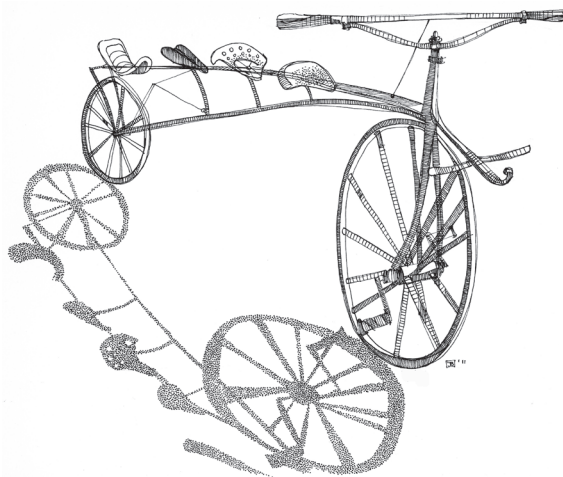


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TOUCH, MARTIAL ARTS, AND EMBODIED KNOWLEDGE

Scott Habkirk

Abstract: Touch is essential to normal human development. It communicates a wide variety of things depending on the culture and the context. Through touch the boundary between subject and object becomes blurred and empathy can be cultivated. In the context of martial arts, touch can paradoxically lower levels of aggression, particularly in a traditional setting. This paper explores how touch is managed in martial arts and the embodied experiences that it can cultivate. Positivistic methodologies have revealed some of the benefits of martial arts on both physical and mental health, and studies that take a quantitative and culturally sensitive approach are revealing other dimensions of bodily experience.

This paper will focus on how the anthropology of the senses, in particular studies about touch, can help us to understand the embodied experience of martial arts. Psychological research done in response to the growing popularity of martial arts in the 1970s has suggested that martial arts training can increase confidence and assertiveness while lowering levels of aggression. A more phenomenological approach to the study of martial arts has also revealed how culture shapes the practitioners subjective, embodied experiences. As I will outline in this paper, phenomenological methodology, drawing from existing literature and my own experiences, offers another means of exploring experiences of the body through training and fighting. As both an anthropologist and a martial artist, I have experienced firsthand how the anthropology of the senses can help us to understand how social and cultural forces shape the way we experience our bodies.

‘RUBBING PEOPLE THE WRONG WAY’

There are many idioms that refer to touch as a form of communication, and researchers who have studied touch in relation to health have observed that touch is essential to normal human development (Andersen 2011; Hertenstein 2011). Touch is necessary for the maintenance of physical and psychological health because it fosters intimacy and emotional connections. It often expresses feelings of warmth and love; in severe cases, touch deprivation can result in emotional, mental, and immunological problems. Touch can also be an act of aggression or coercion, but whether it is attracting or repelling, touch is the medium through which we have some of our deepest sensual experiences. In the edited volume *Handbook of Touch* (2011), Mathew Hertenstein discusses the crucial role that touch plays in communication. Touch can communicate a wide variety of sentiments that are context-dependent. As a form of communication, touch has both equifinality and equipotentiality. Equifinality re-

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fers to how the same idea can be communicated through different forms of touch. For example, support at a funeral in a typical Euro-Canadian context can be expressed through a handshake or a hug, and is usually coupled with verbal condolences. Equipotentiality refers to how the same touch can be ascribed different meanings that depend on the relationship between the two people touching as well as the situational and cultural context. For example, in Western sports a pat on the bum by a familiar teammate is usually understood as a show of support and encouragement, whereas a pat on the bum by an unfamiliar person in almost any other context can be seen as an unwelcome, aggressive, and highly sexualized gesture. These examples highlight the role touch plays in communicating intimacy. As Hertenstein (2011, 307) notes, "To be perceived positively, the intimacy of the touch must be congruent with the intimacy of the relationship." In this way, touch can indicate the nature of a relationship as well as what stage of intimacy the relationship is at (Finnegan 2005).

The boundary between what is acceptable touch in a specific context between two individuals is carefully mediated by the social norms that govern interpersonal conduct, and in certain circumstances those norms may be suspended (e.g., for functional purposes at a doctor's office). Various cultures differ in their ideas about acceptable levels of public intimacy and touch. Peter Anderson (2011) explored some of the cultural differences in communication through touch and found that latitude, collectivist or individualist cultural orientations, and religion played a major role in determining acceptable levels of intimate touch. He found that cultures that are closer to the Equator tend to touch more often. Andersen attributes this to climatological factors related to the cold that lead to decreased skin sensitivity, less outdoor and social activity, reduced skin availability, and a decrease in sunlight which affects the neuroendocrine system (i.e., lack of sunlight increases probability of depression, aggression, and conflict). In the studies Andersen reviewed, people from northern climates tended to be more serious, uptight, and utilitarian when compared to their southern counterparts.

Andersen also found that East Asian cultures, which tend to be more collectivist rather than individualist, were the least touch oriented. East Asian societies have developed strict rules of conduct, decorum, and decency that often inhibit open displays of affection through touch. Ruth Finnegan (2005, 19) notes: "In many Asian countries a mouth-to-mouth kiss in public, with its inevitable physical touching, is considered immoral or disgusting." An obvious comparison is the Japanese bow versus the Western handshake. Both are used for greeting new people, but the Japanese bow involves no touch at all. Lastly, Andersen (2011) looks at the effect that religion has on touch behaviour and found that the more religious a person was, the more likely they were to avoid touch. In many religions, touch is associated with sin and indulgence in profane materiality.

Though these studies help us to understand the social and cultural functions of touch, they primarily use positivistic methods to make broad generalizations that reveal little about the intricate complexity and subjectivity of touch behaviour. Their generalizations may prove useful as a guide, but in the increasing culturally mixed environment that we live in today, the important point to take from these studies is how crucial it is to understand the context through which touch behaviour is made meaningful and how. Even when there are clear normative rules, the rules that govern touch behaviour can change depending on who is involved, the situation, and what function communicative touch is intended to perform. It may be the custom to bow in Japan when meeting business associates, but an internationally educated Japanese businessperson may prefer a handshake with a North American trading partner because of their familiarity with each other and the transmissibility of social norms.

BEYOND THE TACTILE

Research into the anthropology of the senses has gone beyond what is typically considered the realm of touch in sensation. In *Haptic Geographies: Ethnography, Haptic Knowledge and Sensuous Dispositions*, Mark Paterson (2009) argues that the sense of touch cannot be reduced to tactile sensation alone and develops a broader con-

ceptualization of touch that includes kinesthesia, proprioception, and the vestibular system. Kinesthesia is the sense of bodily movement that is controlled with the nervous system and includes such functions as muscle tension and relaxation. Proprioception is the spatial framework the body uses to understand where it is relative to other objects as well as where various parts of the body are relative to each other. The vestibular system works with kinesthesia and proprioception to maintain a sense of balance and postural equilibrium, and kinesthesia and the vestibular system work together to manage sensations of inertia and momentum. This haptic system serves to orient the body in space and movement while establishing relationships of subject and object between the body and things external to it. Paterson challenges the classic notions of the senses being bound to particular sense organs as concepts like kinesthesia, proprioception, and the vestibular system use a variety of sensory input to manage bodily awareness. His focus is more on the interrelation of the senses and the continually shifting and culturally variable nature of their construction. He notes that while these senses serve to establish and maintain the relationship between the bodily subject and the objects around it, touch in particular can serve to break down the distinction between subject and object.

Caroline Potter (2008) is another author who explores alternative notions of sense in her participatory research on dancing. Like Paterson, she advocates for an understanding of the senses that goes beyond reduction to specific organ sensory input and claims that the senses are an “intermeshed web of perceptory apparatuses that direct the body’s total attention... rather than discreet biological pathways that respond independently to physical stimuli” (Potter 2008, 446). In her discussion of dancer’s experiences with the senses, she identifies kinesthesia as moving the body through space and time to achieve a desired end. For the dancers, movement of flow is related to tension and relaxation. Emotional tension can manifest unintentionally in the body to inhibit movement and the body’s efficient alignment with gravity.

Both Potter and Paterson advocate for us-

ing the body as a research tool in order to understand the embodied experience of the senses. They recognize that language can be limited in expressing the sensations of their research participants and that, in order to truly understand their participants’ experiences, anthropologists must immerse themselves in their subjects’ sensory world. Like dancing, martial arts are another medium through which anthropologists can explore the relationship between movement, the senses, and culture.

MIND, MATTER, AND THE MARTIAL ARTS

Due to the popularity of Bruce Lee’s films and the TV series *Kung Fu*, interest in martial arts grew considerably in the West in the 1970s. As a result, there was also an upsurge of academic research on martial arts in the 1980s, particularly in the field of psychology. Julian Fuller (1988), in his article “Martial arts and psychological health,” which appeared in the *British Journal of Medical Psychology*, does a particularly good job of summing up the research done on martial arts in the 1980s. He identifies a variety of psychological benefits that martial arts provide including a positive effect on assertiveness and self-confidence, a reduction of juvenile delinquency, and a decrease in aggressiveness. Studies found that there was a negative correlation between skill level and aggressiveness, which Fuller and others attributed to a greater cultivation of empathy through tactile communication. The consistent tactile communication through sparring and the practice of techniques with partners serve to blur the boundaries between self and other. In my own practice of White Crane Kung Fu, instructors encourage us to use touch to extend our senses beyond the confines of our own body and into the body of our opponent to identify weaknesses. These weaknesses make themselves evident through tension and, in order to reduce one’s own weakness, we are constantly reminded to relax. As Fuller notes:

Their aim is to teach mental calmness, physical relaxation, absorption of antagonistic force, adaptation to sudden obstacles, timing of effective reaction to

stressors and one-at-a-time problem solving strategies [1988, 325].

Fuller recognizes, though, that the positive effects of martial arts training are most prominent in traditional settings where schools aim to recognize and reproduce the practices' cultural origins. He criticizes the public image of martial arts as portrayed in popular entertainment in the 1970s and 1980s for misrepresenting them as overly aggressive and instrumental. This portrayal tended to ignore the spiritual and ethical components of martial arts as practiced in their traditional cultural contexts. I would argue that this type of representation has not persisted, and that martial artists have replaced it with an emphasis on the spiritual and ethical components of traditional Chinese martial arts. Producers of movies like the *Ip Man* series, which was released in 2008, 2010, and 2013,¹ have endeavored to promote an image of Chinese martial arts as being a holistic health practice that avoids conflict unless it is absolutely necessary. Through these movies, martial artists have engaged with the assumption that Chinese martial arts are about violence and instrumental aggression, and aim to correct what they perceive to be misrepresentations. However, Peter Lorge (2012), in his historical research on martial arts in China, asserts that the concept of Chinese martial arts being solely about self-defense and self-cultivation is a relatively modern phenomenon. For most of Chinese history, the majority of martial artists were not scholarly monks or non-violent enlightened masters. Martial arts were practiced to satisfy practical military needs among warring states or by the ruling imperial government to maintain power through the threat of violence. From a historical perspective, to portray Chinese martial arts as being devoted to self-cultivation can be as equally distorting as portraying it as purely instrumental violence.

Fuller recognizes the limits of his and his colleagues' positivistic approach to the study of martial arts and suggests there is a need for more culturally sensitive methodologies to be used in researching the effects of martial arts training on

health. As well, he points out that more research needs to be done in a non-Western setting for the purposes of comparison. As an addendum to Fuller's review, Peter Columbus (1991) suggests that researchers use a phenomenological approach that focuses on the structures of subjective experience and embodied knowledge rather than discursive. Like Fuller, Columbus recognizes that changing the cultural context of the practice changes the training methods and therapeutic effects. Columbus goes so far as to claim that martial arts originate in an Oriental context (1991), but Lorge (2012) argues that this is not the case; most societies at some point in their history have had a martial art. The Western martial tradition goes back to combat sports such as boxing, wrestling, and *pankration* at the Ancient Greek Olympic Games (Crane 2004), includes knightly martial orders from medieval times, and is, in modern times, found in aggressive sports like hockey, rugby, lacrosse, and the Ultimate Fighting Championship (UFC)'s mixed martial arts. It may be the case that martial arts became more interwoven with other cultural traditions or became more institutionalized in some societies. Columbus's point becomes increasingly valid when considering that to truly understand a specific martial tradition, a researcher must investigate the tradition as practiced in its original cultural setting as well as its various modern transformations. In recent times, even this approach becomes troublesome because of the free flow of cultural influences and information between societies; this has never been as open and easy as it is today. One may go to China to study kung fu or Japan to study karate and find that schools in the country of origin have been affected by the mixed martial arts tradition of North America. Columbus (1991) does recognize how problematic distinguishing a traditional martial art from a non-traditional one can be and tries to develop some criteria for identification (e.g., national origin acknowledged, spiritual component, enhanced artistry).

In more contemporary research on the Indian martial art *kalarippayattu*, Ian McDonald (2007) identifies three different ways that the mar-

¹ *Ip Man* was Bruce Lee's martial arts teacher in Hong Kong.

tial art is practiced: as performance art, competitive sport, and bodily practice. As a performance art, kalarippayattu is practiced with an emphasis on the spectacular and often for the purpose of attracting tourists. In this way, kalarippayattu engages in the construction of national narrative building and cultural identification. Lorge (2012, 5) also addresses the connection between martial arts and performance art by noting that “it is because effective violence can be physically elegant and aesthetically pleasing that it has taken on such a broad and large standing place in theatre and film.” McDonald points out that this type of martial arts practice may promote the martial art to cultural outsiders, but the lack of practical utility undermines kalarippayattu’s legitimacy as a credible martial art. My own experience in Taiwan is similar to McDonald’s in this respect. Under the teacher I trained with in Taiwan, we only practiced art forms, and there was never any sparring or practical application employed. The more a martial art is practiced for solely performance purposes, the more likely it is to lose its practical utility.

Practitioners of kalarippayattu as a competitive sport focus primarily on practical applications that fit the rules of global sport (McDonald 2007). In opposition to kalarippayattu as practiced for performance art, this transformation to competitive sport uses instrumental rationality to strip away the cultural context. This methodology is also employed by many schools in North America to serve the needs of the increasingly popular mixed martial arts world as embodied by the UFC. Here, instrumental rationality governs practice, and anything that does not serve those ends is seen as superfluous.

Bodily practice is what McDonald (2007) equates with the more traditional versions of kalarippayattu and is more holistic in nature. According to McDonald, schools that practice the traditional martial art are similar to temples in appearance, are integrated with Ayurvedic medicine, and combine practical utility with graceful art and ritual. Lorge (2012) argues that the notion of traditional authenticity and claims of any particular style, teacher, or school being more authentic or traditional is mostly a matter of marketing. He

also asserts that even the notion of a martial arts style is relatively new in Chinese history, and that martial artists previously used lineage rather than style as a marker of identification. Some modern schools try to trace their lineage to distant historical periods and masters in order to gain legitimacy as a more traditional, authentic martial art. Other schools claim authenticity is demonstrated through success in the ring, while their detractors argue that the rules of competitive sport are so limiting that they cannot accurately demonstrate a school’s or style’s authenticity. For Lorge, the value of a martial art can only be accurately measured on the level of the individual. If the martial art helps the individual reach the particular goals that they are after in practicing it, be it success in competitive sport, better health, or attracting audiences for performance, then the practice has value.

A traditional martial art is one that adheres to certain key principles that resonate with other cultural elements (be they religious, philosophical, or otherwise) in the specific society from which they originate. The key principles in a traditional practice remain conservative and change little over time while also being flexible enough to remain useful regardless of the historical period. A tradition that persists is one that is both immovable and adaptable, and as Lorge (2012, 4) notes: “Martial arts as a living tradition is like any craft tradition in that skills must be taught, learned, and performed by individuals who innovate while reproducing the tradition.”

Both Columbus and Fuller are correct in their assertion that cross-cultural studies which compare martial arts traditions in their cultures of origin are needed to identify the unique therapeutic traits of a particular practice. A researcher or practitioner cannot truly understand the uniqueness of their practice until they have something to compare it to. The passing on of oral tradition has always been a strong component of my kung fu training, and one particular story illustrates this assertion clearly. It is said that a kung fu master and a karate master stood on the edge of a cliff while attackers came at them. The karate master executed a beautiful technique and repelled his attacker with a powerful blow.

The kung fu master just stepped aside and let his attacker fall to his death. This story serves to illustrate a key difference in these two martial arts traditions' philosophies toward aggression. Karate is believed to oppose force with greater force whereas kung fu yields to strength and attacks weakness. Having not trained in karate, I cannot confirm that this is true, but the story does demonstrate how comparison is used to highlight particular key principles and differences.

To answer Fuller's conclusion that more culturally sensitive methods need to be employed in exploring the positive social-psychological effects of martial arts training, Columbus suggests taking a phenomenological approach and identifies similarities between phenomenological research methods and Zen Buddhism. These similarities include an emphasis on immediate experience and a transcendence of the dualism that is inherent in Western philosophy; it was not until more than a decade later that researchers began to put this suggestion into action.

MARTIAL ARTS AND PHENOMENOLOGY

Researchers who use phenomenology as a methodology advocate for the use of the researcher's body as a tool for understanding embodied experience (Downey 2002; Peterson 2009; Potter 2008; Wacquant 2004). The following are two studies I found that have employed this method to understand martial arts. Greg Downey (2002) studied the Brazilian martial art *capoeira*, and Loïc Wacquant (2004) conducted participant research in Chicago at a boxing club. Both authors describe the experience as an apprenticeship of the senses that emphasizes learning through doing rather than a reflexive rational understanding. I have also found this to be true in my own experience and am often scolded by my teachers when taking a moment to reflect on the technique I am practicing. In the intensity of a fight or sparring match, there is no time for reflection. Moments of intellectual reflection disengage the mind from the body, and the aim of martial arts training is to make the mind and body act as one. Martial artists practice techniques repetitively to the point of making them reflexive instinct, but as Wacquant (2004, 98) notes: "A

boxer's ability to cognate and reason in the ring has become a faculty of his undivided organism," and the veteran boxer develops "*a cultivated instinct, a socialized animal*" (emphasis in original). A novice may react on these cultivated instincts, and martial artists skirting unconsciousness during a fight can rely on this training to get back on their feet, but an experienced martial artist has a measure of control over these instincts and does not act purely by reflex.

According to Wacquant (2004, 71), there is "a sort of *sensuous intoxication* that is key to the education of the apprentice boxer" (emphasis in original). For Downey, this sensing is inherently social and cultural. He is critical of positivistic and objectifying approaches that assume that sensation is pre-cultural and that cultural interpretations occur after primary sensation. Instead, sensation is made distinguishable and meaningful the moment it is perceived. In capoeira, the music is an integral part of the martial art and practitioners must also learn to sing and play instruments. The music sets the tempo of the fight and cues changes in practice and style. A novice typically moves along with the music whereas veterans learn to improvise with the music so as to make their movements less predictable. As in dance, through training and acculturation into capoeira, the body is made responsive to culturally specific sounds and the music is made tactile through kinesthesia.

A WARRIOR'S LOVE

You love your comrade so in war. When you see that your quarrel is just and your blood is fighting well, tears rise to your eye. A great sweet feeling of loyalty and of pity fills your heart on seeing your friend so valiantly exposing his body [Jean de Bueil, 1465, cited in Huizing 1979, 73].

Like many tactile encounters (Finnegan 2005), the beginning of a fight or sparring match is marked by the touching of gloves. This touch serves to ratify the agreement that normally unacceptable levels of violence are now made acceptable, though violence at a martial arts club between sparring partners is strictly governed by

a sense of reciprocity and equilibrium (Wacquant 2004; Downey 2002). Fighters choose their sparring partners carefully to balance the risk of injury with the potential for growth and the building of bodily capital (i.e., endurance, strength, flexibility, power, and overall health). As Wacquant (2004, 82) points out: "The principle of reciprocity that tacitly governs the level of violence in the ring dictates that the stronger boxer not profit from his superiority, but also that the weaker fighter not take undue advantage of his partner's willful restraint." The goal of sparring is to approximate the conditions of a real fight, but fighters and their trainers strive not to spend their fighter's bodily capital needlessly. To unnecessarily risk injury is to waste the bodily capital that the fighter has accumulated through training, but to spar without being challenged does not result in an increase in that capital. Through this process fighters develop an increased tolerance and ability for violence, as well as an increased empathy for others, and sparring partners are made into comrades through the heat of the fight.

There is no better example that demonstrates the role that touch and empathy play (or sensitivity to another person's tension and pain) in martial arts than the exercise called *push hands*.² Push hands is usually a precursor to sparring and in its most basic form involves two opponents facing each other, shoulders square like a mirror image, and touching each other on the backs of their hands. The opponents are not allowed to move their feet and the goal of the exercise is to push your opponent off balance. In more advanced versions of push hands, opponents may move around and it can evolve into grappling, but for novices the opponents remain stationary. This exercise serves to develop a martial artist's sense of kinesthesia, proprioception, and the vestibular system. Once the exercise starts there is constant movement back and forth, opponents are made acutely aware of how they manage their space because they are not allowed to move their feet, and they must maintain a sense of balance while searching their opponent's body for imbal-

ances. In order to reduce tension, practitioners focus on remaining relaxed and using as little strength as possible to redirect attacks. The exercise blurs their sense of self and other through an extending of awareness into their opponent's body to search for tension. Where there is tension, the body relies on strength, and if a practitioner relies on strength, then they quickly become tired. If the body is aligned properly, then antagonistic force travels through the arms and body into the legs and out into the ground, or back to its source—the opponent. Through push hands, martial artists cultivate a greater sensitivity to others' tension and pain while also developing a greater sense of balance, movement, and spatial awareness of themselves.

The increase in empathy that results from martial arts training is not cultivated through tactile contact alone. Training in a martial art is "*an ultraindividual sport whose apprenticeship is quintessentially collective*" (Wacquant 2004, 100; emphasis in original). By entering into the moral community of the gym, a fighter becomes accountable to the trainers and other fighters for their management of bodily capital and the level of violence they bring to the ring. As the fighter builds on relationships developed at the club, the progress of any one fighter becomes a matter of collective responsibility. Fighters often practice techniques together in a group and their movements are synchronized by the trainer running the clock. Like a marching band or a group of dancers, the fighters are made to feel as one body that lifts each person beyond their potential solely as an individual. Through these processes, bonds of brotherhood/sisterhood form and empathetic relationships develop. When you go into the ring with a sparring partner, you want to see them improve, so you enact as much violence as they can take and you hit them where they are weak because when they fight competitively, you do not want them to be susceptible to the same weaknesses. At the same time, you feel guilty if you injure them, and any injury is followed by a reassessment of

² Push hands is also called sticky hands, though both of these refer to a variety of exercises that involve opponents being in constant contact with each other.

the acceptable level of violence between sparring partners.

Sparring serves the practical ends of preparing for a competitive fight, but also acts as a form of play that has grown from the wrestling and horseplay of boys to a mutual testing of friendly adults who are working together to improve their technique. The ring can serve as a level playing ground where income, class, and status outside the club are made less meaningful, and the hierarchies that develop are based on skill and experience. Martial arts clubs are typically dominated by men, and martial skill is entangled with notions of manliness and power, but women have been welcomed and encouraged at the clubs I have trained at. Lorge (2012) notes that women typically participate less in wrestling and boxing and are more present in East Asian martial arts because these rely less on power and strength. He also comments on the fact that women often play key roles in East Asian martial arts films like *Crouching Tiger, Hidden Dragon*, so there are more role models for women to aspire to than in Western martial arts. For myself, besides trying to avoid touching genitalia and breasts, there is little difference between how I train with women and men. In the ring, the only thing that matters is martial skill, and to hold back or alter my interaction for any other reason than injury or difference in skill level would disrespect my training partner.

CONCLUSIONS

My love of martial arts comes from the fact that it engages the mind, body, and spirit all in one practice. As psychological research has found, it can have positive effects on mental, emotional, and physical health, though there is a need for cross-cultural comparisons to discover how different cultural contexts affect therapeutic outcomes. One of the main reasons why martial arts have such positive benefits is because they engage practitioners' sense of touch, and through touch, as well as social reinforcement, they cultivate a greater sense of personal awareness and sensitivity toward others. These effects cannot be understood through positivistic methods alone. They must be complemented with qualitative method-

ologies to reveal the embodied knowledge and subjective experiences that are cultivated through martial arts and other bodily practices.

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THE RELATIONSHIP BETWEEN AGE AND ARACHNOID DEPRESSIONS IN HUMANS

Rajitha Sivakumaran

Abstract: The human skeletal collection housed in the Department of Anthropology at the University of Alberta was used to determine the relationship between age and the occurrence of arachnoid depressions on the endocranial aspect of the skull. There were significant differences between the total number of arachnoid depressions found on the vaults of juveniles, adolescents, and adults. When mean ages were compared with total number of arachnoid depressions on the vault, a significant relationship did not emerge. When age was grouped into nine-year intervals to counteract the effect of idiosyncratic variation, the mean number of depressions increased with age, as did the maximum number of arachnoid depressions. The frequency of older individuals without arachnoid depressions was low. Older individuals were more likely to have larger and deeper arachnoid depressions. There were no sex-based differences in the expression of arachnoid depressions. There were no significant differences between archaeological, historic, and modern samples or between pathological and healthy individuals. Although this study verifies the association between arachnoid depressions and senescence, the presence of arachnoid depressions is highly variable and cannot be used reliably as an indicator of chronological age or even as a sign of senescence.

The brain is encompassed by three membranes. Beneath the skull lies the dura mater, followed by the arachnoid mater in the middle and the pia mater closest to the brain (Gosling *et al.* 1985). Of interest to this study is the arachnoid membrane, a thin, avascular layer separated from the pia mater by the subarachnoid space.

A review of the earliest descriptions of the arachnoid membrane by Adeeb *et al.* (2013) is summarized here. The earliest descriptions were made by Herophilus, the father of anatomy, in the 3rd century B.C., and although many studies have been conducted on it since, one feature has received little attention: arachnoid depressions. These structures, also known as Pacchionian bodies, occur on the endocranial aspect of the skull. These “imprints” have been mentioned since ancient times under the name “glandulae” but largely ignored since the advent of modern medicine (Adeeb *et al.* 2013, 19). They were described first by Vesalius in 1543 as structures occurring in the region of the bregma of the cranial vault. In 1704, Pacchioni documented the presence of large depressions on the vault in the region of the sagittal sinus. These structures occur

predominantly at the intersecting point of the sagittal and coronal sutures in the region of the superior sagittal sinus, but they have been documented at the lateral lacunae of the sagittal sinus, along the transverse sinus, and in anterior and middle cranial fossae as well (see Figure 1; le Gros Clark 1920; Grzybowski *et al.* 2007; Haybaeck *et al.* 2008).

As the name implies, these structures are dented regions on the bone surface of circular, ovoid, or irregular form and varying in size and depth. Figure 2 shows a skull of an aged individual from the U of A collection exhibiting arachnoid depressions along the sagittal suture. The enlarged images show their variation in size and depth in a single individual.

The origin of arachnoid depressions is debated. The imprints begin as arachnoid villi; these are protrusions on the exterior of the arachnoid mater and are observable microscopically during the late fetal stage (Adeeb *et al.* 2013). At this point, they remain separate from dural venous sinuses and lacunae (e.g., they have not penetrated the walls of these structures yet). With time, they become complex structures and their location be-

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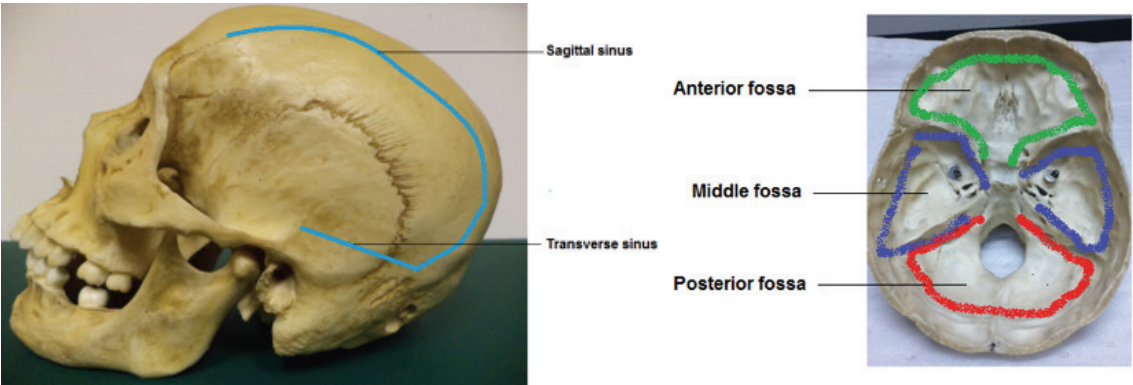


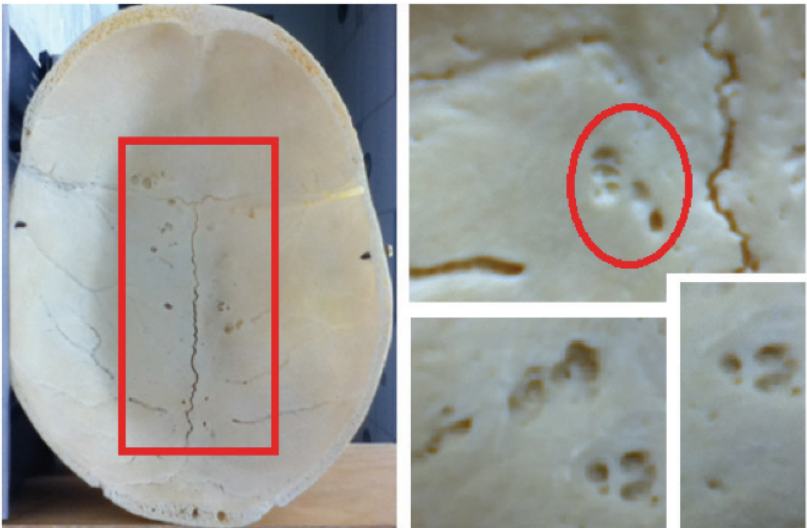
Figure 1: Superior sagittal sinus and transverse sinus of the vault (left) and anterior and middle cranial fossae of the cranial base (right).

comes (mostly) restricted to the region of the superior sagittal sinus. With the growth of the child (at ca. 18 months old), macroscopic observation becomes possible. The villi multiply in number, becoming structurally complex. At this point, they are referred to as arachnoid granulations. When these granulations reach a significant size, they leave imprints on the endocranial surface of the cranium, creating arachnoid depressions.

Children under the age of 10 do not possess these depressions (Basmajian 1952), and neither do many animals. This led Weed (1914) to the conclusion that Pacchionian bodies were skeletal indicators of pathology. This, however, is not the case. The presence of these imprints is related to the upright posture of older humans:

“a negative pressure in the dural sinuses... a suction force... causes the arachnoid granulation to enlarge and bulge into the lumen” (Adeeb *et al.* 2013, 25). Early authors like Rokitansky in 1844 claimed that the depressions emerged as fibrous thickenings of the arachnoid, which consequently left imprints on the skull, while others like Cruveilhier, ca. 1847, believed that subarachnoid tissue gave rise to them. At the present time, the 1875 work of Key and Retzius is accepted. They described these structures as an extension of both the arachnoid membrane and subarachnoid tissue. Although the origin of arachnoid depressions is debated, its function is not. Pacchioni attributed a lymphatic function (e.g. draining of fluids) to these depressions. Two other authors, Fantoni in 1738

Figure 2: Arachnoid depressions of varying size and depth on the endocranial surface of the vault of a modern-day older adult from the University of Alberta skeletal collection.



and Faivre in 1853, improved this early hypothesis by describing the role of arachnoid depressions in the absorption of intracranial humor or fluid. Key and Retzius defined this fluid as the cerebrospinal fluid (CSF; Adeeb et al. 2013).

These bodies are of osteological significance as they appear on bone and can be observed on skeletal remains. There are vague hints in the literature (e.g., Basmajian 1952) regarding the possibility that these structures increase in number, size, and depth with age. Thus, a senescent individual (60+ years) will tend to exhibit more arachnoid depressions than a young adult. However, authors like von Luschka in 1855 (cited in Adeeb *et al.* 2013) report Pacchionian bodies are present in everybody, which if true, diminishes the prospect of using these structures as age indicators (Adeeb *et al.* 2013). On the other hand, Roche and Warner (1996) report that arachnoid depressions occur in one in 100 people.

Basmajian (1952) carried out the first and only study on this topic. His research revealed no statistically significant relationship between arachnoid depressions and age. People of the same age and sex had very different degrees of marking (scoring method used by the author) or expressions of arachnoid depressions. Some men of advanced age had a large degree of marking while other older adults had smaller scores. Despite this, a general increase in size was noted with age. The average degree of marking was much greater in age groups representing individuals over the age of 70 years compared to those who were 30 years and under. Within the former group, some individuals had numerous deep depressions while the opposite was observed in others. Basmajian (1952) concluded that arachnoid depressions could not be used as an indicator of age in a medicolegal setting.

Since only one modern study has been done on the topic, this project was undertaken to reevaluate the results of Basmajian (1952) and test for differences in the expression of arachnoid depressions across different ancestral groups. The potential application of this feature as an estimator of age was explored.

METHODS

Research questions

The objective of this study was to conduct a thorough analysis of arachnoid depressions in humans and answer the following questions:

- Is there a positive correlation between the presence of arachnoid depression and age? Specifically, are they significantly associated with senescence or will young individuals exhibit them as well?
- Is there a correlation between arachnoid depression size, depth, and age?
- Where on the endocranial surface (vault and cranial base) do arachnoid depressions predominantly occur? Does it occur more often on the vault or the cranial base? Are there specific areas that exhibit these structures more frequently?
- Are there sex-based and/or population-based differences in the expression (e.g. presence or absence) of arachnoid depressions?
- Does the time period (e.g. archaeological, historical, and modern) to which an individual belongs influence expression of arachnoid depressions?
- How does pathology impact expression of arachnoid depressions?

Sample

The skeletal collection housed in the Department of Anthropology at the University of Alberta was used to conduct this analysis ($n = 65$). Adult males and females made up 53.8% ($n = 35$) and 38.5% ($n = 25$) of the sample, respectively. Two adolescents, four juveniles and one neonate were also included in the sample. The collection is predominantly comprised of homeless individuals from the Indian subcontinent (Calcutta), but several subjects of European, African, indigenous North American, and aboriginal Australian ancestry were included as well.

Table 1. Scoring system for documenting size and depth of arachnoid depressions.

Score	Size	Depth
1	Small; < 1.5 mm	Shallow, no diploë exposure
2	Moderate; 1.6 - 3.0 mm	Shallow, with diploe exposure
3	Large; > 3.0 mm	Moderately deep; 0.5 - 1.0 mm
4	-	Deep; > 1.0 mm

Data collection

A database was created using Microsoft Excel and SPSS, and the following information was collected for every specimen when possible: presence or absence of arachnoid depressions; age, following Meindl and Lovejoy’s (1985) method for ectocranial sutures for adults and dental aging for subadults (Ubelaker 1978, cited in Scheuer and Black 2004), with the midpoint of the ranges used in statistical analyses; sex, following Acsadi and Nemeskeri’s (1970) scoring system, supplemented by forehead slope, prominence of brow ridges and muscle markings, chin shape, gonial eversion, gonial angle, ramus length, extension of the zygomatic arch as the supramastoid crest and presence of frontal and parietal bossing (sex was not determined for the five subadults); ancestry, signs of pathology, vault weight and broad categories for time period (e.g. archaeological, historical, and modern); and number, location, shape, size, and depth of arachnoid depressions on the vault and cranial base for the 29 cases where it was possible to view the endocranial aspect.

Scoring system

A scoring system was used to document size and depth (in mm) since obtaining actual measurements is difficult considering the small size of the depressions (see Table 1). The scores are based on arbitrary cut-off points, decided by the author after examining the amount of variation in size and depth across individuals.

Zones

Arachnoid depressions have been known to occur predominantly in the lateral lacunae along the superior sagittal sinus (le Gros Clark 1920). Haybaeck *et al.* (2008) noted that large granula-

tions (approx. 2.5 cm) occurred in the transverse sinuses of (mostly) individuals over the age of 65 years. They have been documented in the anterior and middle cranial fossae and posterior temporal bone as well (Chen *et al.* 2010). In order to map approximately where arachnoid depressions occur and verify previous research, the vault and cranial base of the skull were divided into numbered regions as shown in Figure 3. Every arachnoid depression was assigned a zone.

Conflicting age estimations

As mentioned, adult age estimations were determined using Meindl and Lovejoy’s (1985) method using vault and lateral-anterior sutures. A sample of 43 subjects for whom both vault and lateral-anterior average ages were available were used to show the conflicting results produced by these methods. The minimum and maximum ages for vault sutures were 30.5 and 75.0 years, respectively, and the mean age was 38.3 ± 7.7 years. For the lateral-anterior sutures, the minimum and maximum ages were 41.1 and 75.0 years, respectively, and the mean age was 52.8 ± 6.1 years. According to these mean ages, the lateral-anterior estimates indicate a significantly older sample than the vault ages, as shown by an independent T test ($t = -10.415$, $df = 84$, $p = .000$). Meindl and Lovejoy (1985) report that age estimations based on lateral-anterior sutures are more reliable, and thus, the lateral-anterior midpoint ages were used in most of the statistical analyses. These midpoint ages were arbitrarily grouped into nine-year periods to minimize the effects of idiosyncratic variation and reveal any general trends present (Table 2). Assigning an individual to a group depended on their lateral-anterior midpoint age, as well as other skeletal indicators (e.g., unfused basilar suture or age-related alveolar resorption).

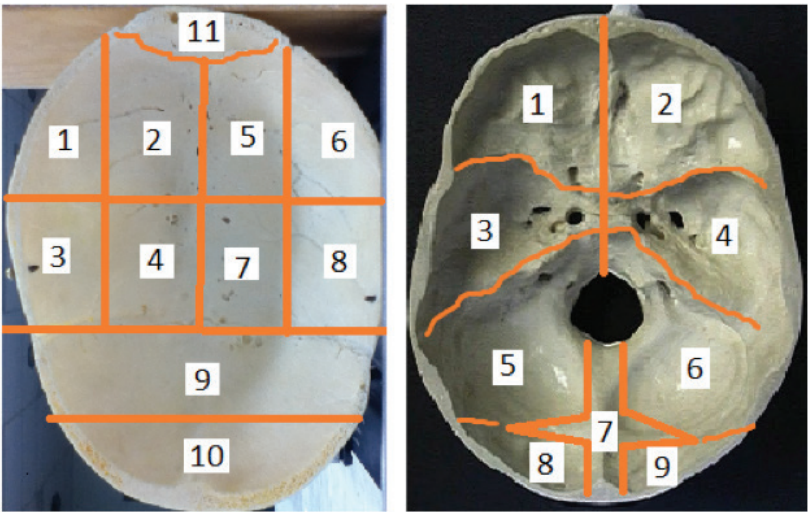


Figure 3: Zones used for mapping the location of arachnoid depressions on the vault and cranial base.

Statistical analyses

Non-parametric tests were the main type of statistics used in this study due to the small sample size (e.g. Chi-square, Mann-Whitney and Kruskal-Wallis tests). Regression analysis, coefficient correlations (r and r^2) and standard error of estimate were reported, as well. Most of these tests used the number of arachnoid depressions found on the vault, rather than the cranial base, to test for increase in frequency with age.

RESULTS

Arachnoid depression and age

Out of the 65 subjects included in this study, 52, or 80%, had arachnoid depressions on the vault, cranial base, or both. The neonate, all

four juveniles, and one of the two adolescents did not exhibit arachnoid depressions. The other adolescent, whose age was estimated to be 18 years, had five depressions on the vault, which is low considering that the maximum number was 55 depressions in an individual aged 50–60 years. A Kruskal-Wallis test performed on 40 individuals showed that there were significant differences between the total number of arachnoid depressions found on the vaults of juveniles, adolescents, and adults ($\chi^2 = 8.017$, $df = 2$, $p = .018$). The test results support the conclusions of previous studies (e.g., Basmajian 1952); arachnoid depressions develop with increasing age. In the present case, the results were based on a rather small subadult sample size, making the reliability of the conclusions somewhat questionable. As lateral-anterior age estimations indicate that the population is composed mostly of senescent individuals, the results verify the idea that arachnoid depressions are associated with older adults.

When mean ages were compared with total number of arachnoid depressions on the vault, a significant relationship did not emerge ($r[19] = .025$, $p = .457$, $N = 21$). A significant linear relationship does not exist between mean age determined from vault sutures and the total number of arachnoid depressions found on the vault ($r[25] = -.053$, $p = .397$, $N = 27$). Although a statistically significant relationship between the presence of

Table 2. Adult and subadult age groups based on cranial sutural age and skeletal indicators.

Age group	Description
1	≤ 10 years
2	11-20 years
3	21-30 years
4	31-40 years
5	41-50 years
6	51-60 years
7	> 60 years

Table 3. Descriptive statistics of age groups based on dental data (subadults) and lateral-anterior sutures (adults), and the number of arachnoid depressions on the vault. The mean number of arachnoid depressions, standard error and deviation, and minimum and maximum number of occurrences, and sample size (N) are shown.

Age group	Mean	Std. error	Std. deviation	Minimum no.	Maximum no.	N
2	2.50	2.50	3.54	0	5	2
5	9.17	4.61	11.29	0	30	6
6	12.95	3.23	14.10	0	42	19
7	21.00	17.16	29.71	0	55	3

Age groups: 1, birth to 10 years; 2, 11-20 years; 3, 21-30 years; 4, 31-40 years; 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. Arachnoid depressions were not observed in group 1 and no data were available for groups 3 and 4.

arachnoid depressions and age did not emerge, Table 3 reveals interesting patterns worth discussing despite being derived from a small sample size.

Here, age was grouped into nine-year intervals to counteract the effect of idiosyncratic variation in the expression of arachnoid depressions (Figures 4 and 5). The mean number of depressions increased with age, as did the maximum number of arachnoid depressions. This pattern is somewhat compromised by the fact that some individuals in every age group exhibit no depressions. So, for reasons unknown, it is possible for older individuals to not have arachnoid depressions. This may be explained by genetic or envi-

ronmental factors, or both. When the sample was restricted to include only those of Indian descent in order to control for population-based variation, only three adults exhibited absence. Overall, the analysis demonstrated that most older individuals had arachnoid depressions.

Determining whether the presence, size, and depth of arachnoid depressions are a function of increasing age is dependent on accurate aging methods if age is unknown, as is the case in this study. Since there is large variation in cranial sutural union commencement, progression, and termination (e.g. Key *et al.* 1994), it is likely that a high degree of error is present in the age esti-

Figure 4: Number of arachnoid depressions present on the vault plotted against age groups derived from lateral-anterior sutures (subadult age groups were based dental aging), where 1 is birth to 10 years; 2, 11-20 years; 3, 21-30 years; 4, 31-40 years; 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. No data were available for group 4.

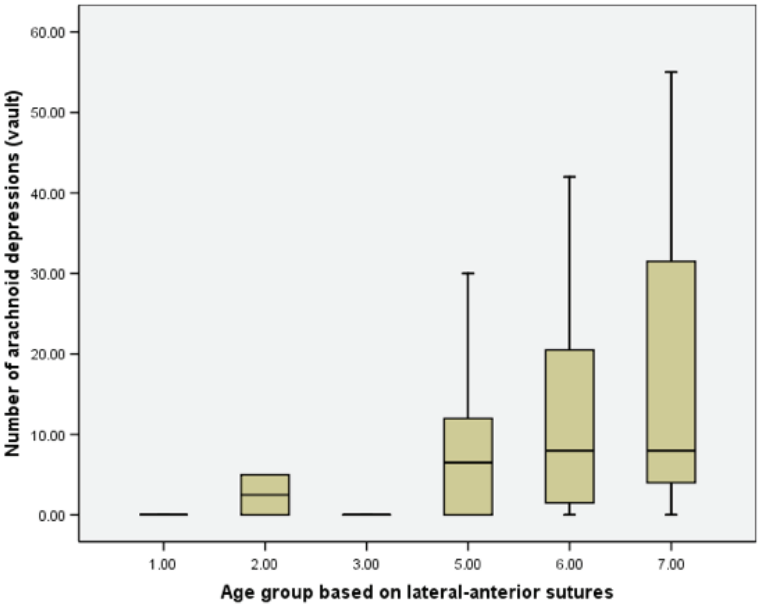
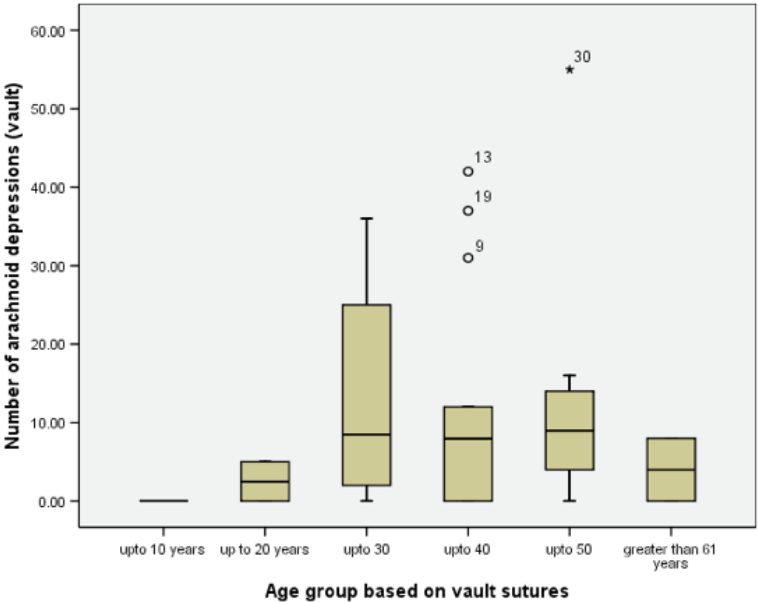


Figure 5: Number of arachnoid depressions present on the vault plotted against age groups derived from vault sutures (subadult age groups were based dental aging), where 1 is birth to 10 years; 2, 11-20 years; 3, 21-30 years; 4, 31-40 years; 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. Outliers are shown outside the box plot.



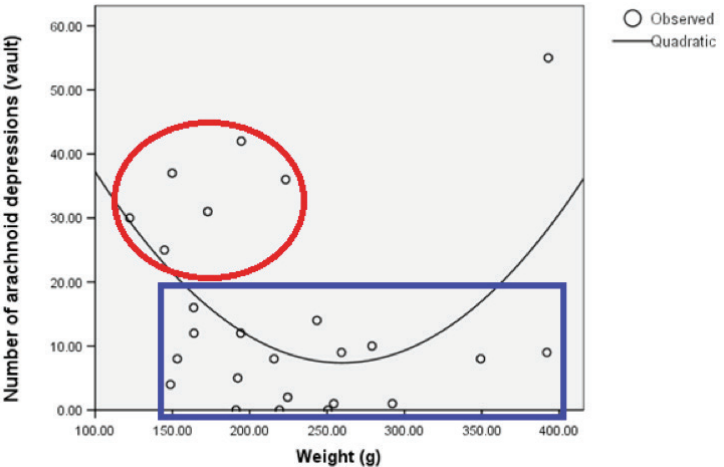
mations produced here. As this is only a preliminary study, dental analyses were not conducted to verify the ages. However, another potential estimate of age was included: weight of the vault. This is not a concrete method of aging; it relies on the idea that bone density decreases with age. If arachnoid depressions do correlate with age, a plot of vault weight against the number of depressions found on the vault may reveal patterns initially obscured by erroneous age estimations.

Figure 6 shows such a plot that illustrates two main clusters outlined in red and blue. The red cluster consists of individuals with a large number of arachnoid depressions, but relatively

small weights, while the blue cluster shows varying weights, all of which are associated with less than 20 depressions. With the exception of the outlier, it appears that the greatest number of depressions occur in vaults weighing less than 250.0 grams. An unexpected positive correlation was seen between vault weight and number of depressions on the vault ($r^2 = .224$), but this is only significant at the $0.05 < p < 0.10$ level ($F = 3.175$, $df = 2, 22$, $p = .061$). Removing the outlier produced the expected negative trend, but the correlation was no longer significant.

There are a number of possible explanations for the weak relationship between vault

Figure 6: Number of arachnoid depressions plotted as a function of weight in grams, showing two clusters, outlined in red and blue, and one outlier.



weight as a proxy for age and the number of arachnoid depressions on the vault. First, as demonstrated by the initial analysis and by Basmajian (1952), there may not be a correlation between age and the presence, number, size, and depth of arachnoid depressions. Secondly, although bone density decreases with age, the resulting density and weight depend on the total density, weight, or both (peak bone density) before reduction occurred. This is influenced by a number of things such as genetics and nutritional intake. Thus, even if all the older adults in this sample exhibited bone density loss with age, they may have had different peak densities. To test this, the sample was restricted to include only modern Indian adults, limiting for similar genetic and environmental conditions (e.g., homelessness in Calcutta, India). ANOVA indicates a significant relationship ($F = 4.373$, $df = 20$, $p = .050$). Here, however, sample size was reduced to 21 individuals and included subjects who did not possess any depressions. The correlation coefficient was weak ($r = .433$, $r^2 = .187$). Although correlation coefficients are not the best indicators of a correlation and are sensitive to factors like sample size, the relationship between bone density (weight) and the number of arachnoid depressions on the vault remains unclear.

Other influential factors include the way a skull was cut. If the dimensions of the vaults used in this study are different, this will impact the weight as well. However, this is a minor source of error since, based on visual observation, the skull vaults roughly resembled one another in dimension. Vault thickness could have contributed to greater or lesser weights even if

dimensions were similar. Simply observing the vault through the foramen magnum with a light source showed how opaque the bone was, and there was definite variation in this sample. The major source of potential error was variance in skull size. In other words, larger skulls would have larger vaults, which would weigh more. As this was a preliminary study, skull dimensions (e.g., length, width, shape) were not corrected for.

Another interpretation of the results indicates that the number of depressions may be correlated with skull density itself, rather than age. This may suggest that thinner cranial vaults are more likely to exhibit depressions. Future study comparing skulls of similar dimensions only would yield a more definitive understanding of the relationship between bone density and the number of arachnoid depressions.

Arachnoid depression size and age

Statistical analysis of lateral-anterior age and arachnoid depression size score did not reveal a significant relationship ($r[19] = -.009$, $p = .485$, $N = 21$). Table 4 shows descriptive statistics using age groups. Although mean score increased from group 5 to 6, an overall linear trend was not seen. The small sample sizes of groups 5 and 7 may have biased results.

Arachnoid depression depth and age

There is no significant relationship between the depth of arachnoid depressions and age ($r[20] = .265$, $p = .117$, $N = 22$). Table 5 compares age group with depth score. Although the oldest group (7) shows the greatest mean depth, the youngest group did not show the smallest depth.

Table 4. Descriptive statistics of age groups based on lateral-anterior sutures (adults), and the size (expressed as a score) of arachnoid depressions on the vault. The mean size score, standard error and deviation, and minimum and maximum scores, and sample size (N) are shown.

Age group	Mean	Std. error	Std. deviation	Minimum	Maximum	N
5	1.85	.05	.10	1.78	2.00	4
6	2.14	.09	.35	1.67	3.00	15
7	1.94	.44	.62	1.50	2.38	2

Age groups: 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. Size score: 1, small, up to 1.5mm; 2, moderate, 1.6-3.0mm; and 3, large, greater than 3.0mm.

Table 5. Descriptive statistics of age groups based on lateral-anterior sutures (adults), and the depth (expressed as a score) of arachnoid depressions on the vault. The mean size score, standard error and deviation, and minimum and maximum scores, and sample size (N) are shown.

Age group	Mean	Std. error	Std. deviation	Minimum	Maximum	N
5	2.93	.10	.21	2.63	3.11	4
6	2.90	.11	.43	2.08	4.00	15
7	3.15	.40	.57	2.75	3.56	2

Age groups: 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. Size score: 1, small, up to 1.5mm; 2, moderate, 1.6-3.0mm; and 3, large, greater than 3.0mm.

Similar to the size results, the small sample sizes of groups 5 and 7 are potential sources of error.

There is a vague consensus that arachnoid depressions increase in size and depth with age, but no study has demonstrated this yet. This study applied a mathematical model, combining the scores for size and depth to produce a single score for 21 individuals that reflected both variables. The formula for calculating volume was adapted here, $V = a \times b \times c$ (length, width and height), to provide a *rough* estimation of the three-dimensional space occupied by each arachnoid depression. The hypothesis was that more of the older individuals would have the maximum size score of 3, a depth score of 4, and a combined score closer to 36, while the youngest adults would have values closer to 1 (minimum

size and depth score = 1). Generally, amongst the younger adults, this appears to be the case (Figure 7), but due to the very broad age estimations produced by cranial sutures, the combined scores for the group with mean age 56.2 years (49–65 years) were difficult to interpret due to a large amount of variation. When considering only the mean scores of groups that consisted of more than one individual, a positive linear pattern was seen (Table 6).

Locations

Arachnoid depressions occurred more frequently on the vault compared to the cranial base. Of the open skulls, 29 crania exhibited arachnoid depressions on the vault, while 14 cases exhibited the depressions on the cranial base. The largest

Figure 7: A comparison of mean age in years derived from lateral-anterior sutures with combined scores based on size and depth of arachnoid depressions of the vault.

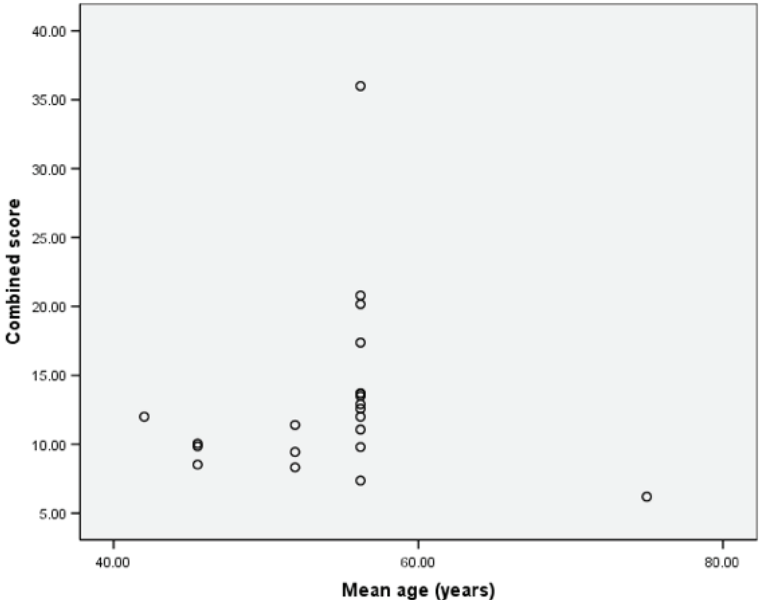


Table 6. Descriptive statistics of ages based on lateral-anterior sutures and arachnoid depression scores for the vault. The mean score, standard error and deviation, and minimum and maximum scores, and sample size (N) are shown.

Mean age	Age range	Mean score	Std. error	Std. deviation	Minimum	Maximum	N
45.5	37-57	9.47	.48	.83	8.52	10.05	3
51.9	36-69	9.72	.90	1.56	8.32	11.40	3
56.2	49-65	15.45	2.01	7.25	7.36	36.00	13

Age groups: 5, 41-50 years; 6, 51-60 years; and 7, greater than 61 years. Size score: 1, small, up to 1.5mm; 2, moderate,1.6-3.0mm; and 3, large, greater than 3.0mm.

count reported for the latter was 14 (n = 1) and more than half of the specimens (57.1%) had less than five depressions. The largest count on the vault surface was 55 (n = 1). Only 27.6% of samples had less than five depressions. Almost half of the sample (41.4%) had more than 10 depressions. In only one case were depressions present exclusively on the cranial base, while 16 skulls had depressions on the vault but not on the cranial base. Thirteen skulls exhibited depressions on both the vault and cranial base. The total number of arachnoid depressions documented for the vault (a count of every observable depression on every skull) was 419. The count for the cranial base, 76, was much smaller.

In this study, the vault and the cranial base were considered separately, with regions in each being divided into zones to document approximately where arachnoid depressions occurred in the skull. The location of arachnoid depressions was represented by zones 1–11 and zones 1–9 for the vault and cranial base, respectively; the total count of arachnoid depressions occurring in all zones is shown in Table 7. Of the 419 depressions that occurred on the vault, zones 4 (n = 96),7 (n = 105) and 9 (n = 130) housed the most (79.0%). For the cranial base, the largest amount of depressions was seen in zone 4 (n = 28), followed by zone 5 (n = 13). These zones accounted for approximately half of the depressions seen on the cranial base (53.9%).

Sex-based differences

Due to unequal sample sizes, a Mann-Whitney test was used to assess if the total count of arachnoid depressions on the vault was sig-

Table 7. Zone of the vault and cranial base and the total number of arachnoid depressions that occurred in these regions.

Zone	Count of arachnoid depressions
<i>Vault</i>	
1	0
2	21
3	1
4	96
5	5
6	1
7	105
8	0
9	130
10	60
11	0
Total	419
<i>Cranial base</i>	
1	0
2	0
3	5
4	28
5	13
6	8
7	10
8	10
9	2
Total	76

Total count is based on 29 skulls with depressions on the vault and 14 skulls with depressions on the cranial base.

nificantly different between the sexes. Fourteen males and fifteen females ($n_{\text{total}} = 29$) were used. The average number of arachnoid depressions occurring on the vault was higher for males (16.4 and 12.4 for males and females, respectively). Variation in the number of depressions was greater in males as well, demonstrated by the standard deviations (17.4 and 10.1 for males and females, respectively). However, these means were not significantly different ($U = 103.5$, $p = .948$). An independent T test for unequal variances ($F = 4.934$, $p = .035$) was performed to verify the non-parametric results. The relationship was insignificant here as well ($t = .754$, $df = 20.6$, $p = .459$). A Mann-Whitney test carried out on males ($n = 14$ and 15 for size and depth, respectively) and females ($n = 15$) showed that there were no significant differences between size ($U = 100.00$, $p = .827$) and depth ($U = 99.00$, $p = .574$) of arachnoid depressions between the sexes.

Population-based differences

Although the study sample was comprised predominantly of those from the Indian subcontinent ($n = 33$, or 50.8% of sample), individuals of European, African, indigenous North American, and aboriginal Australian ancestry were included, as well. Unfortunately, only one individual from each of these groups was available for study. Ancestry was unknown for 26 individuals. The number of arachnoid depressions was documented on only 25 Indians, one European, and one African individual since the other skulls were unopened. A statistical analysis could not be conducted on such a deficient sample size. A larger sample size where different ancestral groups are represented in adequate quantities is needed before any conclusions can be made about the impact of genetics and inter-population variation in the expression of arachnoid depressions.

Time period

A Kruskal-Wallis non-parametric test was used to test whether the total number of arachnoid depressions varied between modern ($n = 23$), historical ($n = 5$) and archaeological ($n = 1$) populations ($n_{\text{total}} = 29$). Results were insignificant ($\chi^2 = 4.830$, $df = 2$, $p = .089$). There is

a strong potential for biased results in this case, particularly with the archaeological sample, since an adequate size was not available for study.

Pathology

A Mann-Whitney test was used to assess whether pathology can increase or decrease the number of arachnoid depression in a person. In a sample of 29 individuals, five were categorized as pathological. There were no significant differences in the mean number of arachnoid depressions seen on the vault of normal and pathological individuals ($U = 51$, $p = .602$).

DISCUSSION

The relationship between age and the presence of arachnoid depressions on the endocranial skull was reexamined in an attempt to determine whether a positive correlation exists. The initial hypothesis was that the number, size, and depth of arachnoid depressions would increase with age. The results confirm this hypothesis, but the relationship is not statistically significant. There are a number of reasons why this might be the case. Firstly, as already demonstrated by Basmajian (1952), arachnoid depressions may not be related to age. This research indicates that there is great variability in the expression of these structures between different people and ages. For instance, a very old individual like case 999.2.84 a and b (documented age of 75 years) possessed only eight depressions. Although she had, on average, moderately deep depressions, their mean size was small. Thus, idiosyncratic variation may obscure patterns. Secondly, the collection was of unknown age, and ages had to be estimated using the problematic method of cranial suture closure. In the words of Singer (1953, 56), "...the age of the individual at death cannot be estimated from the degree of closure of the various cranial sutures, whether taken individually or collectively or whether observed exocranially or endocranially."

Furthermore, the age ranges were very broad, which in turn produced midpoint ages that are most likely to deviate considerably from the actual age. Thus, erroneous age estimations could have biased results. Lastly, the sample size was small, and the effect of this was most ap-

parent when actual ages were organized into age groups. Some of these groups consisted of only a couple of individuals. If they are atypical in any way, results will be biased. Due to the small size, non-parametric tests were used to determine significance. These tests, although powerful, are more likely to dismiss a correlation as insignificant than parametric tests. Future research with an adequate sample size can remedy this.

Previous research on arachnoid granulations, with the exception of Basmajian (1952), did not focus on the potential application of these structures as indicators of senescence. Instead, early researchers were more concerned with documenting appearance, origin, structural organization, etc. This study has verified some earlier conclusions while questioning others. Although Basmajian (1952) reported that children under 10 years of age did not exhibit arachnoid depressions, le Gros Clark (1920) observed these on the cadavers of young children aged 1.5 to 4 years old in the lateral lacunae along the superior sagittal sinus. This study supports Basmajian's (1952) conclusions, but only one neonate and four juveniles were available for analysis.

Mapping the locations of arachnoid depressions offered a good way of verifying the accounts of previous research, which indicates that these structures occur predominantly in the lateral lacunae along the superior sagittal sinus (zones 2, 4, 5, and 7 of the vault), at the junction of the sagittal and coronal sutures (zones 4, 7, and 9 of the vault), transverse sinuses (zones 7, 8, and 9), anterior (zones 1 and 2) and middle (zones 3 and 4) cranial fossae, and posterior temporal bone, (zones 5 and 6) (le Gros Clark 1920; Haybaeck *et al.* 2008). In this analysis, the highest frequencies of arachnoid depressions on the vault were seen along the anterior half of the sagittal sinus and at the junction of the sagittal and coronal sutures. On the cranial base, the right portion of the middle cranial fossa was home to more depressions than other zones. This study found depressions in the left portion of the posterior cranial fossa as well. Previous studies did not find any depressions in this region, but in the sample examined here it contained the second largest number of structures in the cranial base. Although Okamo-

to *et al.* (1997) noted the presence of arachnoid granulations (the soft tissues which cause erosion of the inner table, creating arachnoid depressions) on the posterior cranial fossa, this was a histological observation. Depressions in the area of the transverse sinus occurred in significant quantities as well.

One last point of interest concerns pathology. Winkelman and Fay's 1930 study (cited in Adeeb *et al.* 2013) found that cadavers presenting agenesis of arachnoid villi suffered from hydrocephalus, a condition described as a buildup of fluid in the brain (Gutierrez *et al.* 1975). In cadavers with no signs of hydrocephalus, arachnoid villi were present. Since the villi give rise to the Pacchionian bodies, hydrocephalus reduced the probability of developing arachnoid depressions. Following this example, the pathological specimens of the collection were compared to healthy individuals (although since the assemblage was made up of largely homeless individuals, "healthy" is a relative term). Pathologies as severe as hydrocephalus were not noted; instead idiopathic anomalies like asymmetrical vault bones (e.g., parietals) and cranial base (e.g., posterior cranial fossa), and extra sutures were classified as pathological. Case 369 a and b showed diploic exposure on parts of the frontal and parietal bones. A 75-year-old forensic case, 999.2.84 a and b, exhibited bony protrusions in the anterior and middle cranial fossae. In fact, this case was a consistent outlier in most of the statistical analyses. Although comparing pathological and normal individuals yielded no significant differences, this problem should be reevaluated with a larger pathological sample size.

CONCLUSION

Although arachnoid depressions are typically associated with senescence and are suspected to increase in size and depth with age, the only study done to date (Basmajian 1952) disputes this, and this study mostly supports Basmajian's conclusions. There were significant differences between the total number of arachnoid depressions found on the vaults of juveniles, adolescents, and adults, but when estimated mean ages were used, a significant relationship did not

emerge. However, general, statistically insignificant patterns did arise. When age was categorized into groups to offset the effect of idiosyncratic variation, the mean number of depressions as well as the maximum number of arachnoid depressions increased with age. The frequency of older individuals without arachnoid depressions was low. A negative correlation between vault weight (as a proxy for age, since bone density and weight decrease during senescence) and number of depressions on the vault is seen with the removal of one outlier. Arachnoid depression size and depth did not increase with age, but when a combined score was produced representing both of these variables, it was shown that older individuals were more likely to have larger and deeper arachnoid depressions.

Approximate mappings of the depressions showed that they were most likely to occur on the vault rather than the cranial base. Nearly 80% of depressions occurred in zones 4, 7, and 9 on the vault, as demonstrated by current literature. There were no differences in the expression of arachnoid depressions based on sex, pathology, and time period. Analyses on inter-population variation were inconclusive. Although this study supports the association between arachnoid depression and senescence, it confirms the conclusion of Basmajian (1952). The presence of arachnoid depressions is highly variable and cannot be used reliably as an indicator of chronological age.

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NEANDERTHALS: SPECIES OR SUBSPECIES?

Jennah L.A. Clarke

*Abstract: This article focuses on the ongoing debate regarding whether Neanderthals should be classified as a subspecies of *Homo sapiens* or as an entirely separate species. Several lines of evidence are explored, including recent genetic evidence, which suggest that despite rare interbreeding events, Neanderthals should in fact be classified as a separate species.*

According to Richard Klein (2009, 1), *species* are defined as individuals assigned together based on appearance and membership in the same procreative unit, while subspecies are defined as morphologically and geographically distinct breeding populations within a species that retain the ability to exchange genes and produce fertile offspring. While this may sound simple and straightforward, these concepts actually contain discrete definitions, whereas the organisms that are characterized by them often do not evolve on a continuous trajectory. The debate regarding whether or not the Neanderthals should be classified as a distinct species from anatomically modern humans has been ongoing for over a century. Several researchers have attempted to solve this evolutionary mystery; however, they continue to remain divided on the issue today (Klein 2009; Márquez et al. 2014; Weaver 2003, 2009; Wolpoff et al. 2004).

While it has recently been shown that all non-Africans contain a small percent of Neanderthal DNA, whether or not they produced enough fertile offspring to constitute membership within the same species is questionable. It is extremely difficult to determine where a species or subspecies begins and ends, and at what point they are no longer biologically compatible. Matters are further complicated when one of the proposed species in question is extinct, in which case specimens must be studied rigorously in order to reach some sort of hypothesis or conclusion. Fortunately, the Neanderthals are one of

the most-studied hominins due to the wealth of relevant archaeological material that has been uncovered, and to the cold conditions in which they lived that preserved their DNA.

Based on fossil and archaeological evidence, it had been widely speculated that Neanderthals were simply extreme versions of cold-adapted humans that were capable of the same level of cognitive and symbolic thought as anatomically modern *Homo sapiens* (Harvati 2003; Hublin 2014; Klein 2009; Márquez et al. 2014; Pearce et al. 2013; Weaver 2003, 2009; Wolpoff et al. 2004). While this sounds theoretically plausible, ultimate classification is far more complex in that it must satisfy certain criteria that truly constitute a species versus a subspecies. Up until very recently, Neanderthals had met all but one criterion for the delineation as a separate species as set out by Osbjorn Pearson (2008). Today, with the help of recent genomic data (Castellano et al. 2014; Neves and Serva 2012; Prüfer et al. 2014; Sankararaman et al. 2014; Vernot and Akey 2014) it could be argued that this distinct classification is in fact warranted.

According to Pearson (2008, 44), biological approaches view speciation as a process during which various criteria for what constitutes a “species” differentiate the members of an evolving lineage from its closest living relatives. The purpose of this paper is to provide evidence that satisfies each criterion outlined by Pearson, and to suggest that by the time anatomically modern humans were spreading out of Africa, the Nean-

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derthals had nearly reached full speciation. His list of criteria contain the following: divergence of populations and geographic separation, establishment of identifiable morphology, development of different apomorphies, selection against hybrid individuals, establishment of differing mate recognition systems, reproductive isolation, and ultimately, a complete lack of viability of hybrids (Pearson 2008, 44). Based on several anatomical and genetic studies (Castellano et al. 2014; Currant and Excoffier 2011; Harvati 2003; Hublin 2014; Márquez et al. 2014; Neves and Serva 2012; Pearce et al. 2013; Pearson 2008, Prüfer et al. 2014; Rak et al. 2002; Ramirez 2004; Sankararaman et al. 2014; Vernot and Akey 2014; Weaver 2003, 2009; Wolpoff et al. 2004), it can be demonstrated that the Neanderthals had adapted and evolved separately in Eurasia to the extent that their morphology and genes were no longer compatible with their ancestors who were simultaneously evolving in Africa.

DIVERGENCE OF POPULATIONS AND GEOGRAPHIC SEPARATION

Researchers have long debated the origin of anatomically modern humans based on two models: *Multiregional Continuity* and *Out of Africa* (Klein 2009). The Multiregional Continuity model assumes that archaic populations, including Neanderthals, inhabited all regions of the Old World, constantly exchanged genes, and eventually reached their current modern state, whereas the Out of Africa model posits that one single ancestral anatomically modern population evolved in Africa approximately 200 ka, migrated out, and replaced the contemporary archaic populations of Europe and Asia. A recent publication on the Neanderthal genome by Kay Prüfer et al. (2014) have definitively ruled out the Multiregional Continuity model based on genetic differences between Neanderthals, Denisovans, and present-day humans. They estimate that the population split time between modern humans and Neanderthals occurred somewhere between 550-765 ka (Prüfer et al. 2014, 45). This is consistent with the fossil record, which indicates that some members of *Homo heidelbergensis* spread into Europe from Africa within this time range and began to develop

more Neanderthal-like traits, while those that remained in Africa simultaneously developed more anatomically modern traits.

Prüfer et al. (2014, 45) also estimated the population split time between Neanderthals and Denisovans to be somewhere between 381-473 ka; however, their gene exchange was particularly low, which may be due to the fact that Denisovans were geographically isolated as far as the Altai Mountains in Siberia. The potential geographic divergence of Neanderthals is further highlighted in a study based on epigenetic maps. Jean-Jacques Hublin (2014, 1339) concluded that Neanderthal populations were small and isolated from each other, which combined with low genetic diversity favoured conditions for rapid and random fixation of features by genetic drift. This is also in agreement with the fossil record, whereby *H. heidelbergensis* appears to have evolved into Neanderthals in Europe at a much quicker rate (550 ka) than it did into anatomically modern humans in Africa (200 ka). Hublin (2014, 1339) suggested that rapid divergences and low genetic diversity indicate that two different evolutionary pathways were at work in Neanderthals and anatomically modern humans, which could be responsible for their marked differences in morphology. These factors may also explain why Neanderthals and Denisovans diverged relatively quickly, although we have yet to discover Denisovan hominin remains with which to compare differences in their morphologies.

ESTABLISHMENT OF IDENTIFIABLE MORPHOLOGY

Neanderthals exhibit a wide range of traits, both cranially and post-cranially, that distinguish them from contemporary hominins, particularly anatomically modern humans. An initial explanation by Timothy Weaver (2003) focused on adaptation to the cold glacial climate in Europe as the driving mechanism of their identifiable morphology. Weaver (2003, 6926) attributed many post-cranial differences to cold-adaptation, including the fact that Neanderthals had wide bodies and short, stocky limbs, which would have promoted low surface area to mass and enhanced heat retention in the cold climate. He also studied the femoral head and its articulations and noticed

that the thick, rounded shafts were accompanied by widening pelvic apertures and more flared iliac blades (Weaver 2003, 6928). When compared to present-day humans, Weaver (2003, 6926) concluded that these features, combined with overall thick bone density, indicated that Neanderthal morphology was hyperpolar or hyperarctic due to their extreme body proportions that exceeded those of modern-day Inuit peoples.

A later study by Weaver (2009, 16032) based on geometric-morphometrics suggested that Neanderthal morphology was more likely due to genetic drift with respect to their cranio-facial features. Milford Wolpoff et al. (2004, 531) also elaborated on identifiable Neanderthal cranial features that included retromolar space, taurodontism, supra-orbital torus, receding forehead, occipital bun, suprainiac fossa, projecting mid-face, large nasal cavity, and lack of mental eminence. Both authors concur that these features did not show up all at once, and that they gradually accumulated over an approximate 300,000-year period. Regardless of the mechanism by which these traits were accumulated, Neanderthals had clearly diverged from their predecessor *H. heidelbergensis* and were measurably distinguishable from contemporary anatomically modern humans.

Katerina Harvati (2003) also highlighted the extent of the divergence of Neanderthal features using a measure of both intra- and inter-specific variation. She measured the differing cranio-facial features mentioned above and compared their distances from anatomically modern humans to the distances among present-day human populations, as well as to the distances between the two commonly recognized chimpanzee species *Pan troglodytes* and *Pan paniscus*. She discovered that the morphological distances between Neanderthals and anatomically modern humans overall were consistently greater than the distances among present-day human populations and greater than the distances between the two chimpanzee species (Harvati 2003, 109). Harvati (2003, 126) used these findings to conclude that the Neanderthal's great morphological and genetic distance would most likely have prevented them from contributing to modern humans and should therefore be classified as a different species. Although her

argument is compelling, it would require the additional satisfaction of the following criteria discussed in order to support this claim.

DEVELOPMENT OF DIFFERENT APOMORPHIES

Due to the small and isolated populations of Neanderthals in glacial Europe, genetic drift likely took hold and fixed certain apomorphies that could distinguish them from other species. One recent area of study has focused on the nasal complex of Neanderthals. By comparing them to those of modern humans, Marquez et al. (2014, 2121) argued that Neanderthal adaptation to cold climates could have necessitated other adaptations such as bony medial projections at the piriform aperture rim and mid-facial prognathism. The authors suggest that the evidence for this defining apomorphic trait lies in its presence among juvenile specimens, which indicates that Neanderthals developed these swellings early in their ontogeny, while modern humans never exhibit this peculiar nasal anatomy at any stage of development (Marquez et al. 2014, 2133). Taken together, this strongly suggests that their growth trajectories are distinct and that these groups therefore represent different species.

Yoel Rak et al. (2002) discovered an apomorphy early on by quantifying the curve of the mandibular notch and comparing it to that of *H. erectus*, early *H. sapiens*, and present-day anatomically modern humans. The results indicated that Neanderthals differ more in ramus morphology to *H. sapiens* than do *H. sapiens* to *H. erectus* (Rak et al. 2002, 199). The authors concluded that this deviation in Neanderthals must imply a profound specialization of the masticatory system and significant repercussions regarding the size of their gape (Rak et al. 2002, 202). This unique morphology certainly constitutes a diagnostic feature and warrants yet another indication of a completely separate growth trajectory than that of contemporary anatomically modern humans. It also reinforces the notion of a single African ancestry for anatomically modern humans who are probably closer morphologically and genetically to the African *H. erectus* and *H. heidelbergensis* populations that never left Africa.

Life history traits correlate closely with dental enamel formation and growth, which allow us to determine the developmental shifts that warrant species-level distinctions. Fernando Ramirez Rossi and José Bermudez de Castro (2004) measured the differences in enamel formation between Neanderthals, modern *H. sapiens*, *H. heidelbergensis*, and the alleged *H. antecessor*. The results indicated surprisingly rapid development in Neanderthals due to having the shortest period of growth (Ramirez Rossi and Bermudez da Castro 2004, 936). The authors concluded that since Neanderthals developed even faster than their predecessor *H. heidelbergensis* despite having a larger brain, this represented an apomorphy in growth and an evolutionary reversal that warranted distinction as a separate species (Ramirez Rossi and Bermudez de Castro 2004, 938). This, combined with differences in brain development as mentioned below, is a strong indicator that Neanderthals would not be biologically compatible with anatomically modern humans. It is hard to imagine how a hybrid would be affected by such profound differences in development and growth between the parents.

Important developmental apomorphies have also been recognized in Neanderthal brain organization. Their unusually large brains have often been interpreted as comparable to that of anatomically modern humans, and thus similar in cognitive and symbolic capacities; however, studies have shown that their elongated brain cases are most likely indicative of differing lobe processes. Eiluned Pearce et al. (2013, 1-4) observed that Neanderthals show lateral widening, but overall flattening of the parietal lobes that are responsible for cognition, as well as a relatively larger occipital lobe that is responsible for visual processing. The authors suggested that this, combined with larger eye orbits and high lean body mass, is indicative of their apomorphic brain development, including larger visual cortices and more neural tissue invested in somatic areas that are involved in body maintenance and control (Pearce et al. 2013, 5). Thus, Neanderthals would not have been able to think and process the way that early anatomically modern *H. sapiens* did, and they most certainly would not have been able to

think and process the way that humans do today. This, combined with other developmental apomorphies may suggest that a separate species is warranted for Neanderthals.

SELECTION AGAINST HYBRID INDIVIDUALS

Recent studies on the Neanderthal genome have contributed breakthroughs to our understanding of the origins of anatomically modern humans, as well as to the question of potential interbreeding and Neanderthal contribution to modern human DNA. While Prufer et al. (2014, 45) reported that Neanderthals contributed 1.5-2.1% of their DNA to all non-Africans, this should not be interpreted as definitive evidence in support of subspecies classification. According to Sriram Sankararaman et al. (2014, 355), it was originally estimated that initial interbreeding episodes could have been as high as 62% in East Asian populations and 64% in European populations based on a genetic map of 1,004 present-day humans; however, widespread negative selection against Neanderthal ancestry was detected shortly afterwards. The authors discovered that the largest deserts of Neanderthal ancestry were on the X-chromosome, which was indicative of reduced male fertility of hybrids and an introgression success rate of only 3% (Sankararaman et al. 2014, 356). They concluded that the introduction of Neanderthal-derived deleterious alleles in hybrids could explain why anatomically modern humans were more resistant to Neanderthal ancestry, and why the effect of negative selection resulted in a 'quantitatively large' reduction of introgression based on the estimation of initial interbreeding episodes mentioned above (Sankararaman et al. 2014, 356). This widespread selection against hybrids could be interpreted as evidence in support of the potential biological incompatibility of these two species.

Prufer et al. (2014, 48) also suggested that negative selection of Neanderthal ancestry could have contributed to their widespread population decrease after anatomically modern humans spread out of Africa. It remains a mystery as to why modern human DNA was not detected in the Neanderthal genome; it appears as though they contributed DNA to us, but we did not con-

tribute any to them. Once again, this may have been due to the negative selection of sterile hybrids, seeing as a rapid decrease in population would have severely impacted the number of potential male mates for future female Neanderthals. Benjamin Vernot and Joshua Akey (2014, 1021) reported similar data, which suggested that the DNA sequence divergence between modern humans and Neanderthals was a barrier to gene flow in some regions of the genome and was associated with deleterious fitness consequences. However, they also concluded that modern humans were relatively lucky in that advantageous adaptive Neanderthal genes such as lighter skin pigmentation and immunity to diseases were positively selected at a relatively rapid rate (Vernot and Akey 2014, 1021). These traits would have allowed anatomically modern humans spreading out of Africa to successfully adapt to the colder climate in Europe, whereas potentially sterile hybrids would have had difficulty reproducing and adapting overall.

ESTABLISHMENT OF DIFFERING MATE RECOGNITION SYSTEMS

It has been widely suggested that Neanderthals maintained smaller and more isolated populations, which would have promoted lots of interbreeding with close relatives. Prufer et al. (2014, 45) have supported this assumption with their findings that the parents of a Neanderthal woman from the Altai Mountains from whom they extracted a genome sequence were related at the level of half-siblings and that mating among close relatives was common amongst her recent ancestors. This ultimately had implications for how and why the Neanderthal populations appeared to diverge relatively quickly due to their limited gene pool and potential for genetic drift. These long runs of homozygosity were also present in three other late Neanderthal sequences reported by Sergi Castellano et al. (2014, 6667), which indicated that mating with relatives was much more common in Neanderthals than it is in present-day human populations. They also concluded that Neanderthal genetic diversity within continents differed more than present-day human genetic diversity does between continents

(Castellano et al. 2014, 6667). Based on this information, it seems as though the Neanderthals maintained a highly localized form of endogamy, which may have contributed to their rapid divergence and limited biological compatibility with modern humans. This finding also has implications for the reproductive isolation section below.

REPRODUCTIVE ISOLATION

In contrast to Sankararaman et al. (2014), Mathias Currant and Laurent Excoffier (2011, 15129) hypothesized that the very low rate of interbreeding could imply the existence of 'extremely strong barriers' to gene flow between the two species due to a very low fitness of hybrids, strong avoidance of interspecific mating, or both. Under most demographics within their models, the interbreeding success rate was found to be below 2%, which they suggest might actually be inflated due to recurrent admixture at the wave front where the local invading population (anatomically modern humans) was still growing, and thus passing on the introgressed genes (Sankararaman 2011, 15132). Currant and Excoffier (2011, 15132) also state that uneven introgression from the local to the invading species naturally occurs during range expansion, and that genes introgressing in the invading population are amplified by population growth, which could have a very large final impact.

These findings could explain why anatomically modern humans spreading out of Africa successfully adapted to the new climate in Europe by quickly acquiring these advantageous Neanderthal traits that are still expressed in non-Africans today, and passing them onto their offspring over several generations. This observable large final impact on non-Africans is deceiving based on the authors' estimation that successful interbreeding events would have only occurred once every 23-50 years over a 10,000 year range expansion of modern humans (Sankararaman 2011, 15132). The authors conclude that these interbreeding events were 'extremely rare', which suggests that although interbreeding did take place, it occurred so rarely that it may not be strong enough evidence to constitute membership within the same species.

Armando Neves and Maurizio Serva (2012, 8) apply a different approach to the extreme rarity of interbreeding events between Neanderthals and anatomically modern humans emerging out of Africa by estimating that a single pair of individuals interbred at a 77-generation interval over 130,000 years of co-existence. They also posit that these breeding events would have occurred in breeding zones where early anatomical modern humans were leaving Africa into the Middle East and Western Europe (Neves and Serva 2012, 8). According to this estimate, the biological and genetic barriers to reproductive success between the two groups were so strong that although they co-existed side-by-side for so long they barely exchanged genes. Despite the differing analogies and potential mating success proposed by these studies, each have shown that only 2% of gene flow could have occurred from Neanderthals into all non-African modern humans, which is exactly what Prufer et al. (2014) reported.

LACK OF VIABILITY OF OFFSPRING

As mentioned above, Castellano et al. (2014) observed that each of the three Neanderthal individuals from whom they obtained their genome sequences carried a larger fraction of putatively deleterious alleles than present-day humans. The authors attributed this to the population decrease that occurred, which over a long period of time would reduce the efficacy of purifying selection in Neanderthals and contribute to an even larger amount of deleterious alleles (Castellano et al. 2014, 6667). These deleterious alleles most likely contributed to the sterility of male hybrids produced by these two species as well. Based on the lack of viable hybrid offspring, it would appear that the Neanderthals and anatomically modern humans continued to evolve on different trajectories and eventually became biologically incompatible with each other. Although they contributed a small amount of their genes to non-Africans, which resulted in a modest amount of phenotypic and medical variations, they did not contribute to our overall ancestry as a species, which includes all Africans as well.

CONCLUSION

Due to the limited compatibility of Neanderthals and anatomically modern humans demonstrated by these studies, and the fact that Neanderthals went extinct in their own environment, they may very well have been “evolutionary dead ends” after all. There will always be subspecies and admixture at some level, and unfortunately, genome sequences are not always a feasible option for decipherment. Furthermore, it has also been demonstrated that some hominin groups that allegedly belong to the same population are incredibly diverse to the extent that if discovered in isolation, they would be assigned to multiple species (Arsuaga et al. 2014; Lordkipanidze et al. 2013). Since the fossil record is often all that we have, it will continue to be up to our imaginations to reconstruct the past to the best of our ability.

After over a century of research, the Neanderthal species-versus-subspecies mystery may very well be solved as more ancient genomic data is recovered and studied, but by the same token, the debates may just be getting started. As more hominin and archaeological remains are uncovered and relevant technologies advance, we are constantly forced to ask new questions and rearrange what we thought we already knew about our distant relatives and ancestors. While progress appears to have been made, the difficulty in species classification appears to stem from our limited understanding of what it means to be a species overall, especially in light of genetics, which we do not yet fully comprehend. Despite recent breakthroughs in this field, the issue regarding hominin species classification based on fossil and genomic data (if at all) remains unresolved. However, in the balance of the data presently available, including morphological and developmental apomorphies, an overall derived evolutionary trajectory, and the apparent unviability of hybrid offspring, a solid case can be made for a distinct species classification for *Homo neanderthalensis*.

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The “Winter of Native Discontent”: A Critical Discourse Analysis of Canadian Opinion Journalism on the Idle No More Movement

Tiffany Campbell

Abstract: Aboriginal activism has become increasingly subject to media publicity, reflecting a popular view of Aboriginals not only as a social problem but as creating problems that threaten the social fabric. This paper is based on the findings of a critical discourse analysis of a collection of opinion pieces published in The Globe and Mail and the National Post. The contemporary construction of the “Indian problem” was investigated in the context of the Idle No More movement, viewing these texts as part of larger processes of elaboration, articulation, and application of Western ideas on Aboriginal social policy. One of the fundamental conflicts that can be identified in settler discourse is in regard to history and change and a particular concern with how much of the past should be carried into the future. The discontinuous view of history emphasizes the distance of history, making the past seem foreign to the modern, civilized eye. Injustices are presented as characteristics of history, and the violence of colonial times can be disconnected from the present.

On December 24, 2012, the *National Post* published a special article by Métis lawyer Chelsea Vowel entitled “No, things are not getting better for Canadian Natives.” Vowel argued that, when thousands of Indigenous people across Canada rallied together under the banner of Idle No More, the mainstream media misrepresented their actions by focusing on politics and legislative grievances such as the omnibus Bill C-45. She wrote:

What it all boils down to is this. Canada has not committed itself to addressing the colonial relationship it still has with indigenous peoples. Canada is in denial about that relationship. I think it’s fair to say that most Canadians believe that kind of relationship no longer exists. We are trying to tell you that you are wrong.

The inception of the Idle No More movement was in the final month of 2012 following the *Jobs and Growth Act* (Bill C-45), which made changes to the *Canadian Environmental Assessment Act*, the *Fisheries Act*, the *Navigable Waters Protection*

Act, and the proposed *Safe Drinking Water for First Nations Act*—all of which have profound implications for the rights of Indigenous peoples. The various actions of the movement, which has continued over a year later, included flash mob round dances, rallies, marches, educational events, hunger strikes and in some places blockades, and has played a supportive role¹ at local actions from the Mi’kmaq stand-off against shale gas exploration, to marches for missing and murdered Aboriginal women, to the Unist’ot’en pipeline resistance camp in British Columbia. Though the Conservative Bill acted as a catalyst, it is clear that this new wave of indigenous activism is part of a long history of indigenous struggle in North America.

In the comments section that followed in the online edition of Vowel’s article, the highest-rated comment was by one Anonymous66, who replied:

You can’t demand strict adherence to “nation to nation” treaties AND simultaneous equality with other Canadians - real nations take care of their own rather

¹ These actions were affiliated, in part, through their identification with Idle No More as a national and more broadly international Indigenous peoples movement. You could therefore say that Idle No More is a rallying cry, or a larger banner of solidarity with anti-colonial activism across the country and even globally.

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than harass another nation to fund their needs... If you want equality with every other Canadian in those areas, you're going to have to put all the inequalities that work in your favour on the table as well, and renegotiate a new deal from scratch.

Although the comments sections of online media outlets are not known for their erudite responses, I would argue that Anonymous66's exegesis is more typical than troll.² The commenter's short analysis reveals an ideological topography upon which those engaging in Indigenous activism and Aboriginal³ politics are often forced to tread. These discourses carry with them particular existential, propositional, and value assumptions that should not be taken for granted by writers and readers.

The ideological effects of texts in inculcating and sustaining or changing ideologies have been of major concern for critical discourse analysts and social theorists (e.g., Fairclough and Wodak 1997; Fowler et al. 1979; Hall 1982; Kress et al. 1979; Shapiro 1981; van Dijk 1998; Wetherell and Potter 1992). Fairclough (2003, 9) writes that ideologies are "representations of aspects of the world which can be shown to contribute to establishing, maintaining and changing social relations of power, domination and exploitation." Although the anonymous commenter's version is but one, and its influence upon readers perhaps questionable, it is part of larger processes of elaboration, articulation, and application of Western ideas on Aboriginal social policy. For instance, let us look at another text (in Leslie 1978, 114):

I want to get rid of the Indian problem. I do not think as a matter of fact, that the country ought to continuously protect

a class of people who are able to stand alone... Our objective is to continue until there is not a single Indian in Canada that has not been absorbed into the body politic and there is no Indian question, and no Indian Department, that is the whole object of this Bill.

This is an infamous 1920 quote by Duncan Campbell Scott,⁴ made in reference to Bill 14 which would amend the Indian Act, mandating Aboriginal children to attend residential schools. There are a number of parallels between Scott's argument and Anonymous66's. Why the symmetry between the words of an elite government bureaucrat, almost 100 years ago, and an anonymous internet commenter on an article about a *contemporary* grassroots indigenous peoples' movement?

The purpose of my research was to document and analyze settler Canadian⁵ discourses surrounding the various actions of the Idle No More movement. Using critical discourse analysis, I examined a collection of 30 opinion pieces published in *The Globe and Mail* and the *National Post* (Blatchford 2012; Brazeau 2013; Carlson 2013; Coates 2013; Coyne 2013a, 2013b; Flanagan 2012, 2013; Foster 2013; Gagnon 2013; Gibson 2013; Gurney 2013; Ibbitson 2013a, 2013b, 2013c, 2013d; Ivison 2013a, 2013b; Jonas 2013; Kay 2013a, 2013b; Martin 2013; McParland 2013a, 2013b, 2013c; Murphy 2013; Saunders 2013; Simpson 2013a, 2013b; Widdowson 2013) to investigate the contemporary construction of the "Indian problem" in the context of Idle No More. The rhetorical strategies of the journalists I analyzed tend to mobilize the classic liberal principles of freedom, individual rights, equality, and rationality, along with a historical account of progress, to mount racist arguments. This paper

² "Troll" is internet slang for a person who, usually anonymously, provokes other commenters by posting *ad hominem* insults and various slurs in order to offend or take over the comments section and derail constructive conversation.

³ It has been argued (e.g. Alfred 1999; Eudaily 2004) that terms such as Aboriginal, Indian, and Native are convenient bureaucratic terms that do not do justice to the cultural complexity of First Nations and are "negatively defined by the European norm" (Eudaily 2004, 2). Because of its inclusivity, I will use the term Aboriginal to refer to Canadian Indigenous peoples, as well as the term Indigenous when specifically referring to indigenous modes of production, values, governance systems, and international or global resistance movements.

⁴ Treaty Commissioner (No. 9) and Head of the Department of Indian Affairs from 1913–1932.

⁵ "Settler" refers to non-Indigenous persons, practices, and institutions in a colonizing society.

questions how such apparently benign forms of political discourse become regrouped into arguments opposing certain other freedoms, justifying the perceived pattern of Canadian history.

DISCOURSE AND THE MEDIA

Discourse as an analytic mode has proliferated since Michel Foucault and is now carried out within a variety of scholarly traditions that investigate the relations between language, structure, and agency. In these fields, discourse has generally come to mean somewhat different things (Sawyer 2002), but the key feature is always that language is not simply a tool that neutrally transmits meaning about the objective world from the speaker to the receiver. Rather, it is through discourse that the world is brought into being and objects invested with particular meanings. It is also through discourse that speakers and hearers, writers, and readers come to an understanding about themselves, their relationship to each other, and their place in the world (Ashcroft et al. 1998, 58).

There are several forms of discourse analysis. Critical discourse analysis (CDA)—partly due to its interdisciplinarity and the breadth of its approaches—is widely used across the social sciences. This paper takes its lead, above all, from Wetherell and Potter's (1992) *Mapping the Language of Racism: Discourse and the Legitimation of Exploitation*, in which the researchers develop a framework for the analysis of racist discourse and conduct an empirical investigation into Pākehā (settler) discourse in New Zealand on Māori protest and social policy. My toolbox for linguistic analysis is taken primarily from the CDA approaches of Norman Fairclough (2003) and, to a lesser extent, Theo van Leeuwen (2007).

Opinion journalism in the mainstream media plays an integral role in public opinion formation. Unlike “hard” news texts, opinion discourses (editorials, op-ed articles, and guest columns) “possess a unique idiomatic character

that ‘speaks’ directly to the readership in a way that is familiar” (Greenberg 2000, 520). They are meant to provide insight through the use of argumentation and personal narrative. Greenberg (2000, 521) writes, “In rendering opinions, laying blame, and presenting solutions about problematic issues, actors and events, opinion writers inevitably accentuate some points of view while downplaying others, thus limiting the range of interpretable meanings available to the public.” In such a way, it can be said that these journalists are public opinion-makers, since it is they who define what the problem and the possible appropriate strategies for its solution, and attempt to mobilize and enroll newsreaders around particular ideological positions by resonating in ways that will connect with their ethics and emotions.

ABORIGINALS AND CANADIAN NEWSPAPERS

Various forms of content and discourse analysis have been utilized in the study of the ways in which Indigenous issues, and Indigenous people themselves, are presented in discourse (e.g. Chrisjohn and Young 2006; Furniss 2001; Grenier 1994; Harding 2006; Henry and Tator 2000, 2002; Miller 2005; Pietikainen 2003; Proulx 2011; Singer 1982; Skea 1993; Szuchewycz, 2000; Teo 2000; Warry 2007; Wetherell and Potter 1992). Non-Indigenous newspapers often reduce the complexity of Indigenous histories to “problems” and mitigate what should be radical discussions by recasting them as matters of incremental bureaucratic policy and procedure. As Taiaiake Alfred (1999, 3) writes: “Non-indigenous people have always seen indigenous people in problematic terms: as obstacles to the progress of civilization, wards of the Crown, relics of savagery and dregs of modern society, criminals and terrorists.” There have been a number of studies on racism in the Canadian newspaper industry (e.g., Furniss 2001; Harding 2006; Proulx 2011; Skea 1993). For example, following the Oka crisis,⁶ Fleras and Elliot (1992, 9, 92-98) noted that

⁶ The Oka Crisis was a land dispute between a group of Mohawks and the town of Oka, Quebec, in 1990. The town of Oka was developing plans to expand a golf course and residential development onto traditional Mohawk land, which included pineland and a burial ground, marked by standing tombstones of their ancestors. The Mohawks had filed a land claim for the sacred grove and burial ground near Kanesatake, but their claim had been rejected in 1986. The dispute was the first well-publicized violent conflict between First Nations and the Canadian government in the late 20th century.

First Nations activism was subject to increasing media publicity, reflecting a popular view of Aboriginal peoples as "a) a social problem, b) having problems that cost the Canadian taxpayer, and c) creating problems that threaten Canada's social fabric."

In Canada, media ownership is concentrated in a very small handful of corporations. *The Globe and Mail*, owned predominantly by The Woodbridge Company Limited, is Canada's largest-circulation newspaper. Postmedia Network Inc. owns the *National Post*, whose columns often appear in the company's other papers such as the *Ottawa Citizen*, *Calgary Herald*, *Edmonton Journal*, *Vancouver Sun*, and several others.

Idle No More was a top newsmaker in December 2012 and the first few months of 2013, with news coverage and opinion pieces appearing as top stories nearly every day in both papers. I selected articles discussing Aboriginal issues (which included Idle No More), almost all of which were published in the first three weeks of January, 2013. Online publications of the articles were utilized and converted into electronic word documents and sorted by publication date, and were numbered for charting. Specific references to clauses and word choices in the in-text discussion can be found in the two tables appearing at the end of this paper, corresponding to the numbered article list.

In my examination of opinion pieces in *The Globe and Mail* and the *National Post*, major patterns, themes, and trends emerged in the representation of contemporary Aboriginal issues. Select portions are presented in this discussion. In the first section of the analysis, I will discuss common referential strategies used by journalists to represent Idle No More activists. This section will be primarily concerned with how protesters, and protests in general, are discredited and delegitimized. The second section will concern how history is articulated in settler journalist accounts to minimize Aboriginal claims for justice.

DISCREDITING PROTEST

In their analysis of Pākehā discourses in New Zealand, Wetherell and Potter (1992, 157–158) identified a particular struggle in the rhe-

torical effort to delegitimize Māori claims and protest. This struggle required, in the first case, a contrasting account of what they call "the influence process": that is, the establishment of legitimate and illegitimate forms of influence. This struggle is directed towards positioning oneself, those with whom one agrees, and Pākehā politics in general "within the realm of 'proper' influence." Proper influence places emphasis upon "the 'reasonable', the 'rational' and the 'factual'; while Māori groups are positioned within the realm of 'improper' influence, within the 'emotional', the 'social' and the 'irrational'" (Wetherell and Potter 1992, 157–158). In terms of social practice, improper routes tend to be considered social protest and demonstrations, whereas proper routes involve the due process of mainstream institutions.

In the rhetorical procedures of the columnists writing during this period, the particular emphasis placed on moderation, pragmatism and proportion is highly significant. Attempts to develop persuasive arguments in this domain were bolstered primarily through the use of extreme case formulations, classification, evaluative adjectives and "the usual paraphernalia of argumentation," namely seven rhetorical strategies for discrediting protest identified by Wetherell and Potter (1992, 154). They note that these argumentative practices were so clear and predictable that they seem to come out of a "recipe book" of rhetorical strategies for discrediting opposing political groups (Wetherell and Potter 1992, 153). Specific references to these strategies in my own data can be found in Table 1.

At the more obvious level of word choice (found in Tables 1 and 2), names were given to Aboriginal protesters in the Idle No More movement: warriors, radicals, extremists, and militants. Their actions and words were also frequently accompanied by evaluative adjectives such as fierce, inflammatory, aggressive, angry, venomous, provocative, and highly charged as well as with nouns such as fury, insurgency, and wrath. These word choices predominately contribute to accusing protesters of violating norms of moderation, presenting them as emotional and extreme.

Table 1. Common rhetorical strategies used by op-ed columnists in *The Globe and Mail* and the *National Post* when writing about Idle No More, December 2012–January 2013.

Rhetorical Strategy	Article	Examples
Call into question genuineness of opponent's motives	Blatchford 2012; Gibson 2013; Ivison 2013 <i>a</i> , 2013 <i>b</i> ; McParland 2013 <i>a</i> , 2013 <i>c</i> ; Murphy 2013; Widowson 2013	<p>“inevitable cycle of hideous puffery” (Blatchford 2012)</p> <p>“Chief Spence’s manufactured dissent” (Foster 2013)</p> <p>“Theresa Spence... who points the finger of blame at Ottawa with one hand, while extending the other for more handouts” (Ivison 2013<i>b</i>)</p> <p>“more worrisome is the tone, the ratcheting up of frictions, and the deliberate forgetting by some” (Murphy 2013)</p> <p>“Too many native leaders seem bent more on disruption than actual progress” (McParland 2013<i>a</i>)</p> <p>“There have been protests in Hawaii (anyone who lives in Hawaii and can find something to complain about isn’t trying very hard)... It’s the show that counts, the protest: being part of the great angry disaffected world of progressive opposition to The Man” (McParland 2013<i>c</i>)</p>
Question effectiveness of tactics	Blatchford 2012; Carlson 2013; Coates 2013; Coyne 2013 <i>a</i> , 2013 <i>b</i> ; Gibson 2013; Foster 2013; Ibbitson 2013 <i>b</i> ; Kay 2013 <i>b</i> ; Murphy 2013; McParland 2013 <i>c</i> ; Simpson 2013 <i>a</i>	<p>“scattered incidents of protest that inconvenience others are a surefire way of dissipating support for the aboriginal cause” (Simpson 2013<i>a</i>)</p> <p>“Some chiefs threaten to blockade the country next week. This will not be progress. It will harm their cause and undermine the rule of law” (Gibson 2013)</p> <p>“hunger strikes have a way of reducing complex issues to the most simplest elements” (Blatchford 2012)</p> <p>“to imagine that problems of poverty, ill health and poor education are best addressed—let alone solved—by histrionic threats, social-mediated mob scenes or blocked roads or rail lines is a dangerous delusion” (Foster 2013)</p> <p>“trending on twitter is hardly a substitute for getting down to genuinely ‘hard work’” (Foster 2013)</p> <p>“the Prime Minister is focused squarely on the art of the possible... it is ironic, then, that the very approach he avoids is the one Idle No More has embodied” (Carlson 2013)</p> <p>“the quest for native dignity through other, more symbolic ways, often is expressed in such a theatrical and desperate-seeming fashion” (Kay 2013<i>b</i>)</p> <p>“they want a new leader who will get with the program and limit himself to loudly making demands, with no intention of ever having them met” (McParland 2013<i>c</i>)</p>
Accuse opponents of violating norms of moderation	Blatchford 2012; Brazeau 2013; Coates 2013; Coyne 2013 <i>a</i> , 2013 <i>b</i> ; Flanagan 2013; Foster 2013; Gibson 2013; Gurney 2013; Ibbitson 2013 <i>b</i> , 2013 <i>c</i> ; Ivison 2013 <i>a</i> ; McParland 2013 <i>b</i> , 2013 <i>c</i> ; Murphy 2013; Simpson 2013 <i>a</i> ; Widowson 2013	<p>“The obvious conflict between reality and dream pulls some aboriginals to warrior societies; others to dealing with the ‘crown’ at all” (Simpson 2013<i>a</i>)</p> <p>“The reaction was venomous” (Ivison 2013<i>a</i>)</p> <p>“That is highly charged language” (Ivison 2013<i>a</i>)</p> <p>“The fundamentalists seek to polarize the debate” (Coyne 2013<i>b</i>)</p> <p>“Going all radical, hitting the racial/racist buttons” (Murphy 2013)</p>

Table 1, cont'd.

Rhetorical Strategy	Article	Examples
Accusations of inconsistency	Carlson 2013; Coyne 2013a; Flanagan 2012, 2013; Foster 2013; Gibson 2013; Ivison 2013a; McParland 2013b, 2013c	<p>“surfacing spokespeople demand a shifting grab bag of change” (Gibson 2013)</p> <p>“the movement has not made any specific demands or proposed tangible solutions, spiraling instead into an amalgam of grievances” (Carlson 2013)</p> <p>“The movement, with its vast and ill-defined agenda, its vague and shifting demands, its many different self-appointed spokespersons, is open to any number of different interpretations” (Coyne 2013a)</p> <p>“conflicting nature of native complaints” (McParland 2013b)</p> <p>“What are the aims of The Cause? No one is really quite sure: just as with Occupy, the Idle forces are disparate and leaderless, a great mass of conflicting emotions” (McParland 2013c)</p>
Consistency <i>also</i> problematized	Blatchford 2012; Coyne 2013b; Gibson 2013; Gurney 2013; Ibbitson 2013a; Kay 2013b; McParland 2013c; Simpson 2013a, 2013b	<p>“Chief Spence has attracted various predictable public adherents to her cause” (Simpson 2013a)</p> <p>“Some [demands] are to be expected, such as the call for more money” (Gibson 2013)</p> <p>“horse manure that usually accompanies native protests” (Blatchford 2012)</p> <p>“Rarely has the penchant of native leaders for what a former prime minister’s chief of staff, Derek Burney, has called ‘theology’ been on such open display...[ideologues] prefer to dwell on the inherent nature of aboriginal rights and the spiritual joys of communal ownership” (Coyne 2013b)</p> <p>“Idle No More/Arab Spring, it’s all one and the same. As long as you’re angry at the existing order, one membership card gets you universal access” (McParland 2013c)</p>
Question representativeness of opponent’s support	Carlson 2013; Coates 2013; Coyne 2013b; Gagnon 2013; Ibbitson 2013c; Ivison 2013a; McParland 2013a, 2013b, 2013c; Simpson 2013a, 2013b	<p>“First nations issues ranked at the very bottom in public importance” (Ibbitson 2013c)</p> <p>“According to a recent CROP survey, more than three-quarters of Quebecers hadn’t even heard of the movement [...] Quite a few young Quebec Indians now refuse to play the ‘victim’ card” (Gagnon 2013)</p> <p>“for a determined few, it sounds like due process requires a patience they no longer possess” (Ivison 2013a)</p> <p>“as more and more putative leaders have jumped in front of the parade” (Coyne 2013a)</p> <p>“By their decision to participate, Atleo and his supporters were not just starting down the demands of what I’ve called the fundamentalists” (Coyne 2013b)</p> <p>“Mr. Atleo’s AFN was divided internally, and divided again against more radical elements in the Idle No More movement” (McParland 2013a)</p> <p>“But Idle No More’s co-founder has distanced [blockades] from the protests... emphasizing that the movement is devoted to ‘peaceful’ education events” (McParland 2013b)</p>
Accuse opponents of infringing on the rights of others	Blatchford 2012; Gurney 2013; McParland 2013b, 2013c	<p>“a prime minister should not be blackmailed into doing what any group or individual wants” (Simpson 2013a)</p> <p>“It is tempting to see the action as one of intimidation, if not terrorism... holding the state hostage” (Blatchford 2012)</p> <p>“[Canadians] are likely unwilling to be held to ransom by the most radical elements of that community” (McParland 2013b)</p> <p>“It is increasingly clear that the OPP’s established procedures for dealing with native protests have relegated law enforcement to a second-tier priority” (Gurney 2013)</p>

The presentation of realism is also particularly important in the construction of Aboriginal peoples as irrational, emotional, and naïve. Reference to the unrealistic character of Aboriginal demands or their lack of realpolitik was so pervasive in my data that they were present in almost all of the articles I analyzed. These were riddled with evaluative adjectives such as dreamy, romantic, unrealistic, wishful, nonsense, mythical, simplistic, shallow, and pseudo-academic—all

emphasizing the notion of non-factuality of Aboriginal claims. This is also supported by the presupposition that these falsities or unrealisms boil down to an error in judgment caused by emotion or belief. For example, Aboriginal people were said to dream, romanticize, fantasize, hope, and dwell—leading to their having a sense of entitlement, rather than actual entitlement, and the perception that they are owners of the land rather than their real and legally-defined Aborigi-

Table 2. Word choice of op-ed columnists in *The Globe and Mail* and the *National Post* when writing about Idle No More, December 2012–January 2013.

Discrediting tactic	Examples
Tone policing	“fierce” (Flanagan 2012); “inflammatory, but inaccurate” (Flanagan 2012); “aggressive tone” (Widdowson 2013); “discontent” (Ibbitson 2013b); “sound and fury” (Gibson 2013); “angry chorus” (Gagnon 2013); “noise of social protest” (Ibbitson 2013d); “inspires their wrath” (Ibbitson 2013d); “anger... could trump any willingness to cooperate” (Ibbitson 2013d); “hue and cry” (Flanagan 2013); “The reaction was venomous” (Iverson 2013a); “half-threats” (Murphy 2013); “worrisome is the tone, the ratcheting up of frictions” (Murphy 2013); “national upsurge of native anger” (McParland 2013a); “angry crowds of natives” (McParland 2013b); “the great angry disaffected world of progressive opposition to The Man” (McParland 2013c); “angry” (McParland 2013c); “a great mass of conflicting emotions” (McParland 2013c); “loudly making demands, with no intention of ever having them met” (McParland 2013c); “we are being told loudly, provocatively, and angrily” (Brazeau 2013)
Description as drama/circus	“winter of native discontent” (Ibbitson 2013c); “It is not a comedy of errors but a tragedy of errors” (Ibbitson 2013c); “angry chorus” (Gagnon 2013); “the parade” (Coyne 2013a); “circus-like” (Kay 2013b); “the quest for native dignity through other, more symbolic ways, often is expressed in such a theatrical and desperate-seeming fashion” (Kay 2013b); “great melodramatic appeal” (Murphy 2013); “chaos” (McParland 2013c); “[Spence’s] liquid diet performance” (Brazeau 2013)
Description as violent/radical	“warrior society” (Simpson 2013a); “radicals” (Ibbitson 2013a); “native protests that threaten to escalate” (Ibbitson 2013c); “extremists” (Ibbitson 2013c); “the militant tendency within the native movement” (Ibbitson 2013c); “The wild card is anarchy [... if] the Idle No More activists escalate their demonstrations to the point where there is risk of violence or serious economic disruption” (Ibbitson 2013c); “aboriginal militants [at Oka]” (Gagnon 2013); “insurgency [against Atleo]” (Ibbitson 2013d); “more radical [leaders]” (Flanagan 2013); “[INM] has the potential to radicalize a generation” (Iverson 2013a); “[fundamentalists] seek to polarize debate” (Coyne 2013b); “native violence [in Caledonia]” (McParland 2013b; Gurney 2013)
Description as naïve/entitled	“intellectually in a dream palace (of memory)” (Simpson 2013a); “conflict between reality and dream” (Simpson 2013a); “dreamy, flamboyant” (Simpson 2013a); “unrealistic hopes... fuelling resentment toward the ‘white man’” (Widdowson 2013); “aboriginal perceptions that they are the aristocratic ‘owners’ of the land” (Widdowson 2013); “a romanticized past” (Widdowson 2013); “feigned righteousness” (Widdowson 2013); “wishful thinking behind these initiatives” (Widdowson 2013); “embraces the mythical concept of true native sovereignty” (Ibbitson 2013b); “Native romantics dream...” (Ibbitson 2013b); “torrent of frustration and fantasy” (Ibbitson 2013b); “sense of entitlement” (Gibson 2013); “straight nonsense” (Gibson 2013); “Indian mythology to the contrary” (Simpson 2013b); “the ‘myth’ that Indians were dispossessed from their land” (Gagnon 2013); “its leaders are fighting battles long since won” (Coates 2013); “the righteous mind” (Iverson 2013a); “simplistic arguments” (Iverson 2013a); “amalgam of grievances” (Carlson 2013); “grand and romantic” (Kay 2013a); “shallow constituencies” (Murphy 2013); “pseudo-academic” (Murphy 2013); “ideologues, who prefer to dwell...” (Coyne 2013b); “penchant of native leaders for [...] ‘theology’” (Coyne 2013b); “dreamy-eyed romantic deference to aboriginal peoples” (Brazeau 2013)

nal treaty right to it. This gives the impression of Aboriginal peoples merely feeling dispossessed rather than being actually dispossessed and that their history, traditional use, and historic claims to the land are mythological. Substantive claims and demands, such as homeland return and restitution or even calls for an inquiry into missing and murdered Aboriginal women, are minimized as mere grievances.

When it comes to social protest, the representation of one's opponents as irrational also tended to rely on the notion of a primitive and regressive nature of crowd action. This depends upon the assumption that the individual is immersed in an anonymous mass and subsequently loses identity and rationality; the construction is of followers who jump on bandwagons (see Tables 1 and 2).

The rhetorical procedures for constructing the effect of moderation, and the effect of extremism, are publicly available and collectively shared resources in both their familiarity and in their appeal to prudential values of moderation and practicality. These constructions sustain a framing of debate which contain certain premises and assumptions about what can be considered appropriate and realistic political action. This contributes to structuring discussion and conflict by reinforcing among readers notions of legitimate/illegitimate means to incite and enact change.

However, in the articles I analyzed, *Idle No More* was constructed as a threat to the Canadian social fabric not just in terms of civil unrest and public protest that could escalate, but also in terms of deeper cultural assumptions about history and the (perceived) trajectory of social organization. Journalists were not only concerned with problematizing protest in itself, but also engaged in theorizing the relationship between Aboriginal people and the rest of Canadian society through historical accounts.

HISTORY AND THE ARTICULATION OF CONTINUITY/DISCONTINUITY

The colonist makes history. His life is an epic, an odyssey. He is invested with the very beginning: 'We made this land.'

He is the guarantor for its existence: 'If we leave, all will be lost, and this land will return to the Dark Ages.' Opposite him, a listless being wasted away by fevers and consumed by 'ancestral customs' compose a virtually petrified background to the innovative dynamism of colonial mercantilism. The colonist makes history and he knows it [Fanon 2004, 15].

One of the fundamental conflicts Wetherell and Potter identified in their interviews with Pākehā settlers on Māori social policy was in regard to history and change, and a particular concern with how much of the past should be carried into the future. They write that in these accounts: "History seems to be articulated in two forms either as continuity or as discontinuity. These formulations appear oppositional but they in fact feed off each other" (Wetherell and Potter 1992, 183).

Nominalization is a key form of moral evaluation and a common technique used in accounts of the changes that have occurred over history. These evaluations are obscured in the nominalization of social and cultural processes (e.g. "modernization") in such a way that makes them appear natural. Wetherell and Potter (1992, 137) argue that colonial history can therefore be "reconstructed as a story of clashing values, the modern against the traditional, as opposed to a story of conflicting interests, power relations and exploitation. There is an inevitability and acceptability in the notion of 'culture contact' not found in the rhetoric of annexation, conquest and oppression." In accounts such as these, the events of history come to seem agentless, abstracted, and denatured as part of larger natural processes, helping to veil and deflect responsibility.

Take this excerpt from Jonathan Kay's (2013a) op-ed piece "What's wrong with remote native reserves—Let's ask a veteran doctor who worked there" in the *National Post*, containing a historical narrative offered in the wake of the release of an audit report of Chief Theresa Spence's reserve, Attawapiskat, or what Kay calls "the land that accounting forgot." He writes:

... as modernization set in, the old ways were largely abandoned, and Natives increasingly became sedentary, like the rest of us. Men lost their traditional jobs as their economy lost its relevance in the modern world. Furs went out of style. Hunting and fishing could no longer support the growing population; and, out of necessity, social welfare became the new normal.

Notice how, in this historical narrative of the economy of a remote northern community, change is entirely agentless. This use of nominalization aids in substituting one context for another: colonialism is subtly reworked as neutral and a matter of course. In this way, modernization becomes mechanical or natural and unproblematic. This works to conceal power relations and reduce our sense of what was truly involved in these transactions (Hitchings 2013). Actions in themselves are prioritized over attributing responsibility to the colonial agents dispatched with the purpose of destroying Indigenous economies. For example, Kay writes that Aboriginal peoples “increasingly became sedentary, like the rest of us,” but accounts of forced relocation do not feature in his narrative.

Kay writes that hunting and fishing were replaced with the receipt of welfare, which became “normal”—an idea that has come to carry a negative connotation. In the discourse of meritocracy, welfare is meant to be a shameful last resort; the implication is that if welfare is normalized, it amounts to pathologically lazy individuals and a dysfunctional society. What is being slyly referred to, in the case of First Nations, are transfer payments. The subtle implications of recasting treaty entitlements as welfare are therefore potent ideological resources in the denigration of Aboriginal peoples.

The claim that the traditional economy “lost its relevance” is particularly telling of how Kay sees society. This assessment suggests to the reader that complex socioeconomic and political systems that sustained an immense variety of Aboriginal societies since time immemorial are irrelevant in a modern world. The assumption

of his version of history therefore relies upon the articulation of continuity and discontinuity, in the sense that the story of modernization is one of continual improvement, as long as only certain paths are followed. Aboriginal men did not lose their jobs because they were irrelevant, nor simply because of the dictates of the fur market. It came about due to the setting up of systems that privileged Europeans at every level, including, as we see here, the privilege of writing histories which justify exclusion and oppression as a simple matter of the “old ways” versus the “new.”

Golden Future or Dark Future

Wetherell and Potter (1992, 184) found that Pākehā settler discourse painted an image of a “golden future” when discussing intergroup relations with Māori. They wrote that the future was considered golden “to the extent that history becomes a story of continual improvement.”

Here is another text example from Rex Murphy’s column “Natives need to tone down the anger” (*National Post*, January 12, 2013). In describing what he calls “a moment when moral heroes may be made,” Murphy’s assessment oscillates between a completely unnamed and antagonistic Aboriginal population and a sincere, sympathetic population of Canadian citizens:

Going all radical, hitting the racial/racist buttons and constant invocations of empty pseudo-academic framings of “colonialist, settler, imperialist” mentalities do nothing but burn time, waste energy and alienate a large section of the public.

The biggest point continually to note is how deep a pool of genuine goodwill exists in Canada; how much most Canadians, certainly over the last three decades—perhaps because of the lingering guilt over residential schools—feverishly want an honest reconciliation.... There’s been a rawness to the talk and exchanges of the last few weeks, a reaching for the hard words and the ugly ones, that we have not seen—gratefully—for a long time.... A refusal to acknowledge the

birth of new attitudes and sensitivities will seriously, maybe fatally, wound the effort at reform and reconciliation.

Comparison in discourse almost always has a legitimacy/delegitimacy function (van Leeuwen 2007, 99), and in this case the use of contrast is a powerful way to convince settler Canadians to pick a side, or, more accurately, feel good about being presumed to be on the right side. Both sides are further presented as actively struggling against each other, but for settlers it is in order to appease and reconcile.

Murphy's primary linguistic tactic for delegitimizing, deflecting, and minimizing is to suggest that the tone of discussion is more important than its content. Thus, Aboriginal people and their allies should not be listened to if they are too angry, aggressive, "hit the racist button," or invoke "empty" framings and mentalities. Apparently the only mentality Murphy is willing to engage with are those with whom he agrees, and only after they spend the majority of the discussion acknowledging the intellectual and emotional labour on the part of settler Canadians over the past three decades at least. Aboriginal people and their allies are again being constructed and disqualified from the conversation as unreasonable, unfair, and as possibly unable to engage in productive dialogue. It is evident in this example that critically speaking about the continuing oppression of peoples is therefore minimized as mere impoliteness and rudeness, seemingly excusing readers from actually listening to the "hard words and the ugly ones."

Another major point to draw from this is a possible dilemma between the idea that injustices should be righted, but that Canadians must also distance themselves from the actions of a crueler time. Inasmuch as one acknowledges the "birth of new attitudes," the terms for reconciliation are implied to involve forgetting past injustices. At the very least, this implication mitigates settler Canadian wrongdoing and lessens the weight of Aboriginal claims for justice. What are the consequences of the construction of reconciliation (cf. James 2012; Woolford 2004; Corntassel and Holder 2008) on these terms? Murphy's claims are

made out as statements of fact, but actually rely upon—and are justified by—an evaluative framework that denies the possibility of informed and reciprocal discussion. Any real history is elided and a history of settlers as having endeavored to reach accommodation is substituted.

Wetherell and Potter (1992, 184) noticed that Pākehā New Zealanders also envisioned another possible outcome, seen as a "dark future": "[They] will outline pessimistic and apocalyptic accounts of inevitable doom, chaos, failure and the barbaric times to come." In these cases, once again, moderation is praised against the backdrop of a threatening and destructive extremism that will damage the status quo. These mythopoetic exaggerations are an attempt to link nonviolent political activism to isolated and more uncommon forms of Aboriginal protest (such as Oka). In this view, Aboriginal protests always threaten to escalate, stir up racial division, derail progress, and cause serious damage to persons or property.

What is significant, according to Wetherell and Potter, is the different discursive contexts in which the two versions of a 'golden future' and a 'dark future' are utilized. Opinion writers were concerned at how increasing tensions and disruption resulting from Idle No More protests might mar the future, yet when justifying the status quo and current social and political context, the future once again became golden. The continuous view of history and the golden future pose a difficulty to the critic, as Wetherell and Potter (1992, 185) write:

[They] are powerful argumentative resources not least because it becomes irrational from this perspective to question the current form of society... the characteristics which make the future golden... increasing technological benefits, rational administration, civilized values, and charitable good-will.... This is the way the world is going and resistance thus becomes quixotic. The critic is skillfully caught in a dilemma—how can one argue against such 'obvious' good things and such optimism, without appearing to advocate a return to 'the bad old days'?

The Idle No More movement is likewise cast as irrational not only for harboring extremists who disturb the peaceful resting state of the status quo, but also for critiquing the spirit of optimism contained in the notion of a society becoming increasingly just, equitable, efficient, and comfortable every day.

The discontinuous view of history is a potent formulation and resource for justification and (de)legitimization. Its emphasis on the distance of history makes the past seem foreign to the modern, “civilized” eye. Injustices are presented as characteristics of history, and “the violence of colonial times can be firmly and safely placed in history and disconnected from the present. Again the critic is silenced” (Wetherell and Potter 1992, 185).

DISCUSSION

As Wayne Warry (2007) suggests, it is confusion about the nature of culture that is key to misunderstandings between Indigenous peoples and settlers. Traditions are often confused with static customary practices as opposed to ways of thinking that can and do change with the times. This is the assumption that underlies the common argument that Indigenous peoples have been too tainted by modernity to warrant special status or nationhood. However, when culture is perceived in this way—as deeply equated with the past—the implication is that all modern Indigenous peoples “become liable to damage, by definition” (Wetherell and Potter 1992, 130): their participation in “modern” activities is taken as evidence that their culture is losing its relevance, and loss of specific cultural practices is seen as loss of *all* culture (Warry 2007, 89). Moreover, this ignores how much indigenous culture has been sustained despite policies explicitly aimed at assimilation and the complex negotiations that take place on the part of Aboriginal individuals and communities.

There is, as one might then imagine, a pervasive misunderstanding that indigenous peoples are fighting to preserve the ways of their past, but in fact they are fighting for their right to have a say in their own future (Maybury-Lewis 2001). As Neu and Therrien (2003, 3) write: “They see clearly that they are being dispossessed of

their traditional territories, not for the sake of the country as a whole, but for the sake of private profit.” Vermette (2012, 18) argues that the cheapest and most convenient way to achieve such dispossession is to be more inclusive:

Equality is meaningless without an examination of the context in which it is grounded. Once one realizes that ‘economic equality’ operates largely on the presumption that Aboriginal peoples are (or want to become) marauding capitalists (and the corresponding realization that Aboriginal cultures are not capitalist cultures) the idea of equality is quickly shattered. Any initiatives that reach out to Aboriginal peoples in this way do so at the expense of Aboriginal ways of life.

Without socioeconomic analysis, there can be no real understanding of such abstractions as progress and development, and, as Fairclough (2003, 95) writes, “no real sense of its contingency—how changing things at one level could produce different possibilities.” Many contemporary policy texts—and this can be extended to mainstream media—can therefore be seen to “limit policy options by portraying the socio-economic order as simply given, an unquestionable and inevitable horizon... essential rather than contingent, and without time depth” (Fairclough 2003, 95).

The idea that assimilation is the solution to current marginalization of Indigenous peoples is not simply right wing, but a predominant mainstream view. Opinion journalism makes the commonsense assimilationist approach to Aboriginal issues quite accessible to most within the general public, as it utilizes “the symbolically-potent rhetoric of equality” (Cairns 2000, 73) and invokes the reader’s sense of fairness. As Wetherell and Potter (1992, 182) write: “Equality allows for passionate argument and forceful indignation at its supposed violation because the ethical grounds of argument seem so well established. Liberal principles are firmly entrenched as common sense.” The idea is that race-based policies should be rejected in a democratic society that does not discriminate on the basis of race (Warry 2007). However, Canadians are often blind to or

ignore the times when they were privileged in policies that directly discriminated against Aboriginal peoples. The inherent double standard is that Aboriginal people are accused of dwelling on their rights, but settlers do not question their own rights to privately own or have access to their own culturally relevant institutions.

We can therefore see why it is so important to recognize the multi-referential nature of arguments and interpretive resources (Wetherell and Potter 1992, 71), as race can be mobilized in different ways at different times, and for very different ends. In fact, the concept of race poses some difficulties to the critic, particularly when considering the popular approach to racist discourse which exclusively focuses on truth and falsity. As Wetherell and Potter (1992, 68) have argued, these views are not "an automatic guarantee of effective anti-racist practice" and can actually undermine anti-racist practice "with their under-developed concepts of the social nature of the 'real'." For instance: that racial slurs are considered to have been banished from politically-correct public discourse is taken as an indication that our society has become more culturally enlightened; that Aboriginal symbols are included in schools and national events is seen as fostering inclusiveness; and that individual Aboriginal people in the marketplace is said to prove that our society is one of equal opportunity. The ideological effect of these kinds of explanations is the obfuscation of exploitative social and economic relations. To quote Alfred (1999, xv):

From the outside, the intensity of the crisis is obscured by the smokescreen of efforts to reduce the most obvious signs of social deprivation and increase the material wealth within Native communities. It is commonly thought that allowing indigenous people a reasonable standard of living will solve all their problems. But there is more to justice than equity. Of course indigenous people have a right to a standard of living equal to that of others. But to stop there and continue to deny their nationhood is to accept the European genocide of 500 years.

CONCLUSION

Because people only know tiny portions of social life, they "are pressed to rely on mass media for bearings in an obscure and shifting world"; therefore, more than any other institution, "the media specialize in orchestrating everyday consciousness" (Gitlin 1980, 2). The rhetoric, imagery, and underlying common stock of knowledge which writers assume their audience shares form the basis of reciprocity between news producers and consumers. Although the establishment, maintenance, and contestation of the social dominance of particular social groups is neither automatic nor transparent, the ability to implicitly justify oppressive and exploitative relations is an essential feature of the modern state.

Assimilationist arguments and policies of today mirror the spirit and purpose of Duncan Campbell Scott's "Indian problem" which mandated one of the most horrific policies in the genocide of Indigenous peoples in North America. Yet the palatability of these arguments is increased through the journalistic appeal to popular Canadian self-perceptions of fairness, sympathy, and the assumption of a progressive present.

Mainstream opinion journalism is premised on the colonial narrative. By diverting discourse away from substantive issues such as homeland return and restitution, they bypass opportunities to honestly interrogate the colonial relationship Canada has with Indigenous peoples in a way that any real reconciliation would require. Mainstream journalists have therefore produced a "politically salient misreading" (Eudaily 2004) of the protest tactics of the Idle No More movement by conflating such tactics with the conclusion that activists accept the rules of the game laid out by liberal democratic principles. In this way, Indigenous peoples' movements which set out to transform relations between settler and Indigenous communities can be depoliticized in that their goals are presented as being internal to political liberalism and can be made the objects of problem solving rather than the agents of problematization for government.

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Diversipede [dar·vər·sɪ·pid], a peer reviewed journal published by the anthropology student associations at the University of Alberta, seeks to provide a forum for students to gain their voice through the experience of academic publishing. As the name suggests, this publication is “powered by diversity,” a definition that applies not only to the content sought, but to the discipline of anthropology as a whole.


Through the act of writing and submitting a paper or reading and editing submissions, it is *Diversipede's* goal to provide both undergraduate and graduate students a chance to experience the process of professional publishing firsthand. It is the desire of *Diversipede* to highlight the high level of scholarly ability of anthropology students, and to highlight current research interests.

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The University of Alberta Anthropology Undergraduates (UAAU) is a student association that promotes an undergraduate community within the Department of Anthropology. Our group encourages both academic and social activities and offers a great way to get to know people in the anthropology department. For more information, visit sites.google.com/a/ualberta.ca/uaau/ or email uaau@ualberta.ca.

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The Association of Graduate Anthropology Students (AGAS) represents graduate students within the Department of Anthropology at the University of Alberta. Every graduate student automatically becomes a member when they begin their graduate program. For more information, visit sites.google.com/a/ualberta.ca/agas/ or email agas@ualberta.ca.



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Articles are read as anonymous submissions by a minimum of two reviewers of equal or higher academic standing, and if possible from the same subdiscipline. You will be notified within one month whether your article has been recommended for inclusion in a future volume of the journal. Reviewers' comments on recommended articles are returned to outline any necessary changes, with revised copy read by our entire review board prior to final acceptance. You will be advised on any further editing required, but substantive changes are not accepted after this time.

Papers must adhere to the *Chicago Manual of Style*, with citations following the Author-Date format. Incorrectly formatted papers may be excluded from consideration. Graphics for print should be in greyscale (B&W) with a minimum resolution of 300 dpi; submit separate hi-res copies if they appear in-line with your text. Colour graphics normally will appear in our online edition only; consult with the Editor on whether a budget exists for colour printing, and ensure that colour images for print are in the CMYK rather than RGB colour profile.

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