for horses kept indoors, the long periods between feeding, which he calls ‘vacuum periods’ are associated with peaks of restlessness (McGreevy, 2012, p 17).

Stabled horses are also traditionally fed hay from hanging haynets or hayracks – which keeps their food off the floor and away from feces and urine. This forces horses to eat with their heads raised in an unnaturally high position however, which can adversely affect the muscles and nerves in their necks, and make it more difficult for them to clear their upper airways when they inhale particles – in particular the dry particles of the food they are eating (McGreevy, 2012, p 14).

The Canadian Code of Practice for Equines suggests that handlers maximize the amount of time horses can forage – either in a pasture, or by eating hay in a dry lot. And they recommend horses be able to feed in such a way that “mimics natural feeding behaviour” insofar as they should be able to eat in a natural feeding position with their heads down – something which remains the exception for the majority of stabled horses (Codes of Practice, 2013, McGreevy, 2012).

Stabling and Social Contact

It is not just freedom from confinement and the ability to forage that are important for equine well being. As Hockenhull et al (2015) note, horses that are turned-out alone will spend less time outside (if given the choice). And without other horses around them, they will not forage as long, and will not gain the same value in being outside.

The company of other horses is critical, and when it comes to social contact not all stables are created equally. In the Canadian Code of Practice for Equines (2013) it is recommended that stables be constructed so that horses have contact with other horses “via sight, sound and smell” (p 17). And yet, in the section referring to stereotypies, one of the recommendations for their prevention is to construct barns so that “tactile contact” with other horses is also possible (p 40). McGreevy (2012) similarly stresses the importance of tactile communication with respect to stable design, and notes that it is “rarely possible” for horses in typical barns with individual stalls (McGreevy, p 18). And having a limited ability to touch other horses – over the top of a stall for example - but not have “full body contact” may actually increase frustration levels for horses (Hockenhull et al, 2015, p 33).

Deprived of physical contact with other horses – those who are individually stalled cannot play with each other, groom each other, or take part in mutual fly-swatting (McGreevy, 2012) And perhaps not surprisingly, aggression rates are higher for horses isolated to individual stalls. Interestingly, aggression is often cited as the reason for housing horses individually versus in open, group settings. Particularly for competitive horses, there is a fear that antagonistic and even playful behaviours could lead to serious injuries; an idea which is not supported by research (Jorgensen et al, 2009). Aggression is of course possible amongst any social group, and with group housed horses it is more likely to occur over food sources. Hartmann et al, (2012) suggest that “sufficient feeding space per animal” greatly reduces the risk of violence - as does the general social stability of the group (p 84).

The benefits of housing horses in group settings are similar to those of horses who spend more time at pasture with other horses. They are better able to develop their social skills with other horses and again, develop fewer stereotypies, and are less aggressive towards other horses and humans (Hartmann et al, 2012). Group housing affords horses the opportunity to move about more freely, to have physical contact with other horses, and to play, which “encourages movement which has been linked to enhance musculoskeletal development” (Hartmann et al, 2012, p 78). And, group living horses are found to be easier to handle and train (Hausberger et al, 2008).

Social Upheaval

As we’ve seen, the domestication of horses brought with it a great deal of social upheaval, and continues to do so. And unlike cats and dogs, where the expectation (if not the reality) is that once adopted or purchased they will stay with one person or in one place for life – the same is not

necessarily assumed of horses, even those kept for pleasure. It is quite common, for example, for a horse to start off trained in a sporting discipline (for example, dressage) for the purpose of competing in small local sporting events. Here, she might spend several years with one rider, who either advances in her competitive pursuits - and looks for another horse who will give her a more competitive edge - or perhaps her rider's interest in horses dwindles, either way, she is sold to another rider. After a few more years, potentially spent circling the same sporting events, she is either sold again, or perhaps receives an injury and is retired and/or is sold on to work as a schooling horse, doing low impact work until she ages out of that, and, if she's lucky remains where she is for her retirement, or perhaps is sold again as a pasture pal (company for other horses). And with each move, she must adapt to a new environment, and a new set of horses and people. And each time she is introduced into a new environment, it means real social upheaval for her and the other horses she encounters.

In the wild, the social lives of horses are relatively stable – especially for mares. Changes in social groups do occur, most notably for young horses leaving their natal bands. However long term social bonds are the norm (Leblanc, 2013). Wathan (2015) notes, the preference for prolonged associations between even very small social groups remains strong for domesticated horses. This is not surprising given that domesticated horses will quickly return to similar social structures as wild/feral horses if given the chance (Leblanc, 2013). The mismanagement of the need for strong social relationships is thought to be at the root of many behavioural issues in domesticated horses (Wathan, 2015). The outward signs of the effects of social upheaval, are similar to those of social isolation, and too much confinement - with increased signs of stress and stereotypies and higher levels of aggression (Hartmann et al, 2012).

Conclusion: Going Back to the Beginning: Acknowledging the Effects of Domestication

According to Latimer et al, (2009), within traditional horsemanship communities there is an inherent acknowledgement of at least the desired and intentional effects of domestication in horses. Horses in these communities are seen as being “part of a hybrid social/cultural world” in which breed and breeding are important to identity, to the extent that many horses are defined by what they are bred to do, as show jumpers, eventers, etc. (p 15).

Perhaps reflecting the wider, complicated and often ambiguous relationship humans have with the process of domestication however, within the NH narrative there is almost a denial of it having taken place for horses. Wildness is highly valued in NH communities, and the bodies of horses are seen as representing “wildness and naturalness” (Latimer a, 2009, p 15). An almost mythic image has developed surrounding the interactions between NH practitioners and wild mustangs, which according to Birke (2008) helps foster the belief that “relating to horses as wild - even in the process of taming – is the only way to develop a relationship” (p 119). Again, however, most of the horses NH practitioners encounter are not even feral, instead the vast majority will have had contact with humans from a young age, and will be “relatively well socialized into human/horse relationships by the time they begin training” (Birke, 2008, p 119).

This is not to say the focus on wildness within the NH community is a wholly or even largely bad thing. It has arguably helped improve training relationships and equine welfare as we have seen. Appreciating that horses are more than simply domesticated animals, more than the products of selective breeding is to the credit of NH practitioners. The process of domestication is after all

complex and fluid, and does not erase all traces of wildness – this, horses themselves have proven time and again.

The lack of appreciation for what the process of domestication has meant for horses however, is perhaps one of the reasons why the losses for horses associated with it, do not factor in the NH narrative (nor are they recognized – at least as losses - in traditional horsemanship communities). If practitioners can't fully appreciate the effects of domestication for horses, they might not look as critically, at some of the factors inherent in their domestication, which can continue to cause harm.

We could begin a further reimagining of human-horse relationships then, simply by acknowledging these losses, by considering them in relation to horse management and training practices, and where possible, ameliorating them. At the same time, we can step back and look at human horse-relationships in a broader, historical context - to remember that however much it has been romanticized, the history of these relationships includes a great deal of exploitation and abuse, and however far we have come, current training and management practices have not fully divorced themselves from these roots. And so we must continue to amend management and training practices when and if they are proven harmful or ineffective, or when other practices prove to be more beneficial.

One of the key losses associated with domestication for horses, has of course been to their sensory acuity, and through training relationships and built environments they can lose it further still. It's incredible to think, for example, that perhaps before they are fully out of their mother's womb, the process of desensitization to touch can begin for foals. Desensitizing horses may indeed

be necessary for the safety of human-horse interactions – however such practices can at the very least be questioned in their degree if not in their totality.

Furthermore, the environments in which horses live can be made to be more stimulating, and less socially isolating – they do not have to add insult to injury as it were. We know which kinds of environments result in stereotypic behaviours and which do not. And to that end, we can maximize the amount of time horses have access to the outdoors with other horses, able to graze, play, rest, allogroom etc. We can also maximize the amount of contact they have with other horses indoors. And we can recognize the importance of the stability of social groups for horses - we can question the normalization of frequent social upheavals in their lives, and where possible, protect the integrity of domestic social groups.

When it comes to communication between humans and horses, we can keep in mind that there is still much we don't know. Wathan (2015) laments, for example, that outside of a recognition of the play face, little research has yet been done around what body language cues (in particular facial expressions) are associated with positive emotions in horses, “a critical yet poorly understood aspect of animal welfare” (Wathan, 2015, p 118).

We can appreciate however, (as some of the best-known NH practitioners contend) that it takes time to become familiar with horses, and how they communicate. And while moments of connection and communication are profound and important, they do not equate to relationships free of conflict or resistance.

And we can acknowledge there are things which can limit communication. While it is important for example, to look to the results of the latest equine research to inform our interactions with horses, we must also remember that the language used by researchers can serve

to deny the agency, intelligence and subjectivity of horses. And so we should be careful not to confuse the language used in this research with the horses themselves.

We can recognize that training relationships have been developed around a simplified picture of predator-prey dynamics, which holds truth to it but presents a limited picture of humans and horses. We can appreciate that horses have the capacity to fight as well as flee, that humans are prey as well as predators, and that depending on the context, horses may well perceive us as such. Similarly, we should be cautious of assuming that dominance between horses is firmly set, or can be easily translated out of context into human-horse interactions.

Finally, we can appreciate that there may well be moments of partnership between humans and horses, but there is also an inherent power imbalance within training relationships – particularly when it comes to who decides the topics of conversation, or indeed whether to participate in them at all. Our interactions with horses are still predominantly goal oriented and can leave little space for horses to express themselves fully, and so little opportunity for us to know them more fully. We might encourage then, far more human-horse meetings outside of the trainer/trainee context.

If, as both the NH practitioners like Roberts (1996) and Brannerman (2001) contend – that communication between human and horses is served by the ability to relate to them – perhaps we could approach our encounters with them with a greater appreciation that they, like us, are complex social beings - beings who have been profoundly affected by their relationships with us – as we have been through ours with them. Beings who have been changed through the process of domestication, but who are not wholly defined by it. Beings who still have their own agencies, and agendas, intelligence and intuitions.

Looking back at my eleven-year-old self, I think about how I would have reacted if I had been encouraged to question whether certain aspects of my relationship with Mystery and the circumstances of his environment were as 'right' as I believed them to be at the time. And if in so doing, I had been able to identify to some degree what was causing the sense of unease that I felt. I wonder how our relationship might have changed, for him and for myself, if I had been encouraged to listen more - if that had been stressed as much or more as learning how to control and maneuver him through our lessons. To listen more, to have a greater sense of curiosity and a little more humility and flexibility. These are the things I would wish for my eleven-year-old self, and for Mystery, who so patiently taught me despite it all.

Future Research Questions

- How do economic and competitive interests factor into how we communicate with horses - what we are willing and not willing to 'hear'?
- There are trainers who suggest men and women communicate with horses differently (Roberts, 2007, kohanov, 2001) – is that the case? If so, in what way(s)?
- We've seen that humans vary in their ability to detect nonverbal cues, is the same true of horses?

References

- Abram, D. (1996). *The spell of the sensuous*. Toronto, Canada: Random House, Inc.
- Agriculture and Agri-Food Canada. (2015). *Horse Supply at a Glance - Canada*. Retrieved from https://canadianhorsedefencecoalition.files.wordpress.com/2016/02/horsesupply_december-2015-english.pdf
- Allman, J. M. (2000). *Evolving brains*. New York: Scientific American Library.
- American Association of Equine Practitioners. (2015). *Horse Soring and The Past Act, S. 1121 and H.R. 3268* [Booklet]. Lexington, KY. Retrieved from https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Documents/2015-Soring-Booklet-Final_Logo.pdf
- Birke, L. (2008). Talking about horses: Control and freedom in the world of "natural horsemanship". *Society and Animals*, (16), 107-126.
- Birke, L., & Brandt, K. (2009). Mutual corporeality: Gender and human/horse relationships. *Women's Studies International Forum*, 32(3), 189-197.
- Blake, H. (1975). *Talking with horses*. Ebbw Vale, Wales: Souvenir Press.
- Brandt, K. (2004). A Language of Their Own: An Interactionist Approach to Human-Horse Communication. *Society & Animals*, 12(4), 299-316.
- Brandt, K. (2006). Intelligent Bodies: Embodied Subjectivity Human-Horse Communication. In *Body/embodiment: symbolic interaction and the sociology of the body* (pp. 141-151). Ashgate Publishing.
- Brannaman, W. (2001). *The faraway horses*. Guilford, CT: Lyons Press.

Brubaker, L., Udell, M. A. (2016). Cognition and learning in horses (*Equus caballus*): What we know and why we should ask more. *Behavioural Processes*, 126, 121-131.

Bruford, M. W., & Townsend, S. J. (2006). Case studies in the genetics of animal domestication: sheep. In *Documenting Domestication: New Genetic and Archaeological Paradigms* (1st ed., pp. 306-316). Berkeley, CA: University of California Press.

Bulliet, R. W. (2007). *Hunters, herders, and hamburgers the past and future of human-animal relationships* [Kobo].

Brüne, M. (2007). On human self-domestication, psychiatry, and eugenics. *Philosophy, Ethics, and Humanities in Medicine*, 2(1), 21.

Cassidy, R. (2007). Introduction: Domestication Reconsidered. In *Where the Wild Things Are Now Domestication Reconsidered* (pp. 1-25). Oxford: BERG.

Code of practice for the care and handling of equines. (2013). Ottawa: Equine Canada.

Cowperthwaite, G. (Director). (2013). *Blackfish* [Documentary]. United States: Magnolia Pictures.

Dorrance, B., Desmond, L. (2007). *True horsemanship through feel* (2nd ed.). Guilford, Conn: Lyons Press.

Evans, R., Franklin, A., (2010). *Equine beats: unique rhythms (and floating harmony) of horses and riders*. In: Edensor, Tim ed. *Geographies of Rhythm: Nature, Place, Mobilities and Bodies*, Farnham: Ashgate, pp. 173-188.

Evernden, N. (1993). *The natural alien: humankind and environment* (2nd ed.). Toronto: Univ. of Toronto Press.

Fijn, N. (2015). The domestic and the wild in the Mongolian horse and the takhi. In *Taxonomic Tapestries the Threads of Evolutionary, Behavioural and Conservation Research* (pp. 279-298). Acton: ANU Press.

- Fowler, V., Kennedy, M., & Marlin, D. (2012). A comparison of the monty roberts technique with a conventional uk technique for initial training of riding horses. *Anthrozoos*, 25(3), 301–321.
- Francis, R. C. (2016). *Domesticated: evolution in a man-made world*. New York: W. W. Norton & Company.
- Fureix, C., Pagès, M., Bon, R., Lassalle, J., Kuntz, P., & Gonzalez, G. (2009). A preliminary study of the effects of handling type on horses' emotional reactivity and the human–horse relationship. *Behavioural Processes*, 82(2), 202-210.
- Grandin, T. (1999). Safe handling of large animals (cattle and horses). *Occupational Medicine*, 14(2).
- Grandin, T., & Johnson, C. (2005). *Animals in translation: using the mysteries of autism to decode animal behavior*. New York: Scribner.
- Hamilton, A. J. (2011). *Zen mind zen horse: the science and spirituality of working with horses*. North Adams, MA: Storey Publishing.
- Haraway, D. J. (1991). *Simians, cyborgs, and women: the reinvention of nature*. New York: Routledge.
- Hartmann, E., Søndergaard, E., & Keeling, L. J. (2012). Keeping horses in groups: A review. *Applied Animal Behaviour Science*, 136(2-4), 77-87.
- Hausberger, M., Roche, H., Henry, S., & Visser, E. K. (2008). A review of the human–horse relationship. *Applied Animal Behaviour Science*, 109, 1-24.
- Hearne, V. (1986). *Adam's task: Calling animals by name*. New York: Alfred A. Knopf, Inc.
- Heleski, C., Bauson, L., & Bello, N. (2008). Evaluating the Addition of Positive Reinforcement for Learning a Frightening Task: A Pilot Study With Horses. *Journal of Applied Animal Welfare Science*, 11(3), 213-222.

- Hendriksen, P., Elmgreen, K., & Ladewig, J. (2011). Trailer-loading of horses: Is there a difference between positive and negative reinforcement concerning effectiveness and stress-related signs? *Journal of Veterinary Behavior: Clinical Applications and Research*,*6*(5), 261-266.
- Henry, S., Hemery, D., Richard, M., & Hausberger, M. (2005). Human–mare relationships and behaviour of foals toward humans. *Applied Animal Behaviour Science*,*93*(3-4), 341-362.
- Henry, S., Richard-Yris, M. A., & Hausberger, M. (2006). Influence of various early human–foal interferences on subsequent human–foal relationship. *Wiley Periodicals*.
- Henry, S., Richard-Yris, M., Tordjman, S., & Hausberger, M. (2009). Neonatal Handling Affects Durably Bonding and Social Development. *PLoS ONE*,*4*(4).
- Hockenull, J., & Creighton, E. (2015). The day-to-day management of UK leisure horses and the prevalence of owner-reported stable-related and handling behaviour problems. *Animal Welfare*,*24*(1), 29-36.
- Humane Society of the United States. (2017, January 13). *Obama administration finalizes rule to protect Tennessee walking horses*. Retrieved from http://www.humanesociety.org/news/press_releases/2017/01/USDA-finalizes-horse-soring-rule-011317.html?referrer=https://www.google.ca/
- Innes, L., & McBride, S. (2008). Negative versus positive reinforcement: An evaluation of training strategies for rehabilitated horses. *Applied Animal Behaviour Science*,*112*(3-4), 357-368.
- Johansen, S. G., Wang, C. E., Binder, P., & Malt, U. F. (2014). Equine-facilitated body and emotion-oriented psychotherapy designed for adolescents and adults not responding to mainstream treatment: A structured program. *Journal of Psychotherapy Integration*,*24*(4), 323-335.
- Jorgensen, G. H., Borsheim, L., Mejdell, C. M., Søndergaard, E., & Bøe, K. E. (2009). Grouping horses according to gender—Effects on aggression, spacing and injuries. *Applied Animal Behaviour Science*,*120*(1-2), 94-99.

Keating, C. F. (2016). The developmental arc of nonverbal communication: Capacity and consequence for human social bonds. *APA handbook of nonverbal communication.*, 103-138.

Kohanov, L. (2001). *The tao of equus: A woman's journey of healing and transformation through the way of the horse*. Novato, California: New World Library.

Lansade, L., Bertrand, B., & Bouissou, M. F. (2004). Effects of neonatal handling on subsequent manageability, reactivity and learning ability of foals. *Applied Animal Behaviour Science*, 92, 143-158.

Latimer, J., Birke, L. (2009). Natural Relations: Horses, Knowledge, technology. *The Sociological Review*, 57(1), 1-27.

Leach, H. (2003). Human Domestication Reconsidered. *Current Anthropology*, 44(3), 349-368.

Leblanc, M. (2013). *The mind of the horse: an introduction to equine cognition*. Cambridge, MA: Harvard University Press.

Lentini, J. A., & Knox, M. (2009). A Qualitative and Quantitative Review of Equine Facilitated Psychotherapy (EFP) with Children and Adolescents. *The Open Complementary Medicine Journal*, 1(1), 51-57.

Lesimple, C., Sankey, C., Richard, M. A., & Hausberger, M. (2012). Do Horses Expect Humans to Solve Their Problems? *Frontiers in Psychology*, 3, 1-4.

Levine, M. A. (1999). Botai and the Origins of Horse Domestication. *Journal of Anthropological Archaeology*, 18(1), 29-78.

Livingston, J. (1994). *Rogue primate: an exploration of human domestication*. Toronto, Canada: Key Porter Books Limited.

Maurstad, A., Davis, D., Cowles, S. (2013). Co-being and intra-action in horse-human relationships: a multi-species ethnography of be(com)ing human and be(com)ing horse. *Social Anthropology*, 21(3), 322-335.

McGreevy, P. (2012). *Equine Behaviour: A guide for veterinarians and equine scientists*. (Ex: 2nd ed.). Toronto, Canada: Saunders.

McGreevy, P. D. (2007). The advent of equitation science. *The Veterinary Journal*, 174(3), 492-500.

Meyer, I., Forkman, B. (2014). Nonverbal Communication and Human-Dog Interaction, *Anthrozoos*, 27(4), 553-568

Miller, R. M. (1991). *Imprint training of the newborn foal*. New York: Lyons.

Miller, R. M. (2007). *Natural horsemanship explained: from heart to hands*. Guilford, CT: The Lyons Press.

Nevzorov, A. (2011). *The horse crucified and risen*. Saint Petersburg, Russia: Nevzorov Haute Ecole

O'Regan, H. J., & Kitchener, A. C. (2005). The effects of captivity on the morphology of captive, domesticated and feral mammals. *Mammal Review*, 35(3-4), 215-230.

Parelli, P., Swan, K., & Hagen, K. P. (2013). *Natural horse-man-ship: the six keys to a natural horse-human relationship: attitude, knowledge, tools, techniques, time, imagination*. Colorado Springs, CO: Western Horseman.

Parelli, P., & Swan, K. (2006). *Raise your hand if you love horses: Pat Parelli's journey from zero to hero*. New York: Lyons.

Patton, P. (2003). Language, Power, and the Training of Horses. In *Zoontologies: The Question of the Animal* (pp. 83-99). Minneapolis: University of Minnesota Press.

- Plumwood, V. (2000). Integrating Ethical Frameworks for Animals, Humans, and Nature A Critical Feminist Eco-Socialist Analysis. *Ethics and the Environment*,5(2), 285-322.
- Price, E. O. (2002). *Animal domestication and behavior*. Oxon: CABI.
- Price, E. O. (1999). Behavioral development in animals undergoing domestication. *Applied Animal Behaviour Science*,65(3), 245-271.
- Quiroz Rothe, E., Vega, B. J., Torres, R. M., Campos Soler, S. M., & Pazos, R. M. (2005). From kids and horses: Equine facilitated psychotherapy for children. *International Journal of Clinical and Health Psychology*,5(2), 373-383.
- Rashid, M. (2011). *Nature in horsemanship discovering harmony through principles of aikido*. Kobo edition, New York: Skyhorse Pub.
- Roberts, M. (2004, November). How Do You Cure a Herd Bound Horse? Retrieved from http://www.montyroberts.com/ju_ask_monty_1004.html#HerbBoundHorse
- Roberts, M. (2007). *From my hands to yours: lessons from a lifetime of training championship horses* (3rd ed.). Solvang, Calif.: M. and P. Roberts.
- Roberts, M. (1996). *The man who listens to horses*. New York: Random House, Inc.
- Roberts, F., Bradberry, J., & Williams, C. (2004). Equine-Facilitated Psychotherapy Benefits Students and Children. *Holistic Nursing Practice*,18(1), 32-35.
- Sankey, C., Richard-Yris, M., Henry, S., Fureix, C., Nassur, F., & Hausberger, M. (2010). Reinforcement as a mediator of the perception of humans by horses (Equus caballus). *Animal Cognition*,13(5), 753-764.
- Savvides, N. (2012). Communication as a Solution to Conflict: Fundamental Similarities in Divergent Methods of Horse Training. *Society & Animals*, 20(1), 75-90.
- Savvides, N. (2011). "Loving-knowing" women and horses: Symbolic connections, real life conflicts and "natural horsemanship". *Humanimalia: a journal of human/animal interface studies* 3 (1), 60-76.

- Skeen, J. (2011). Predator–Prey Relationships: What Humans Can Learn from Horses about Being Whole. *The Psychology of the Human-Animal Bond*, 81-106.
- Sutton, E. (Director). (2006). *The Woman Who Thinks Like a Cow* [Documentary]. United Kingdom: BBC-Horizon.
- Tyler, T. (2003). If Horses Had Hands *Society and Animals*, 11, 267-281.
- U.S. Dept. of Agriculture, Animal and Plant Health Inspection Service (2016) (enacted).
- Vidrine, M., Owen-Smith, P., & Faulkner, P. (2002). Equine-Facilitated Group Psychotherapy: Applications for Therapeutic Vaulting. *Issues in Mental Health Nursing*, 23(6), 587-603.
- Visser, E. K., Vandierendonck, M., Ellis, A. D., Rijksen, C., & Reenen, C. G. (2009). A comparison of sympathetic and conventional training methods on responses to initial horse training. *The Veterinary Journal*, 181(1), 48-52.
- Waran, N. (2007). *The welfare of horses*. Dordrecht: Springer.
- Warren-Smith, A. K., & McGreevy, P. (2007). The use of blended positive and negative reinforcement in shaping the halt response of horses (*Equus caballus*). *Animal welfare*, 16(4), 481-488.
- Wathan, J. (2015). *Social Communication in Domestic Horses: The Production and Perception of Facial Expressions*. (Doctoral Dissertation). University of Sussex. Retrieved September, 2016, from <file:///C:/Users/lesle/Desktop/MRP%20ARTICLES/Facial%20expressions%20horses.pdf>
- Webber, M. L. (Director). (2010). *The Elephant in the Living Room* [Documentary]. United States: Warner Bros. National Geographic Wild.
- Wright, R. (2005). *A short history of progress*. Edinburgh: Canongate.
- Zeder, M. (2012). Pathways to Animal Domestication. In *Biodiversity in Agriculture: Domestication, Evolution, and Sustainability* (pp. 227-259). Cambridge: Cambridge University Press.

