



On Art as a Source of Knowledge: Beyond Rationalization



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Art as a Source of Knowledge: Beyond Rationalization

Proceedings of the 2013 Company of Ideas Forum
of The Jeffrey Rubinoff Sculpture Park

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“So much of my thinking evolved as an alternative to the idea that war is natural to human beings ...

Through the art of the Paleolithic age, we can look at the possibility that war is not natural to human beings, that war is not a prescription. And if there is an alternative to that particular prescription, then that gives us a chance of survival in a time when nuclear holocaust is the obvious result. ...

In fact, it is a necessity now in this particular period of time that I call post-agriculture to create an approach and a language that allows us to get beyond rationalization. The way that I look at morality is as rationalization, whether religions do it or whoever does it, and usually the rationalization is for war.

And my argument is that you can't get past the rationalization of morality unless you move to individual conscience.”

— Jeffrey Rubinoff

2013 COMPANY OF IDEAS FORUM DIALOGUES

ABOUT THE 2013 FORUM

Sculptor Jeffrey Rubinoff has argued that one of the most influential historical developments of the Age of Agriculture was the institutionalization of a warrior class.

Dr. Arther Ferrill, a military historian and expert on prehistoric war, explains that early agricultural societies devoted significant resources to defence, and as civilizations emerged at the end of the Neolithic period, their political and military leadership usually overlapped.

According to Rubinoff, territorial security became a premise for the institutionalization of the warrior class, as well as an underlying assumption in the architecture of the political, civil, and religious institutions that arose to manage and perpetuate society. This assumption so permeates the 10,000-year history of agriculture and its institutions that we struggle to think beyond it, even after the assumption itself becomes absurd.

2010 Forum presenter Dr. Lawrence Badash, professor emeritus of the history of science at the University of California, outlined how, during the Cold War, American scientists theorized the widespread famine resulting from nuclear winter following a full-scale nuclear war. Their updated models indicate that the effect could be triggered by even a limited nuclear exchange. Rationalizing leadership by the warrior class on the basis of a guarantee of security had become absurd.

In his 2010 Forum paper, Yale University cultural historian Dr. Jay Winter added that during World War I, the military castes of Europe essentially committed suicide while leading their formerly hegemonic empires to oblivion.

Rubinoff perceives that the failure of the underlying assumptions of the cultural institutions of agriculture is actually the end of the Age of Agriculture. He argues that our present inability to culturally evolve beyond this failure has spread a futureless pall over civilization, and even humanity itself. Rubinoff calls this the “nuclear winter of the mind.”

At the 2009 Company of Ideas Forum, art historian Jenni Pace Presnell presented compelling evidence of Rubinoff’s perspective in the rise of pop art in the 1960s art world. In his Introduction to the 2012 Forum, Cambridge University art historian Dr. James Fox explains that these changes in the art world were part of a larger cultural shift toward postmodern philosophy calling the very notion of meaning into question.

Rubinoff argues that to escape this evolutionary cul-de-sac, natural history must be recognized as history. David Lawless, a graduate student in Biodiversity Conservation & Management at Oxford University, points out that a range of behaviours commonly associated with cultural concepts such as morality are based on genetic components. In his 2013 Forum paper, Lawless returns to a Darwinian notion of a “sense” of morality to provide a conceptual framework for this growing body of evidence. However, Rubinoff is careful to differentiate this sense of morality, or conscience, as he puts it, from morality based on civil, political, or religious origins. He believes that conscience, a sense of awe and the sacred, and art sense, all present in all known cultures, are influenced by clusters of genes.

As our understanding of our own 3.5 billion year natural history advances, the genetic factors in many human traits will come to be understood. If fundamental spiritual knowledge comes to be seen as having origins in our shared natural history, what will be made of the historical civil, political, and religious claims of authority over moral conventions?

As Rubinoff states: “Judgments made with the weight of individual conscience encourage the evolution of consciousness and reduce our divisive, atavistic dependence on mythological origins. We have learned in our recent history that there are times when individual conscience must overwhelm group moral certainty.”

Rubinoff defines art as an “act of will in accord with a mature conscience,” locating this natural moral sense at the center of artists’ spiritual existence. Art communicates from this inborn center, through the entirety of that artist’s learned knowledge.

Art can be a source of knowledge to those seeking a perspective from which to imagine a future.

— Karun Koernig, Curator

2013 FORUM PARTICIPANTS

Presenters

Dr. Arther Ferrill

PROFESSOR EMERITUS OF HISTORY

UNIVERSITY OF WASHINGTON AT SEATTLE

Arther Ferrill is professor emeritus of history at the University of Washington at Seattle and a respected expert on Ancient Rome and military history. In addition to his book *The Origins of War* (Westview Press 1997), he has also written *Roman Imperial Grand Strategy* and *The Emperor Caligula* (Thames & Hudson 1991). He is a regular contributor to *The Quarterly Journal of Military History* and other periodicals as an author and in review of other authors. He received his PhD from the University of Illinois at Champaign-Urbana in 1964.

David Lawless

MSc STUDENT IN BIODIVERSITY
CONSERVATION & MANAGEMENT

OXFORD UNIVERSITY

David Lawless is pursuing an MSc in Biodiversity Conservation & Management at the University of Oxford. His research focuses on evolution, integrative biology, and the management of protected areas. David has also worked with Parks Canada as a naturalist and interpreter, using art and science as a way of connecting visitors to national parks. His additional interests include the history of science, evolutionary ethics, and music.

Discussion Panellists

Dr. Peter Clarke

PROFESSOR OF MODERN HISTORY
FORMER MASTER OF TRINITY COLLEGE
A FELLOW OF ST JOHN'S COLLEGE

CAMBRIDGE UNIVERSITY

Peter Clarke has published twelve major books on aspects of British political history in the late 19th and 20th centuries, including *The Keynesian Revolution in the Making 1924-1936* (Clarendon, 1988). He is the author of volume nine of the *Penguin History of Britain, Hope and Glory, Britain 1900-1990*. He writes regularly on history and politics for *The Times Literary Supplement* and the *London Review of Books*. Clarke was elected a Fellow of the British Academy for the Humanities and Social Sciences in 1989.

Dr. James Fox

RESEARCH FELLOW AT GONVILLE & CAIUS COLLEGE
DIRECTOR OF STUDIES AT EMMANUEL
AND GONVILLE & CAIUS COLLEGES

CAMBRIDGE UNIVERSITY

James Fox graduated with starred first-class honours in History of Art from Emmanuel College, Cambridge. He subsequently completed an MPhil in British modernism before spending a year on a Herchel Smith Scholarship to Harvard. He returned to Cambridge in 2006 to pursue doctoral research in art of the First World War. He spent Michaelmas 2010 at Yale University as a visiting scholar at the British Art Center. In January 2011 he joined Gonville & Caius College as a Research Fellow. James is currently finalising a monograph on British art and the First World War, and he is editing a volume of essays on 20th century North American sculpture. In 2012 he signed a two-book deal with Allen Lane (Penguin), for whom he will write a *Cultural*

History of Colour, and a *History of Modern British Art*. Recent publications include ‘*Traitor Painters: Artists and espionage in the First World War*’ (British Art Journal 2009); ‘*Fiddling While Rome is Burning: perceptions of artists in wartime*’ (Visual Culture in Britain 2010); and *Conflict & Consolation: British art and the First World War* (Art History 2013).

Karun Koernig
CURATOR

THE JEFFREY RUBINOFF SCULPTURE PARK

Karun Koernig is a social development specialist with twenty years of experience in various positions. He held the position of Activities and Forum Director for The Jeffrey Rubinoff Sculpture Park from 2008-11, and in 2012 accepted the position of Curator. In addition, he holds the position of Head of Operations for the German Water is Right Foundation, which funds water and sanitation projects. Previously he worked in partnership with UN-HABITAT in Nairobi to establish entrepreneurship, environment, and arts programmes for low-income urban youth. Karun Koernig graduated with honours from Simon Fraser University, where he majored in Political Science.

Alex Massouras
ARTIST AND WRITER

Alexander Massouras is a painter, printmaker, and author of *Three Moderately Cautionary Tales*. He is a member of ‘Art School Educated’, a Leverhulme-funded project at Tate Modern investigating the post-war histories of London’s art schools. Alex Massouras’s PhD thesis investigated how pedagogical reforms in London’s art schools have responded to and shaped changes in the identity of the artist since the first Coldstream Report. The research focused on the metamorphosis of art schools into academic institutions, through the assimilation of art history and theory; their varying approaches to divisions among media disci-

plines; and their engagement with notions of professionalism and vocation. He has exhibited his work with galleries in the UK and the US, including Skylight Projects, New York; 7Eleven Gallery, New York; the American Standard Gallery, Miami; The Royal Academy, London; and Julian Page Fine Art, London. In 2010 he was shortlisted for the Jerwood Drawing Prize and the Gilchrist Fisher Award, and in 2011 he won the Pulse Prize. His work is in the collections of the British Museum, the Rhode Island School of Design Museum, and the London School of Economics.

Sergei Petrov
ARTIST AND SCIENTIST

Born in Moscow in 1953, Sergei Petrov graduated from the elite Moscow Institute of Physics and Technology. His professional photographic career started in 1978 when Sergei left his position as a researcher in the Soviet defence industry and began working for leading Russian publishing houses. He photographed sculpture and paintings in the Tretyakov Gallery in Moscow and the Hermitage in Saint Petersburg. In 1981, he became a dissident, first coming to international attention in 1982 when he spent 50 days on a hunger strike trying to win permission to emigrate. While unable to leave the Soviet Union, Sergei completed a number of assignments for Western magazines including *Architectural Digest*, *Discover*, *New York Times Magazine*, and *Le Figaro*. In 1988 an “in absentia” exhibition of his work was opened at the State Department in Washington DC by former US Secretary of State George Shultz. The following year Sergei was finally permitted to leave the Soviet Union, the culmination of years of sustained pressure from the US Government and, in particular, President Reagan and the US Ambassador to Moscow, Arthur Hartman, and his wife, Donna. His art was featured in *American Photographer* and *The Washington Post Magazine*. In 1991 The Corcoran Gallery of Art made a purchase of his work.

Dr. James Purdon
RESEARCH FELLOW AT JESUS COLLEGE
CAMBRIDGE UNIVERSITY

James Purdon is a Research Fellow at Jesus College. He previously studied for BA and PhD degrees at Emmanuel College, spent a year at Harvard University as a Herschel Smith scholar, and worked as a parliamentary reporter. He has written regularly on literature and culture for *The Observer*, *The Times Literary Supplement*, *Literary Review*, and *Apollo*, and he is a founding editor of the online quarterly magazine *The Junket*. His research interests include modern British fiction, experimental prose, the aesthetics and cultural history of information, modernisms, and literature and film of the Cold War.

Dr. Aaron Rosen
LECTURER IN SACRED TRADITIONS & THE ARTS AS WELL AS
IN LIBERAL ARTS, DEPARTMENT OF THEOLOGY & RELIGIOUS
STUDIES

KING'S COLLEGE LONDON

Prior to King's, Dr. Rosen was a research fellow at the Institute of Sacred Music at Yale University, Junior Research Fellow in Jewish Culture at the University of Oxford, and post-doctoral fellow at the Institute of Israel & Jewish Studies at Columbia University. He received his PhD from the University of Cambridge and was a visiting scholar at the University of California Berkeley. He has written widely for popular and scholarly publications including *The Oxford Dictionary of National Biography*, *Apollo*, *New Humanist*, *Times Higher Education*, *Jewish Quarterly*, *Literary Review*, *Art & Christianity*, *Religion & the Arts*, and *Literature & Theology*. His first book was *Imagining Jewish Art: Encounters with the Masters in Chagall, Guston, and Kitaj* (Legenda 2009). He is currently working on a book entitled *The Hospitality of Images: Modern Art & Interfaith Dialogue* and editing *Religion and Art in the Heart of Modern Manhattan* (Ashgate 2015).

Jeffrey Rubinoff
SCULPTOR

Rubinoff completed his BA and MFA in the 1960s in the United States, returning to Canada in 1969. His one-man shows included the Helen Mazelow Gallery, the Ontario Science Center, the Nathan Manilow Sculpture Park, Queen's Park Toronto, York University, and Two Sculptors New York. In the past two decades he has concentrated on group historical exhibitions, including works by sculptors David Smith, Alexander Calder, Anthony Caro, Mark di Suvero, Nancy Graves, George Rickey, Beverly Pepper, Tony Smith, and Robert Murray. In 1973, Rubinoff purchased an 80-hectare farm on Hornby Island, off the west coast of British Columbia, Canada, for the eventual establishment of a sculpture park. Living and working on-site, he has created over one hundred sculptures, constructing each piece alone in his studio from COR-TEN or stainless steel. Located in the former barn, the studio is uniquely equipped with a one-man steel foundry, making it possible to cast the complex shapes seen in his later series.

Dr. Tom Stammers
LECTURER IN THE DEPARTMENT OF HISTORY

DURHAM UNIVERSITY

Tom Stammers is a cultural historian of France from the Revolution down to the end of the 19th century. His PhD thesis and forthcoming book explore questions of collecting, material culture, and heritage in post-revolutionary Paris. He is currently finishing research related to early collectors of revolutionary prints, the afterlives of Rococo artefacts, clandestine worker theatres, and the political controversies surrounding the antiques trade. Future research projects include a study of artisans and connoisseurs in the 19th-century museum, entitled *the 'untutored eye'*. Tom is interested in a wide range of historiographical and theoretical controversies related to 18th and 19th-century Europe.

Dr. Maria Tippett
CULTURAL HISTORIAN AND AUTHOR

Maria Tippett is one of Canada's leading cultural historians. She is the author of many books including two award-winning biographies, including the Governor General's Award for English-language nonfiction in 1979 for her biography of Emily Carr. She has lectured extensively in North and South America, Japan, and Europe. A Fellow of the Royal Society of Canada, she is a former Senior Research Fellow at Churchill College, Cambridge University. Tippett was a member of the editorial board of *Arts Canada*, *Art Focus* and an Arts Journalist Fellow at The Banff Centre in 1988. In 1989, Tippett was a guest curator at the London Regional Art Gallery in London Ontario. She received honorary doctorates from Windsor University in 1994 and from the University of Victoria and Simon Fraser University in 2006. In the course of her career, Tippett has curated art exhibitions at Simon Fraser University Art Gallery (BC, Canada), the London Region Art Gallery (Ontario, Canada), the National Library (Luxembourg), and both the Clare Hall Art Gallery and the Churchill College Art Gallery (Cambridge University).

JEFFREY RUBINOFF

Introduction to the 2013 Company of Ideas Forum

Welcome to the second Forum regarding Art as a Source of Knowledge.

Knowledge is information that changes our perception.

Art can provide changes in perspective that change perception itself.

This transformation of perspective to perception is how art creates knowledge.

This Forum contains two excellent essays, one by Arther Ferrill, professor emeritus, and the other by David Lawless, a graduate student. Together they span the joy of these forums not only to be addressed by a spectrum of scholars but also to cover a vast spectrum of history from the inextricability of proto war and agriculture to the pressing issues of post-agriculture.

In my Introduction to the 2010 Company of Ideas Forum, I stated "...that artists map the human soul. I consider the human soul to be the sum of all human knowledge. The artist works at the limits perceived to be the extent of that knowledge in a given time.

“War has so permeated the ten thousand years history of agriculture and dominated the five thousand years history of civilization that it is impossible to map the human soul without navigating it...”

In my 2010 essay titled *Art Beyond War: A Discussion about Prehistoric War and History of Art by Artists*, I conclude, “Though the [Paleolithic] caves have yielded evidence of great art, they yield no evidence of war...the history of art predates the history of war and agriculture by some 25,000 years.”

This perception of the human soul is one of art’s great gifts as a source of knowledge.

The great paintings and drawings of the Paleolithic caves give way to gestural graphics—highly excited first drawings of man hunting man. It is the artist as graphic storyteller who will transform art’s purpose. From these violent graphics, they will evolve the purposefully calm drawings and sculpture for the new patrons of the Age of Agriculture.

Arther Ferrill’s expertise fills in the transitional period of the inception of war and agriculture.

This period of interaction between war and agriculture will be followed by the 10,000–year Age of Agriculture and ascent of the warrior class.

David Lawless joined the Company of Ideas in 2012 as an undergraduate. It soon became clear in conversation that he was the rare combination of a scientist with strong art perception. He was asked to do a short student paper to bring a scientist’s analysis to the art of the Paleolithic caves.

This year we asked him to expand his essay by examining Darwin’s evolutionary statement of “moral sense.” In keeping with my view of evolution as history, with the genome completing the text in 2003, David addresses the question from my 2012 Forum essay titled *Existential Realities of Post Agriculture*: “Can art become the fulcrum for the reconciliation of science and history to lever conscience beyond the plasticity of morality?”

— Jeffrey Rubinoff,

May 18, 2013

MILITARY RANK AND THE ORIGINS OF AGRICULTURE

by Dr. Arther Ferrill

PROFESSOR EMERITUS OF HISTORY
AT THE UNIVERSITY OF WASHINGTON AT SEATTLE

“... if we think of the ‘beginning of the age of agriculture’ as the entire Neolithic period, we can see ... a relationship between the origins of agriculture and the emergence of an institutional warrior class. ... By the end of the Palaeolithic Age the rapid increase in the use of bows and arrows and slings and the need to settle down to grow crops led to the outbreak of organized warfare, and organized warfare required an officer class to impose the rigid discipline and training necessary for success in war.”

— Dr. Arther Ferrill

2013 COMPANY OF IDEAS FORUM PRESENTATION

As Jeffrey Rubinoff argues, the introduction of agriculture led to many new social organizations, including an institutional warrior class. He calls this “the most dangerous necessity” of the new Age of Agriculture. We shall see that he was remarkably correct and that specialization of labour in military institutions was as developed as in other prehistoric social institutions. We know that in the early civilized states military rank was greatly advanced, and that discipline, which included the right to execute a member of one’s own society, was commonly imposed. As we shall see, rank and discipline had been highly developed in the Neolithic period. Associated with the evolution of rank and discipline were the creation of tactics in the deployment of military lines and other formations, the use of spies in warfare, siege warfare, and even flanking movements and other sophisticated military manoeuvres requiring an officer class and common soldiers. Some Neolithic settlements even practiced naval warfare, an activity that requires a captain.

There is ample evidence to support the above statements. Cave paintings depict warriors in military uniform with differences between the uniforms of officers and privates. There is an execution scene that probably depicts a disciplinary execution, though it could possibly represent the killing of an enemy soldier or spy. There are scenes of troops marching in formation.¹ Neolithic walls and palisades provide impressive evidence of prehistoric siege warfare. Widespread use of the bow and the sling in organized attempts to take agricultural sites requires the leadership of commanding officers, and it is reasonable to assume the development of early strategic plans. The fortifications of Neolithic towns reflect a form of Neolithic strategy. The Neolithic period

¹ George Nash, “Assessing Rank and Warfare-strategy in Prehistoric Hunter-gatherer Society: A Study of Representational Figures in Rock-art from the Spanish Levant, Southeastern Spain,” *Warfare, Violence and Slavery in Prehistory: Proceedings of a Prehistoric Society Conference at Sheffield University*. (Oxford: Archaeopress, 2005): 75-86.

witnessed the earliest appearance of cavalry, a military force that requires its own strategic and tactical leadership and formations.²

When I did the research for the first chapter of my book, *The Origins of War*, published in 1985, there was very little in print on prehistoric warfare.³ Anthropologists and archaeologists simply were not interested in early warfare and seemed to believe that prehistoric man was peaceful and unwarlike. There was a fascinating book by Harry Holbert Turney-High entitled *Primitive Warfare: Its Practice and Concepts* from which I learned a great deal, but it was on primitive, not prehistoric, warfare.⁴ It dealt primarily with primitive societies in the historic period after the emergence of civilization and in most cases after contact with technologically advanced European and American cultures. An example would be the post-Columbian Native Americans of North America, about whom he wrote a great deal. For genuine prehistoric warfare I was forced to rely primarily on cave paintings and drawings that showed Neolithic man using weapons such as the bow and arrow and sling in obvious acts of war. Archaeology revealed numerous examples of military construction, though archaeologists generally ignored the military implications and referred to defensive structures and palisades merely as walls.

I am happy to report that in the last twenty-five years that has changed dramatically.⁵ All one need do today is to check

2 Vera Warmuth, "Reconstructing the Origin and Spread of Horse Domestication in the Eurasian Steppe," *Proceedings of the National Academy of Sciences* 109, no. 21 (2012): 8202-8206.

3 Arther Ferrill, *The Origins of War: From the Stone Age to Alexander the Great*, 5th ed. (New York: Westview Press, 1997). See also my article, "Neolithic Warfare—The Second Oldest Profession," *MSQ: The Quarterly Journal of Military History* 3, no. 1 (Autumn, 1990): 24-29.

4 Harry Holbert Turney-High, *Primitive Warfare: Its Practice and Concepts*, 2d ed. (Columbia, University of South Carolina Press, 1971).

5 See a feature in *Archaeology* (March 30, 2009), "Bloody Stone Age: War in

the internet under "Neolithic warfare" and he will be rewarded with a wealth of bibliographic material on the topic. Neolithic specialists have embraced the subject of warfare. Articles and monographs are now appearing every year. Perhaps the single most influential is a book, available in paperback, by Lawrence H. Keeley, *War Before Civilization: The Myth of the Peaceful Savage* (1996). A professor of anthropology at the University of Illinois at Chicago, Keeley argues that warfare in the Neolithic period was endemic. Deadlier and more ruthless even than modern war, Neolithic man was a looter and trophy taker more brutal than his modern warrior counterparts. Recently one of Keeley's students, Mark Louis Golitko completed a doctoral dissertation entitled *Warfare and Alliance Building During the Belgian Early Neolithic, Late Sixth Millennium, BC* (2010) in which he demonstrates that diplomatic and economic alliances developed as villages became linked in response to increasing levels of conflict.⁶ It is no longer necessary to prove that Neolithic man practiced warfare. It is now an accepted fact.

Today I would like to discuss some aspects of Neolithic warfare as it relates to Jeffrey Rubinoff's perception about the Age of Agriculture. He has said that the Age of Agriculture was the most important development in the history of mankind. According to him it lasted until 1945 with the dropping of the atomic bomb. The discovery of agriculture enabled man to settle down to build villages and later cities, eventually to create civilization with all its manifestations, including art, literature, architecture, science,

the Neolithic." See also Steven A. LeBlanc, "Prehistory of Warfare," *Archaeology* 56, no. 3, on the prehistory of warfare in America. George R. Milner, "Nineteenth-Century Arrow Wounds and Perceptions of Prehistoric Warfare," *American Antiquity* 70, no. 1 (January 2005): 144-156, wrote: "It is now widely recognized that conflicts took place among small scale societies of the distant past..." (144). See also Steven LeBlanc, *Constant Battles: Why We Fight* (New York: St. Martin's Griffin, 2004).

6 See also Mark Golitko and Lawrence H. Keeley, "Beating Ploughshares back into Swords: Warfare in the *Linearbandkeramik*," *Antiquity* 81 (2007): 332-342.

philosophy, and mathematics. But it was also accompanied by an explosion of warfare that has ravaged humankind since the beginning of the Neolithic period. Indeed agriculture and warfare seem to have appeared simultaneously. To practice agriculture early man had to abandon his nomadic hunting and gathering lifestyle since agriculture required permanent residency in the chosen fields. Because it was no longer possible to move freely in the search for food, human beings became vulnerable in their new settlements. They had to stay where their productive land was, and they amassed stores of food to see them through the winter season. That food became a magnet attracting others to their sites, so they built fortifications consisting of walls, palisades, and trenches.⁷ Another possibility is that weapons and their use escalated at the end of the Paleolithic Age, and the threat of warfare became so great that prehistoric man had to settle behind fortifications to protect himself. The need for defence led to permanent villages, and people were forced to discover agriculture in order to sustain themselves. At Jericho the walls seem to predate the practice of agriculture. In my opinion the evidence is not good enough to determine which came first in this classic case of the chicken and the egg.

The discovery of agriculture is usually and rightly associated with major human progress. It was a necessary step toward cities and civilization. It is worth noting, however, that agriculture was not an unmitigated blessing for early man. Farming is not easy or pleasant. Even in modern times we suffer famines, dust bowls, and flooding. In good times a farmer's job can be back-breaking, and the hours are long. Before mechanized farming the occupation could be especially tedious and difficult. Now that we realize that the discovery of agriculture came simultaneously with the emergence of organized warfare, it should be obvious

7 Colin Burgess, ed., *Enclosures and Defenses in the Neolithic of Western Europe* (Oxford: British Archaeological Reports, 1988).

that the Neolithic Age was fraught with dangers that made the earlier prehistoric period look like a golden age. Human nutrition actually declined. One of the reasons almost certainly was that early Neolithic farmers had to devote substantial resources to defence. The cost of massive walls and the human forces to defend them was undoubtedly high. This put a premium on stealing from neighbours and on protecting one's own property.⁸

Before considering the specialization of labour in prehistoric military activity, let us first examine the kinds of military conduct that prevailed at the time. Today armies usually meet in the field and clash along lines that are formed by the dispersal of troops on both sides. Sieges like Stalingrad in World War II between the Russians and the Germans sometimes occur, and occasionally there are naval sieges like the ones conducted by the U.S. Navy and Marines in the Pacific, for example, at Tarawa and Iwo Jima. Also, the development of air power in the 20th century had a huge impact on how war is fought. The lack of a large air force by Germany in the last year of World War II made it virtually impossible to defend the homeland against the Allied and Russian advances. Japanese and American navies waged the war in the Pacific mainly with aircraft carriers. At the Battle of Midway the opposing fleets never even saw one another except from the air. Still, the clash of armies in the field remains the *sine qua non* of warfare. Near the end of the 20th century American troops brought an end to the Gulf War in Kuwait with an attack from the center of their infantry line against the Iraqi line opposing them.

Unfortunately for the Neolithic period, since there was no writing and no literature, there is virtually no evidence of the deployment of troops against one another in a line in the open field. We know that was the standard form of fighting in the ancient

8 See the interesting discussion by Robert Rowthorn and Paul Seabright, "Property Rights, Warfare and the Neolithic Transition," a publication of the Toulouse School of Economics, November, 2010.

world. Two good examples are the Battle of Cannae between the Carthaginians and the Romans and the Battle of Gaugamela between Alexander the Great and the Persians. Even on the sea, fleets were normally deployed in line. But in the Neolithic Age there is little archaeological evidence, like the trenches of World War I, for that kind of deployment on land and virtually none for naval warfare. Armies do sometimes leave traces of their presence in the field but usually not enough to reconstruct their lines without help from literary sources.⁹

For the Neolithic Age there are no literary sources at all. If armies clashed in the open field, and I assume they did, we remain ignorant of their battles and their strategy and tactics. Archaeological evidence for Neolithic walls and palisades, on the other hand, is widespread, and sometimes near those walls and palisades there are relics of siege warfare, usually in the form of concentrations of arrowheads and sometimes in skeletal remains with arrowheads still embedded in the skeletons. There are some Neolithic cave paintings that illustrate prehistoric warriors engaged in siege warfare.

One good example of Neolithic siege warfare is at Catal Huyuk in south-eastern Turkey.¹⁰ The inhabitants there apparently did not build walls, which were common in the Neolithic eastern Mediterranean. They lived in building complexes with contiguous walls. If an attacker managed to break through one wall, he found himself in a small room where it would be possible

⁹ The site of many famous battles is unknown. The Battle of Zama between Scipio Africanus and Hannibal in 202 BC, the battle that ended the Hannibalic War, is a good example.

¹⁰ James Mellart, *Catal Huyuk: A Neolithic Town in Anatolia* (New York: McGraw Hill, 1967). See also Michael Balter, *The Goddess and the Bull: Catalhoyuk: An Archaeological Journey to the Dawn of Civilization* (New York: Free Press, 2004), and Ian Hodder, *The Leopard's Tale: Revealing the Mysteries of Catalhoyuk* (New York: Thames & Hudson, 2011).

to deploy only a very few troops. The main offensive weapon at the site seems to have been the sling, far more effective than many today realize. Another example is at Crickely Creek in England. Neolithic man lived there inside an encirclement of palisades. The gates in the outer ring did not match those of the inner ring. If an attacker broke through an outer gate he could not simply rush straight into the inner compound. Eventually this site did fall to an attack. Concentrated clusters of arrowheads have been found in the gates of the palisade, and the settlement was destroyed by fire.¹¹

Cavalry appeared for the first time in the Neolithic Age probably in southern Russia and spread into the eastern Mediterranean and eastern Europe and from there into Western Europe. Horse-mounted warriors were widespread by the end of the Neolithic Age. Horses became an important part of warfare up to the early 20th century. Much about their role in warfare is totally misunderstood. Horses are difficult to train and have a mind of their own. They bite. They kick. They will not charge anything they cannot jump. Sometimes loud noises, in abundance on most battlefields, scare them. They cannot gallop at full speed for great distances. The earliest Neolithic warriors who rode them had to put much effort into using them reliably in the field. A good cavalry horse has little in common with the Lone Ranger's Silver. A horse that neighs and raises itself on its hind legs can get its rider killed.

Horses cannot charge well-held infantry lines or squares. Cavalry is used mainly for running gaps or for flanking movements where there is nothing in front of the horseman except open space. One danger on the field is in pursuing too far and too fast. It blows the horses. This happened at Waterloo where a British cavalry brigade under Ponsonby drove the French corps

¹¹ Burgess, ed. *Enclosures and Defenses*.

under Erlon off the field but chased them some distance at full gallop. The British blew their horses and, when they trudged back to the battlefield on mounts so exhausted they could hardly move, the French slaughtered them. Ponsonby was killed by a French lancer.¹²

On the other hand, cavalry can be used for its shock effect against demoralized troops. A warrior of the line already frightened and exhausted can perhaps be forgiven for lacking the courage to face a body of charging horses threatening to trample him into the ground. If he turns to run along with others beside him, he and they will almost surely be killed. Turning one's back to the enemy is a nearly certain passport to that never-never land inhabited by fallen warriors. A line of well trained and highly motivated troops, however, as long as they remain in formation, can normally withstand a cavalry charge. Horses may be stubborn and difficult to train, but they are not stupid. Rather than run at a full gallop into a line of well-trained men, horses will turn at the last moment to avoid the clash. Incidentally, the riders will do the same. The trick is to convince the infantry that the horses will actually turn. No matter how often the commanding officer says that the only safety is in standing firm, a foot soldier facing the charging beast may momentarily doubt it.

It should be obvious that in some ways Neolithic warfare was highly developed, but the weapons were relatively primitive, including javelins, spears, slings, scaling ladders, stone axes, warclubs, and the bow and arrow. All these weapons can be fatal. Effective use requires leadership, discipline, and training. The U.S. army found in World War II that even with good weapons and the opportunity, U.S. troops had limitations as killers. S.L.A. Marshall, the army's chief military historian, found in interviews after the war that only fifteen to twenty-five percent of American

¹² There is an excellent discussion of cavalry in general and Ponsonby's rout in particular in John Keegan, *The Face of Battle* (New York: Penguin Books, 1983).

infantry riflemen ever fired their weapons.¹³ They were perhaps too scared, or they feared that by firing their weapon they would attract enemy fire. Some of them simply found it too difficult to shoot another human being. Riflemen do have to aim at a specific human target unlike artillerymen. After World War II and before the outbreak of the Korean War, the army changed its way of training infantrymen by having them fire at targets that looked like human beings rather than targets merely having a bulls eye.

In Neolithic times there undoubtedly was greater use of offensive weapons by men of the line. Much of the fighting was man-to-man. In modern warfare man-to-man fighting has virtually disappeared from the battlefield. Bayonets are still issued to some troops, but they are almost never used. Except for archers, slingers, and javelin men, Neolithic troops, relying on clubs, maces, and daggers, had to engage the enemy face-to-face, and it is very likely that archers, slingers, and javelin men had backup weapons for use after they exhausted their ammunition and closed with the enemy. Great courage is required for man-to-man fighting and considerable training and discipline are needed to drive soldiers into that kind of combat. Most armies have a handful of men who are gung-ho, the commando types, who usually do most of the fighting. That was probably true even in Neolithic times, but a far greater percentage of the prehistoric troops had to engage with the enemy directly. The common belief that early warfare was ritualized in order to avoid casualties and fatalities is far from true.

It is often assumed that the organization of command and logistics was a major weakness of Neolithic warfare. Keeley

¹³ S.L.A. Marshall, *Men Against Fire: The Problem of Battle Command*, (Norman: University of Oklahoma Press, 2000). There has been much written about Marshall's discussion of the ratio of fire. For a critical view see General Bruce Clarke's comments in Frederic Smoller, "The Secret of the Soldiers Who Didn't Shoot," *American Heritage* 40 (March 1989), 45. Whatever the truth of Marshall's statistics, he helped resolve the problem of men failing to fire on the enemy when conditions required it.

and Turney-High agree on this. Lacking the political and social organization of the state, Neolithic settlements could not train men in units as opposed to individual discipline and had no ability to transport ammunition and supplies over long distances or for a long period of time. It is probably true that early Neolithic political and military leadership was relatively weak. But the Neolithic period in the eastern Mediterranean lasted several thousand years from 12,000 to 3500 BC. By the end of that time Neolithic villages were on the verge of becoming cities and states. It is reasonable to assume that political and military organization developed substantially throughout the period. To judge from the Narmer Palette, the earliest Egyptian army immediately after the end of the Neolithic Age in Egypt was one of some sophistication in command and in logistics.

Both Keeley and Turney-High ignore one important facet of logistics: The simplest system is called “living off the land.” It has been used frequently even by modern armies and is characterized by some logical necessities. Armies that live off the land must stay on the move. They must always march toward food supplies either in the field or in villages and cities. Modern armies, because of their size, consume enormous quantities of food, but smaller Neolithic armies could be fed much more easily. As time went by Neolithic armies surely learned how to transport at least some of their food because early civilized armies had reasonably sophisticated logistical support systems.

It has been said that early Neolithic commanders could not have had any command of strategy since their objective was normally a single battle against a neighbouring foe. I agree that military strategy could not have been very highly advanced. There were no military academies and no recognized science of generalship. Still, it is fair to assume that the earliest Neolithic commanders learned some simple strategic lessons: Deny the enemy food by destroying his fields; employ surprise when possible in launching

an attack; amass a larger force than the enemy has; use scouts to gather intelligence. Some of these simple strategic facts often verge on tactics, but tactical considerations in early warfare often have some strategic value as well. We should not look for a Von Schlieffen plan in Neolithic warfare. A common strategy was probably the interdiction of unoccupied territory so that others could not utilize its resources. Related to that would be the maintenance of the no-man’s lands between villages. Another strategy was to plunder a weak neighbour’s territory since it was easier to do that than to work for the resources. Finally, there was the strategy of unconditional surrender, the defeat of the enemy and the seizure of his territory. In the ancient world this often involved the killing of the men and the enslavement of the women. It was always a brutal and violent act.

On the tactical level most authorities agree that prehistoric warfare almost certainly saw some ingenious practices. Both Keeley and Turney-High deal with several of them.¹⁴ The tactic of surprise, sometimes in an ambush, was probably a feature of Neolithic war. A Neolithic cave painting from Spain appears to show a double envelopment by troops attacking the center of a line while others attack both flanks. Siege tactics were almost certainly practiced with some skill since the fortification of villages with walls or palisades was common in the Neolithic Age. There are indications of military architecture in some of those fortifications. Troops were almost certainly trained to man the walls for defence and to attack them in offence. One common practice in ancient warfare during a siege was to place an agent inside the city or to entice a defector, who could at some point open the gates to the forces on the outside. Since the villages attacked in the Neolithic Age were almost certainly near the village of the attacker, there were probably some persons from one village familiar with some of the enemy villagers. If there were economic contacts between

14 Keeley, 42-58.

the two villages, it might have been possible to have had an inside agent.

This brief survey of certain features of warfare in Neolithic times may serve as the backdrop for a discussion of rank in Neolithic armies. From ancient to modern times stratification by rank in armies has been universally practiced. Even in non-military segments of society, Americans generally know that there are high ranking officers, sergeants, and privates in the U.S. Army. Many people, however, do not know the difference between a lieutenant general and a major general or between a sergeant major and a master sergeant. Military rank has become a bit of a mystery, with rank in the navy even more so. The history of military rank is even less well known. Who is the highest ranking American officer ever, when was the rank of general first awarded, and who was the first person to serve as lieutenant general are questions that would stump even many men and women in active service today.¹⁵

We can assume that military rank in Neolithic armies was much less complicated, but we can also safely assume that it did exist. The Age of Agriculture led to social stratification and specialization. Division of labour intensified as the Age progressed. Though there are no literary sources, we can assume that there were potters, priests or shamans, farmers, chiefs, tools and weapons makers, warriors, and traders. By the end of the Neolithic Age and the beginning of civilization these and others were firmly attested. Some had undergone considerable development over the long period of the Neolithic. Political leaders, who also usually served as military leaders, were on the verge of

¹⁵ The highest ranking officer in the history of the U.S. Army was WWI General Pershing, who was awarded the rank of General of the Armies. Ulysses S. Grant was the first to hold the four-star rank of general, and Winfield Scott was the first to be named Lieutenant General, although George Washington may have held that rank in the Revolutionary War. Several WWII generals held the five-star rank of General of the Army.

becoming kings, and their villages or towns were becoming city-states.

In the eastern Mediterranean, as early as the seventh millennium BC, 5000 to 6000 people may have lived at Catal Huyuk in modern Turkey, and the population of Jericho at about 8000 BC has been estimated at 2,000, with a possible defending force of 500 to 600 men. At the beginning of the Neolithic period in the Near East some armies may have numbered up to 1,000 or so and by the end of the period somewhere between 5,000 to 10,000 men. Armies of that size compare with full scale historic armies of a much later period. If size alone is a consideration, prehistoric armies were capable of practicing warfare in a highly sophisticated fashion. In fact, men can be organized effectively for war in groups of less than 500.

It is possible that there was only individual discipline in the earliest armies. As time went by, however, and Neolithic populations grew, warfare became more sophisticated, and unit discipline emerged. Every unit that was trained to fight in a line and to march in a column needed its own commander, and a cadre of early officers appeared as villages grew to 500 or so occupants. Such villages could probably have fielded an army of 150 warriors. Squads of 10 men would have been assigned to larger companies of 50, each with its own captain. As we have seen, there was a population explosion at some point in the Neolithic period, and by the end some Neolithic towns and villages numbered in the thousands. By then Neolithic armies were likely at least a thousand strong. Armies in the early civilized period were rather sophisticated, and some of that, particularly in the Near East, must have appeared in the late Neolithic.

We can assume that by the time civilization emerged Neolithic armies had a range of officers and warriors with several ranks. Egyptians at an early period had armies of tens of thousands and

a system of rank that became standard. Late Neolithic armies would have had fewer ranks, but we must assume that they had several. The armies probably were not standing armies. In all likelihood men were called up on a voluntary or mandatory basis as needed. Most ancient warfare was conducted in the summertime, and that was probably true in the Neolithic period as well. Armies normally began their campaigns in the spring, when it was possible to harvest some enemy crops. Living off the land in the wintertime could lead to starvation.

If we can assume an army of 1,500 men, such a force would probably have been divided into three main groups of 500 each. There would have been two companies of 250 men, each having five platoons of 50, and each platoon five squads of 10. This, of course, is speculation, but based on the organization of the early Egyptian army, it seems not unreasonable. Remember that these estimates are for late Neolithic sites in the eastern Mediterranean. There would have been an overall commander, the village or town chieftain or king, three captains in command of 500, fifteen lieutenants in command of the platoons, and 75 sergeants in command of the squads. We cannot know what titles these officers and non-coms were given, and the titles probably varied from site to site. The captains and lieutenants may have been chosen from the local aristocracy, but the sergeants were probably selected for their fighting ability. In sites that fielded cavalry, only those wealthy enough to have horses would have fought.

In any event, if we think of the “beginning of the age of agriculture” as the entire Neolithic period, we can see that Jeffrey Rubinoff was certainly correct in assuming a relationship between the origins of agriculture and the emergence of an institutional warrior class. The wandering nomadic tribes of the Palaeolithic Age may sometimes have clashed with other bands of hunters and gatherers, but the scuffles and melees that resulted cannot be called war. By the end of the Palaeolithic Age the rapid increase

in the use of bows and arrows and slings and the need to settle down to grow crops led to the outbreak of organized warfare, and organized warfare required an officer class to impose the rigid discipline and training necessary for success in war. As I have said in another publication, when Neolithic man first emerged from civilization and learned how to write, he had wars to write about.

Appendix to Military Rank and the Origins of Agriculture

The figures on the following three pages were sourced from:

George Nash, "Assessing Rank and Warfare-strategy in Prehistoric Hunter-gatherer Society: A Study of Representational Figures in Rock-art from the Spanish Levant, Southeastern Spain." *Warfare, Violence and Slavery in Prehistory: Proceedings of a Prehistoric Society Conference at Sheffield University*. (Oxford: Archaeopress, 2005): 76-79.

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FIGURE 2. Cuvea Remegia, Gasulla, Castellón, panel IX (after Ripoll Perello 1963).



FIGURE 3. Les Dogues, Castellón (after Ripoll Perello 1963).



FIGURE 4. Cuevas del El Civil, Castellón, panel III (A) (after Mateu 2002).



FIGURE 5. Minateda, Albacete (after Mateu 2002).

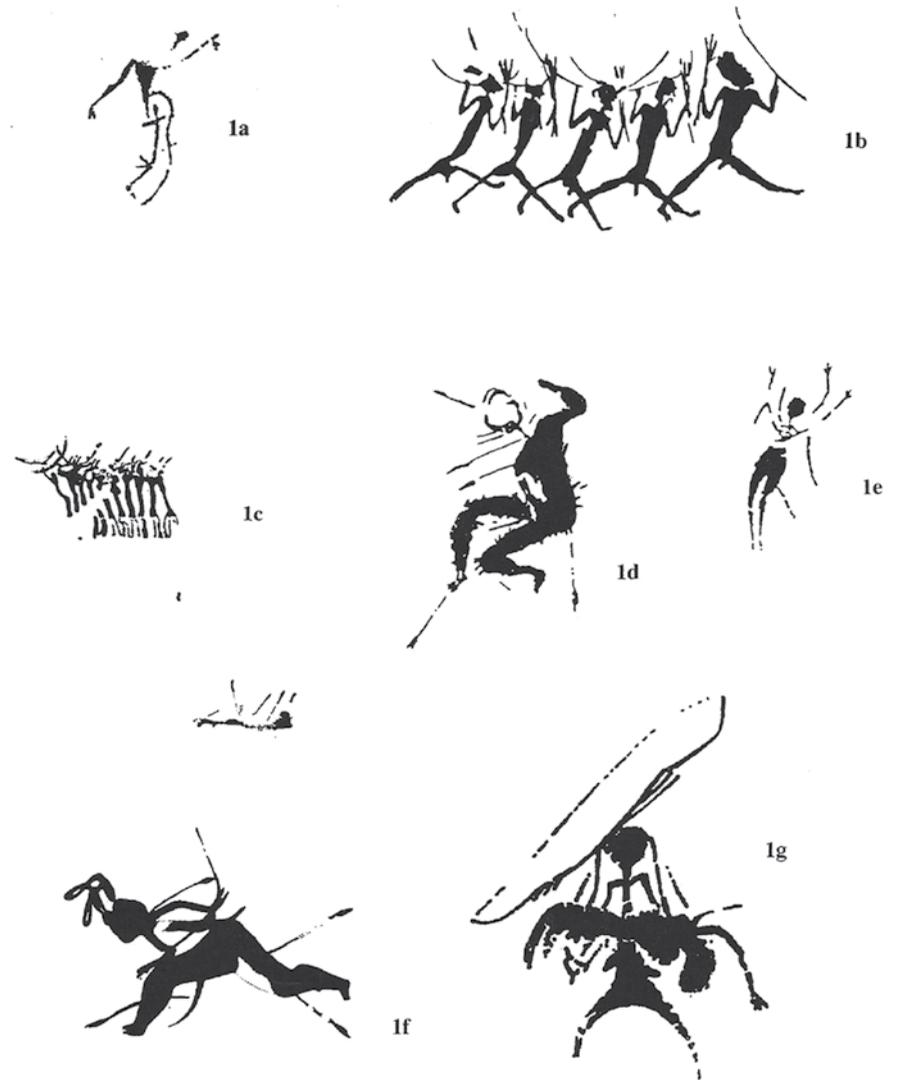
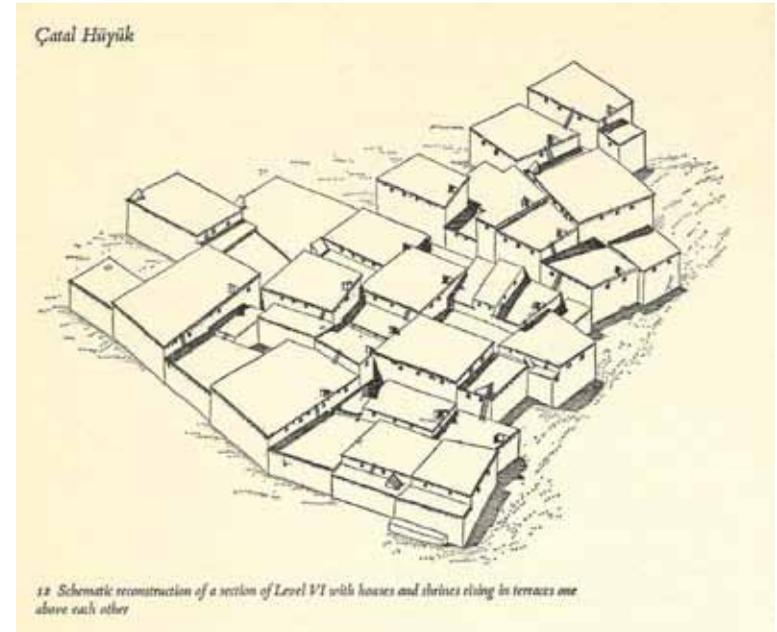


FIGURE 1. a. Execution scene from the El Cingle de la Mola Remegia, Gasulla, Castellón (after Beltrán 1982). b. A file of ceremonial archers from El Cingle de la Mola Remegia, Gasulla, Castellón (after Beltrán 1982). c. Execution scene from El Cingle de la Mola Remegia, Gasulla, Castellón (after Beltrán 1982). d. Gladiatorial combat with wounded warrior from Cuvea Remegia (caveat IV), Gasulla, Castellón (after Mateu 2002). e. Execution victim from El Cingle de la Mola Remegia, Gasulla, Castellón (after Beltrán 1982). f. Injured warrior with two arrows through the legs from El Cingle de la Mola Remegia, Gasulla, Castellón (after Ripoll Perello 1963). g. Archer and dead or dying comrade from the El Cingle de la Mola Remegia, Gasulla, Castellón (after Ripoll Perello 1963).

Slinger at Catal Huyuk, Turkey



Artist's interpretation of the Neolithic site at Catal Huyuk, Turkey



The figures on the preceding two pages were sourced from:

James Mellart, *Çatal Hüyük: A Neolithic Town in Anatolia*. (New York: McGraw Hill, 1967): 62 and 92

DIALOGUE ON ARTHER FERRILL'S 2013 PRESENTATION

Jeffrey Rubinoff: The first thing I would like to do is thank Arther for filling in a period of time that I didn't feel like I could deal with in the 2010 paper that I wrote called *Art Beyond War*. I couldn't deal with that transitional period into agriculture partly because the question of the provenance of the art required an expertise about the warfare itself. So I thought that it was really important that Arther has been able to fill in something that I had not been able to address.

When I looked at the Paleolithic paintings, there was no evidence of war whatsoever. I was able to look at the paintings in those Palaeolithic caves — Lascaux, Altamira, and ultimately the Chauvet cave — and see a fusion of the artist themselves with the painting, and how extraordinary that was.

That I did consider a great gift of art to knowledge.

We can see in Arther's presentation that as warfare begins, there is this transition to art illustrating warfare. That seems to be one of the strongest things shown in this particular period.

And what Arther says in his book *The Origin of War* which he doesn't say in his paper is "In the Epipaleolithic, and the Proto-Neolithic periods, also collectively known as the Mesolithic age (12000 to 8000 BC) there was a revolution in weapons technology that has only few modern parallels — the invention of gunpowder, the locomotive, tanks, the airplane and the atomic bomb. For this staggering power to make its first appearance, weapons along with the Paleolithic spear, the bow, the sling, the dagger, or the short

sword or the mace — this new revolutionary technology — were combined with the invention of military tactics that by historical standards appears as true warfare."

So we have to look at what technology and war has meant to us in terms of our development. A question I have asked many times in these years and in these forums is: What major technological developments since 1945 cannot be attributed to the military industrial complex? Even transgenic engineering seems to have its birth in biological warfare.

What I saw at the end of the Age of Agriculture is the abrupt ending of the rationalization of war, as this incredible escalation of technology from the enlightenment through the industrialization period culminates in the atomic bomb.

I am raising this because Karun Koernig has asked me to bring this year's Forum up to date on my concept of the end of the Age of Agriculture and its relation to art.

I looked at the age of warfare and the Age of Agriculture as almost interchangeable. But what I was most concerned about when I was evolving the concept of the end of the Age of Agriculture was to have a position to be able to address the issues of what I considered to be the loss of rationalization, or the loss of the institutionalization of rationalization. This is needed in order to deal with nuclear deterrence as well as transgenic engineering.

I felt we needed a language of transition because we did go through a transition. But if we maintained the institutional reasoning of the previous 10,000 years, what we end up with is this rationalization of warfare.

This is really interesting because of how much war has been rationalized in the Age of Agriculture and how much we still do it

almost instantly. Given a potential for going to war, we will institutionally look for a new rationalization; whether it is the Falklands or Iraq, we just instantly find new rationalizations. This is the part that we have to get beyond. Maybe skirmishes or smaller wars are the only way to move beyond that.

We need a language that moves beyond the language of rationalization.

And that is what I am trying to work for now, this concept that we are born with a potential for conscience that is not rationalized. And that is the definition of art that I use: "Art is an act of will in accord with a mature conscience." It is searching for that position of being able to be a witness to life itself without rationalizing its destruction.

And I see that it is not automatically there. Many people, for many generations, have just assumed that war was part of human nature.

So the thought is that modern humans came out of Africa into Europe about 50,000 years ago. And not long after they come out of Africa to Europe, the cave paintings appear.

If we look at 50,000 to 35,000 years for the Chauvet caves, we can see that those human beings, of which our human genome is a part, do not automatically gravitate to warfare as part of their nature.

The best that I can tell is that for the last 200,000 years, the human genome has been pretty stable, so it is the work of modern human beings we are seeing in the caves.

And the paper that David Lawless will give will take us back to the genome itself, to the concept of a moral "sense" being our evolutionary nature, versus a propensity for war.

If there is a possibility that we can envision a structure of language that can get us past that perception, then we can deal with the issues of transgenic engineering.

Should we remain with rationalization, we are going to oversell transgenic engineering just the way that we oversold nuclear power as an excuse for nuclear weapons.

If we really look at it, what nuclear power resulted in was a waste stream that was simply turned into weapons — from 1945 to very recently. There was a high point in the 1980s where there were so many weapons it was unbelievable, and the idea of continuing to recycle nuclear waste into weapons became absolutely absurd, but it was entirely rationalized.

So that is the rationalization that is built into the psychology of the institutions of the Age of Agriculture. Perhaps it is just a quixotic thought, but the way that I see art is a statement that exists beyond this rationalization. And that is what I mean by a mature conscience. We can look at the art of the Paleolithic caves in terms of that ability to reach beyond it.

We can't do that anymore once we reach the Neolithic period. We can already see that the excitement in these drawings is in actually hunting man. So already the purpose of art has changed.

So what I would like to see from art in terms of a long-run perspective is to actually evolve a language past this rationalization.

James Fox: I would like to ask a question of Dr. Ferrill. You showed these wonderful images of battle scenes. I just wondered what you think the function of those was. Do you think they were records of past battles? Were they some premonition of future battles? What is your interpretation of their function?

Arther Ferrill: You know, I am not sure what their function was. You might argue that some of them are designed to reinforce military values and attitudes, where they show disciplinary punishment, marching in line, things of that sort, but a lot of them are not that obvious. I have no idea of the purpose, and even in the case of the ones I have mentioned, I can't be sure of what I am suggesting.

One thing that I do believe is that all prehistory is speculation. And that it has been from the beginning. You have some physical evidence which is pretty limited. And from that the archaeologists and the anthropologists have built large constructs of religious concepts.

For example, the Venus figurine is found over great areas in different cultures in slightly different forms. Everyone seems to believe that the Venus figurine was a reflection of a fertility cult. Yet that is just pure speculation; the Venus figurations were statuettes usually with large breasts, large belly, and exaggerated vulva, and so it was easy to interpret as a Venus, as fertility.

But it could also be that in prehistoric times there wasn't much food, and there weren't very many women that would have been overweight. And the overweight women just seemed especially attractive to prehistoric man. Or maybe they were just dolls. All I am saying is that it is all speculation, because you don't have any written documents. You have nothing to explain what those people were thinking.

Sergei Petrov: I completely appreciate the difficulty of interpreting these paintings. I would like offer an artist's perspec-

tive, as a caution as to how they can be misinterpreted. First of all, you cannot assume that these drawings represent a moment in time and space. For example, when you see twelve people with bows and arrows, it does necessarily mean it represents a group. The space is limited, so as an artist practicing on a wall, it would be natural to draw one figure after another next to each other, trying to get something right. So their relationship to one another isn't necessarily represented by what they do in combination.

Second observation — I don't think they represent paintings in the modern sense. We are already conditioned by our recent culture to interpret two-dimensional drawings as a three-dimensional space.

At that time, I think these painters were more like two-dimensional sculptors. If you look at each one of them, there is some center there, but there is no perspective. There is no ground on which they stand. There is no background. That is why, for example, I am skeptical of the scene of the execution, on page 37 [of this printing], because I personally think there are unrelated drawings which just happen to be together. To imply that they represent a whole scene would be to imply that there is perspective, there is a ground which they stand on, which would be inconsistent with the rest of the images.

As to the figures you describe as having different military rank, it is also very easy to jump to conclusions. If you look to figure one and figure two, it could be the same figure, the same individual drawn at a different angle, we simply don't know. If you look at the history of art, as you all well know, the concept of perspective and placing the object into the environment came much later.

Karun Koernig: Dr. Ferrill, in your paper you have said that the political and military were intertwined, that the political leadership was drawn from the warrior class.

Would you comment on which came first? Is there any way of assessing the order?

Arther Ferrill: What we do know with some certainty is that by the beginning of the civilized times — which puts us right at the end of the Neolithic — the political leadership usually provided military leadership. That is to say that the king usually led the army in the field.

So I tend to project that backward into the late Neolithic period and assume the political leadership was in control of the military, but there really isn't any way of knowing with any certainty.

Peter Clarke: Let me say that we have heard a very interesting presentation by someone who has a great mastery of this important field. I want to raise a question about methodology here, not in order to challenge your interpretation, but really to test its robustness in a general way.

You rightly say that you disagreed with the traditional interpretation of the archaeologists who were not interested in warfare and seemed to believe prehistoric man was peaceful and unwarlike. And you chart the general shift that has taken place with which your own work is associated here.

It is always much more difficult to prove a negative than it is to prove a positive. If you are trying to say something does exist, you

find one example, and you document it, and you can point to it. If you say that something doesn't exist because there is no evidence for it, that may be because it really didn't exist or maybe that we just can't find the right sort of evidence.

So if you're saying that warfare does exist in the Neolithic period, you are quite convincing in producing different kinds of evidence here. But can I point out an underlying point that you have already made in your presentation on page 24 [of this printing] that unfortunately "for the Neolithic Age there are no literary sources at all. If armies clashed in the open field, and I assume they did, we remain ignorant of their battles and their strategy and tactics."

I just wanted to point out the very honest acknowledgement of the limits of the evidence within which we are working here, and it seems to me that in therefore mounting your argument about warfare in the Neolithic period, you are inevitably pursuing a methodology which I think in the age of the Enlightenment often went under the name "conjectural history." In essence we have built by inference from a small number of empirical examples, to what seems to be a reasonable interpretation here.

My question arising out of this is that if you have to rely on this sort of reasoning in the light of the evidence that exists and survives from the Neolithic period in order to suggest that there was war in the modern sense, how can we be confident that war didn't exist in the Paleolithic period, where much less evidence survives of all kinds? How confident can we be in assuming that simply because we find fewer pointers to something that we can identify as war, that war as we would recognize it did not exist in that still earlier period?

Arther Ferrill: A very good question, and I am not totally confident, but I am inclined to believe that war didn't exist. I do believe that there was fighting and killing in the Paleolithic period. I am inclined to believe that most of it took the form of what we would call skirmishes and melees and not organized warfare. But someone someday may prove me wrong.

Peter Clarke: That would be very inconvenient from Jeffrey's point of view.

Jeffrey Rubinoff: I am quite aware of the possibilities of that. What I am trying to do is project what we might learn from the art. And that is conjectural; for all we know, the artists just didn't bother illustrating it.

Arther Ferrill: The art of the Paleolithic period is just very different from that of the Neolithic. I looked at lot of Paleolithic art, hoping to find some evidence of warfare, but I didn't find anything.

Jeffrey Rubinoff: Nothing? And there obviously is a lot more art than just these caves, as well.

Maria Tippett: Yes, there is much more than just what's in the caves. In an Ice Age exhibition that is on right now at the

British Museum, there are figurative works from 30,000 to 40,000 years BC which are really quite stunning.

Aaron Rosen: Just a basic question. We were talking about the definition of warfare versus fighting. Would you say you are talking about a difference in technology, or technique, or ambition, or scope that really defines warfare versus a skirmish?

Arther Ferrill: Well, I think it's not just scope, but it is a deliberate organization and discipline that you do not have evidence for in the earlier period. And if you did have evidence for it, you would probably have warfare. Warfare involves the use of discipline and organized troops. And without it, you simply have a melee or a skirmish.

One of the most interesting things that have happened in the last 20 years is when some of Jane Goodall's monkeys on one side of the island just packed up one night and moved over to the other side of the island and killed a bunch of the chimps on that side. They just killed them — no obvious explanation. They weren't living contiguously. Until then, I think everyone had assumed that chimps were peace-loving creatures.

Karun Koernig: One of the things that I wanted to ask Dr. Ferrill was related to the rationalization of war. How does rank influence the rationalization to go to war? You mentioned that going to war was often rationalized by some breach of honour.

Arther Ferrill: In the earliest period for which we have literary elements, such as the Trojan War, the rationalization was to avenge a king who had been abused by the seizure of his woman, Helen. And you have the motivation for war associated with things like that in the earliest period for which there are written accounts.

But then you have territorial disputes that are usually interpreted to the advantage of the side going to war, as an excuse later on. Then occasionally, in the case of the Romans in the third Punic war against Carthage, they don't have a very good pretext for going to war. They have a minor pretext, but the major reason for going to war against Carthage is because "we know the Carthaginians hate us so much that if we allow them to keep growing and become strong again, they are going to turn against us. So that is why we go now, before they can wipe us out."

Tom Stammers: I have something between a comment and an observation about something that Peter Clarke said earlier on conjectural history. Because in reading this, there is Jean-Jacques Rousseau on every other page, there is Adam Smith on every other page; I mean the retelling of this story and this transition is fundamental to Enlightenment social thought, precisely because it is so speculative in some ways. So we need to see this story as a model. It is very powerful for that purpose.

Arther Ferrill: I would argue that the "counter prehistory," the prehistory represented by all of the people that I don't represent, is equally speculative.

Tom Stammers: And just to echo Rousseau, what was fundamental in the transitions he identified with the shift to agriculture is the emergence of property. It is one of the words you don't talk about, but a discussion of the "fall of man" and violence is inherently related to the institution of property. The Age of Agriculture is also then about the age of private property.

Arther Ferrill: Yes, that is very important. I do, in a very slight way, deal with that when I talk about territorial property, the confines of one city or village as opposed to another, but I don't get into the question of private property.

Peter Clarke: Just a small footnote to that, since it is so apposite for Jeffrey's idea, doesn't Locke say that the origin of property is when a man has mixed his labour with the soil? You couldn't have a more explicit idea that private property originates in agricultural activity.

Sergei Petrov: I would like to offer a different perspective on the origin of ranks, and I would very much appreciate your opinion because we were talking about the emergence of the military. But what about the emergence of the police? As someone who grew up in a totalitarian state, I am well aware of militarization and domestic uses of the military. So I am just wondering if in earlier communities, the military was used internally more than externally first, especially given the scarcity of the population.

Because before you can wage a successful war against your neighbour, you need to maintain power within your own community. And while you can raid your neighbour with a very rudimentary military organization, policing a local community requires the maintenance of secrecy, which requires command structures of who reports to whom and who is responsible for whom. That, in my opinion, is a more conducive environment for creating hierarchy and a hereditary system of rank.

Arther Ferrill: That is an interesting question. I wouldn't want to presume to know the answer definitively, but I know that in a number of ancient states — and again, I use them because they come right after the Neolithic period — the use of military power for the most part was genuinely military.

That is, the Roman legions, in the days of the Roman Empire, served mainly to protect the frontiers. There are a few exceptions. The legions in Syria were there to be on guard against Jewish rebellions, and there were probably some exceptions in North Africa, but for the most part, the legions were stationed along the frontier to protect the frontier, not to police the provinces internally.

Of the 30 legions maintained by the emperor in the days of the high Roman Empire, I don't think more than five of them would have been used for internal purposes, and even those five had other functions as well.

So, that is also true in Egypt in an earlier period of antiquity. The Egyptian armies, for the most part, seemed to have served as defenders of the Egyptian frontiers and were in fact much more active on the eastern coast of the Mediterranean and even up into Turkey than they were in Egypt.

Maria Tippett: Were they conscripted?

Arther Ferrill: Yes, Egyptian troops tended to be conscripted, and so were Roman troops until the days of the high Roman Empire. The high Roman Empire army depended on volunteers. But in the days of the Republic and the wars against Carthage and so forth, they were conscripts.

Jeffrey Rubinoff: What we have to look at, at the beginning of these agricultural communities, is the importance of the granary. And that hasn't yet been mentioned, but they are a critical part of each one of these Neolithic villages.

If you just harvest grain as a gatherer, you just pick it up. But as you start to grow it, you are going to have to really understand those cycles, and that takes time. The way that I explain this is that in my left hand I hold wheat, and in my right hand I hold seed wheat. What is the difference between the two? Absolutely nothing.

Firstly, the people of that village have to volunteer their crops to create a granary, because if they don't, during famines — the seven years of want — they will eat the seed wheat. If they eat the seed wheat, the village dies. In one hand is food, in the other the future of the village.

At some point or another, those two things surely must come into conflict. And the conflict would be over how to share the food in the granary.

I think that is how you end up with the priesthood. Because somebody is going to have to predict the output of these crops in order to rationalize how much could be eaten and what should be saved. Then they need a police force to protect the granary, firstly against their own people, and then against the intruders.

Now you have to have whole institutions built around the granary, and these are the institutions of rationalization.

Arther Ferrill: When you start running out of wheat as opposed to the seed wheat, that is when you have to start thinking about raiding your next-door neighbour's granary.

David Lawless: There has been a tendency among the scientific community and scientists to take up a Hobbesian philosophy of perpetual warfare and assume one narrative of prehistoric evolution; that, I think, might contribute to some of the uncertainty we have in reaching conclusions about the difference between the Neolithic and Paleolithic periods.

Hobbes talked about man being in a perpetual state of war, whereas later you have Kropotkin, who proposes that competition and warfare is a modern development and not characteristic of primitive mankind.

I think there is a risk of assuming that it is either competition or cooperation within the Neolithic and Paleolithic periods. I think that we will never be able to distinguish those mechanisms at that level.

Karun Koernig: I have one last question related to the rewards system for the various ranks as a practical way of motivating military conscripts; how you see the evidence for that emerging. What is the earliest evidence for an institutionalized rewards system?

Arther Ferrill: I am not sure that there is any evidence for that in the prehistoric times. We know that it happened later on in the ancient world. When the Romans went to war, they always appointed a general who then had the responsibility of raising his army by appealing to citizens to sign on. And those generals almost always promised a share of the booty to the Roman citizens. And later on, they were even promised land grants for their service. So it was definitely very common in the ancient world to think about the booty, and the booty was an incentive for going to war. And I assume that that was true in the Neolithic period, but I can't say that there is evidence for that.

Alex Massouras: In the Paleolithic images of hunting, are there any indications of rank? Because that would speak to some reward.

Arther Ferrill: Actually, in most of those images of hunting, and you can correct me if I am wrong about this, but I think the depictions are mainly of animals. You don't have a lot of depictions of humans in those Paleolithic paintings; there are some but not a lot. So you don't have any way of knowing whether there is any rank within the hunting community.

Karun Koernig: I wonder if you could clarify whether your definition of organized and disciplined troops implies the need to have a large enough population base to support at least part-time military specialization. Doesn't this, in turn, imply a predictable means of feeding those specialists, such as agriculture?

So, I wonder if the definition you give of war is a projection backwards from our current perspective. If we do this, don't we rule out a definition of war that could potentially have been applied to Paleolithic periods because the communities would have been so small?

Arther Ferrill: I think there is some truth to that. What I suggested at the outset is that agriculture required man to settle down. And once he settled down, he had to defend the territory that he settled in. On the other hand, the development of war forced man to defend himself, and that meant building walls and building essentially settled communities. And that is a part, also, of agriculture. You have to accept the communities in order to have agriculture. And the two are so closely interrelated it is hard to separate them.

THE EVOLUTION OF MORAL SENSE AND THE ART OF MATURE CONSCIENCE

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“... current scientific evidence and literature have developed Darwin’s original logic into a modern understanding of moral sense, as well as the social instincts, such as altruism, that shape it. ... no matter which level of biological organization selection acts on, social behaviours which can indicate conscience or moral sense, have evolved through the process of natural selection.”

— David Lawless

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Introduction

According to sculptor Jeffrey Rubinoff, in order to understand the role of the artist in society, we must first integrate natural history with history itself since all humans share the narrative of natural history¹. Central to this understanding is the examination of Darwin’s theory of evolution by natural selection, which provides a judicious account of human development, including the mental powers and intellectual faculties considered key to artistic expression. Although many scholars, scientists, and historians alike often take possession of Darwin’s terminology rather than his leading ideas, it is important to establish the scientific basis for many of his arguments that have considerable implications for enriching the role of art in society.¹ Expanding on evidence supporting Rubinoff’s argument suggesting that the Paleolithic age represents a vital point in the evolution of artistic development², I plan to address the issue of moral sense according to Darwin and integrate this concept into Rubinoff’s definition of art as “an act of will in accord with a mature conscience.” I propose that moral sense is a necessary condition of a mature conscience, and as such, we must consider if this condition is evolutionarily derived.

Since Darwin was one of the first to approach moral sense exclusively from the side of natural history, there was limited empirical evidence at the time to support or refute his theory. As a result, this paper will examine the scientific development of moral sense expounded by Darwin and place this concept within the framework of modern evolutionary theory. I contend that there is sufficient scientific evidence to support Darwin’s concept

1 Rubinoff, *Existential Realities of Post Agriculture* (Hornby Island BC Canada: The Jeffrey Rubinoff Sculpture Park, 2012), 21.

2 See Rubinoff, *Art Beyond War: A Discussion About Prehistoric War and the History of Art by Artists* (Hornby Island BC Canada: The Jeffrey Rubinoff Sculpture Park, 2010).

of moral sense as a product of evolution, which places Rubinoff's notion of "mature conscience" within the realm of scientific credibility. After a careful examination of Darwin's original texts and those scholars whom he influenced, I will present an argument in favour of the protection of diversity and highlight some of the scientific consequences for transgenic engineering, which Rubinoff suggests is one of the existential realities of the artist.¹ Finally, I will discuss the implications of moral sense as a means to move beyond the age of agriculture, and as Rubinoff argues, "the plasticity of morality."¹

Foundations of Moral Sense

In *The Descent of Man, and Selection in Relation to Sex*, Darwin proposes that moral sense, by which he means to suggest conscience, can be explained in terms of natural history as the result of evolutionary processes. Moral sense, as he argued, was the biological basis of morality, obtained from ancestors through the process of natural selection.³ Darwin described moral sense as being the highly complex sentiment that tells us "what we ought to do and the conscience which reproves us if we disobey it."⁴ For Darwin, the moral sense or conscience was also considered to be the most important distinguishing feature of all the differences between modern humans and lower animals. Nevertheless, he maintained that while "the difference between the mind of the

3 Charles Darwin. *The Descent of Man, and Selection in Relation to Sex* (1871), (London: John Murray, 1871), 145.

"Natural selection is the mechanism by which beneficial variations or traits in a population tend to be preserved while unfavourable variations tend to be lost, as a function of differential survival and reproduction. Evolution is the change in the inherited characteristics (i.e., gene frequencies) of biological populations over time."

4 Ibid., 93.

lowest man and that of the highest animal is immense,"⁵ a moral sense was one of degree and not of kind:

"[A]ny animal whatever, endowed with well-marked social instincts, would inevitably acquire a moral sense or conscience, as soon as its intellectual powers had become as well developed, or nearly as well developed, as in man."⁶

In his determination, Darwin considered four main factors as being fundamental to the development of moral sense. First, social instincts "le[a]d an animal to take pleasure in the society of its fellows, to feel a certain amount of sympathy with them, and to perform various services for them."⁷ Second, the development of mental powers enhance the memory and mental evaluation of past impressions and actions, both good for and detrimental to the community, which guide individuals to act differently for the future. Third, as mental powers and intellectual faculties develop, the power of communication and language grow stronger, thereby allowing individuals to become consciously aware of the needs of others and express their own desires. Finally, habitual behaviour, which benefits the community through a repeated standard of conduct, helps solidify social instincts of mutual aid in society. Of these four main factors, the social instincts and development of mental powers were considered the most essential in forming moral sense, whereas development of language and the inherited habits, while both important contributors, served to reinforce the moral sense, or conscience.

Nevertheless, it is our social disposition as humans that Darwin argued was paramount to the development of moral sense, asserting that "the moral sense is fundamentally identical

5 Ibid., 70.

6 Ibid., 72.

7 Ibid., 88.

with the social instincts”⁸ as both relate at first exclusively to the community. Furthermore, humans are, by their very nature, social animals as a consequence of natural selection. For example, Darwin maintained that humans descended from some comparatively weak but social species, such as the chimpanzee, rather than from some stronger but unsociable and isolated species, such as the gorilla.⁹ This social behaviour contributed to mutual aid among groups, which increased the fitness and evolutionary potential of the species. Therefore, because of our social instincts, Darwin claimed that other faculties, such as mental powers and communication, could emerge and further contribute to moral sense.

In the development of mental powers, the ability to evaluate past experiences and impressions allows humans to evaluate their actions as being advantageous or harmful for the community, and to adjust them suitably for the future. This power of memory, acquired through mental powers, is what Darwin also believed reinforced our moral sense or conscience:

“A moral being is one who is capable of comparing his past and future actions or motives, and of approving or disapproving of them. Man, from the activity of his mental faculties, cannot avoid reflection: past impressions and images are incessantly passing through his mind with distinctness.”¹⁰

This mental power, Darwin insisted, would be the beginning of conscience. It is highly probable that the intellectual faculties have been gradually shaped either directly or indirectly by natural selection, since these faculties are variable and are inher-

8 Ibid., 101.

9 Using modern phylogenetic analyses, we now know that Darwin’s prediction of human ancestry is accurate.

10 Darwin, *The Descent of Man*, 89.

ited.¹¹ Darwin noted that in primitive society, individuals who are most perceptive and who are best able to defend themselves and care for their group would rear the greatest number of offspring. Hence, it seems entirely possible from Darwin’s account that “the number of men gifted with such virtues could be increased through natural selection, that is, by the survival of the fittest.”¹² Following this development of mental powers and intellectual faculties, language and communication significantly improve in humans. Darwin explains:

“If it be maintained that certain powers, such as self-consciousness, abstraction, etc., are peculiar to man, it may well be that these are the incidental results of other highly-advanced intellectual faculties; and these again are mainly the result of the continued use of a highly developed language.”¹³

Although a “highly developed language,” mostly linguistic, is used to explain the power of communication in forming moral sense, I argue that this “developed language” could also extend to include artistic expression. Evidence suggests that the language of art, both visual and musical, can facilitate the conscious exchange of ideas of others and to express this collective memory for the future. Further, being able to communicate and transmit information more effectively than written or spoken language, as well as to inscribe this memory for the future, is extremely important for our survival as a species.¹⁴ However, this does not reduce artistic expression and aesthetic experience to some biological function or imperative. Instead, it suggests that genes selected

11 The requirements for natural selection to act are variation among individuals in a population, heritability of this variation, and differential survival or reproduction associated with the particular trait in question.

12 Darwin, *The Descent of Man*, 163.

13 Ibid., 105.

14 Koernig. *The Inherent Value of Art at the End of the Age of Agriculture* (2009), 7.

for highly developed intellectual faculties, including language and visual acuity, are also associated with traits important for artistic expression, such as imagination and abstraction. Studies suggest that imagination and abstraction serve to enhance the imprinting period of learning, which is vital to the development of intellectual faculties. Therefore, it is not unlikely that selection of traits responsible for highly developed intellectual faculties also includes traits linked with artistic expression. Interestingly, Darwin believed that the success of these highly developed intellectual faculties in societies is achieved “mainly, though not exclusively, through their arts.”¹⁵ Although he mainly considered these “arts” as inventions of technology, traits such as adept visual acuity necessary for their production would have been extremely beneficial for survival. Through selection for this heightened visual acuity, other traits associated with artistic expression would also be enhanced.¹⁶ In Europe, for instance, the success of humans supplanting primitive societies of the Bronze Age was “probably due in a degree to their superiority in the arts” since “the habitual practice of each new art would likewise strengthen the intellect.”¹⁷

Not only was the power of communication and language vital to the development of moral sense, but Darwin also believed that “the effects of habit naturally lead to the foundation of a moral sense.”¹⁸ He argued that individuals would acquire habits of socially approved behaviour that would direct the moral instincts, through which individuals would learn how to help their neighbours and advance the welfare of their group. Habitual behaviour, according to Darwin, is a means to balance social instincts, with their derived virtues such as sympathy, against the lower and stronger impulses or desires. The struggle between noble acts and the

15 Darwin, *The Descent of Man*, 160.

16 Lawless, 88–89.

17 Darwin, *The Descent of Man*, 160.

18 Ibid., 106.

often-stronger impulses that lead individuals to gratify their own desires at the expense of others is characterized as one requiring self-command. Darwin argued, “through long habit we acquire such perfect self-command, and man’s desires and passions will at last instantly yield to his social sympathies,”¹⁹ thereby reducing the struggle between the higher and lower impulses until the virtuous social instincts become inherited through natural selection. From Darwin’s estimation, if an instinct, such as sympathy, is in any way more beneficial to a species than some other or opposed impulse, the former would be rendered the more potent of the two through natural selection, and individuals with this instinct most strongly developed would survive in larger numbers. These habits, as Darwin maintained, were followed during many generations, and in the future, “we may expect that virtuous habits will grow stronger, becoming perhaps fixed by inheritance.”²⁰ Hence, what originated as a basic instinct responding to obvious perceptual cues in our human ancestors would become, from Darwin’s view, a moral motive under the guidance of social behaviour and intelligence.

Clearly the account that Darwin gives in explaining the evolutionary origins of moral sense is a matter of defining the necessary inputs rather than predicting the outcomes. These four conditions or “inputs” (i.e., social instincts, development of mental faculties, power of communication and habitual behaviour) are necessary, but equally, they are not predictive of a unique outcome of moral sense or conscience. Indeed, moral sense is not only a necessary condition of a mature conscience, it is arguably a mature conscience, at least in how Darwin characterizes it:

“Ultimately, a highly complex sentiment, having its first origin in the social instincts, largely guided by the approbation

19 Ibid., 91.

20 Ibid., 104.

of our fellow-men, ruled by reason, confirmed by instruction and habit, all combined, constitute our moral sense or conscience.”²¹

As the moral sense evolved, so did our distinctively human nature along with all the inherent existential realities Rubinoff has outlined.²² Therefore, we must now consider the extent to which current scientific evidence supports Darwin’s evolutionary model of moral sense to determine how social behaviours of conscience, such as altruism and co-operation, occur in different degrees, suggesting the maturity of conscience. Darwin’s construction of moral sense, at least initially, supports the idea that in order to survive, humans must have evolved their consciousness, which as Rubinoff argues is the existential commitment of the artist.

A History of Moral Sense

According to Darwin, our moral sense is based primarily on social instincts, which is the product of evolution by natural selection. Yet he also recognized that there is a degree of cultural evolution²³ that also exists, as both our intellectual capacities and sheer cultural knowledge have increased over time. Likewise, Rubinoff describes maturity of conscience as the degree to which consciousness is engaged with the collective memory, which is determined by the extent of knowledge accumulated by an individual. Rubinoff contends that cultural selection also acts on the continuum of moral sense such that selection of leadership and direction of a culture is based on what it considers best for that society to survive. For Darwin, the evidence that humans are now

21 Ibid., 166.

22 Rubinoff, *Existential Realities of Post Agriculture*, 4.

23 Cultural evolution describes how cultures change over time, often in a direction to more complex societies.

much more developed intellectually than our ancestors 200,000 years ago supported the idea of cultural evolution of moral sense and that, as a result, “the standard of morality has risen since an early period in the history of man.”²⁴ However, in order to understand the evolutionary origin of moral sense or conscience, we must not only account for cultural evolution, but also the role of social behaviours in human evolution. This inevitably leads us to consider the ideas presented by the Russian zoologists and evolutionary theorists Karl Kessler and Petr Kropotkin.

Kessler proposed that while Darwin’s work certainly is permeated by the idea of competition between animals for food and reproduction, there is also “the law of mutual aid, which, for the success of the struggle for life, and for the progressive evolution of species, is far more important than the law of mutual contest.”²⁵ Kropotkin expanded Kessler’s idea and hypothesized that mutual aid is not only a law of nature as a factor of evolution, but is also an argument in favour of a pre-human origin of moral instincts since “mutual aid is the surest means for giving to each and to all the greatest safety, the best guarantee of existence and progress, bodily, intellectual, and moral.”²⁶ Competition, Kropotkin maintained, is not the rule in the animal world, but instead the exception. He believed that the elimination of competition by means of mutual aid and mutual support provided better conditions for survival and that “no progressive evolution of the species can be based upon such periods of keen competition.”²⁷ This is a further extension of the arguments Darwin himself expressed in *The Origin of Species*:

24 Darwin, *The Descent of Man*, 103.

25 Petr Kropotkin. *Mutual Aid: A Factor of Evolution* (1939), 14.

26 Ibid., 73.

27 Ibid., 13.

“One of the most frequent modes in which Natural Selection acts is, by adapting some individuals of a species to a somewhat different mode of life, whereby they are able to seize unappropriated places in Nature.”²⁸

In other words, natural selection continually seeks out ways of avoiding competition as much as possible. Although this tendency of nature is always present, it is not always fully realized, and as a consequence, this struggle for life as competition has been used as an argument to support the view that the strong should thrive at the expense of the weak.²⁹ We are rightly critical of simple generalizations of biological concepts as applied to the study of human affairs. It is important not to misstate the reach of natural selection and reduce artistic expression and aesthetic experience to some biological function, since every artist has different priorities that cannot be reduced to one practice. It is one thing, of course, to explain natural selection; it is another thing to justify it, for which we need only look to Huxley, Spencer, and Heidegger.³⁰ While Kropotkin, in fairness, also declared that cooperation should be the basis of our social order, he also did not completely exclude the role of competition, admitting that “there is, within each species, a certain amount of real competition for food at least, at certain periods.”³¹ As a result, he did not drastically oppose Darwinism but rather expanded its scope by

28 Darwin, *On the Origin of Species*, 145.

29 Social Darwinism, expounded by Herbert Spencer, is justly criticized as a crude manipulation of Darwin’s theory of natural selection to support Spencer’s own anachronistic ethical theories.

30 Heidegger, for example, maintained that conscience was a negative force that tells one not to do something (*Being and Time*). He may have taken Darwin out of context in this justification: “the highest stage in moral culture at which we can arrive, is when we recognize that we ought to control our thoughts” (Darwin, *The Descent of Man*, 101). Thomas Huxley, in a series of famous essays about ethics, advanced his own “gladiatorial” view of natural selection as a being in a state of perpetual competition, based on Darwin’s work.

31 Kropotkin, 45.

acknowledging the significance of competition as a complementary mechanism to mutual aid in evolution.

I discuss Kropotkin’s theory of mutual aid because it asserts the importance of social behaviours such as altruism and cooperation, behaviours that scientific evidence suggests are genetically and socially evolved.³² Since these instincts require some degree of conscience, they have considerable implications for moral sense as well as “mature conscience” proposed by Rubinoff. Darwin urged that the moral sense, the motive feeling that encouraged individuals to perform altruistic acts and impelled dissatisfaction when these acts were ignored, was at its root a social instinct. From his work, we see that humans have a disposition certainly to act within small social groups, particularly when these were kin groups. Eventually, these groups coalesced over time to form larger groups and societies. His view, also shared by Kropotkin, was that a form of group selection³³ could explain certain human social instincts such as altruism. There is still much debate however, about whether natural selection operates at levels of organization higher than the individual,³⁴ to produce adaptations that benefit larger, non-kin groups. This debate can largely be attributed to the difficulty of empirically testing behaviour as opposed to testing the morphological evolution of a species trait. Therefore, arguments for and against group selection models of conscious behaviours have been widely criticized. Since Rubinoff argues that individuals who can perceive and act in accord with this inner intuitive sense of conscience are of great adaptive value,

32 Social evolution, as proposed by the evolutionary biologist William Hamilton, refers to social behaviours that have fitness consequences for individuals other than the actor alone (e.g., altruism and mutualism). See W. Hamilton, *The Genetical Evolution of Social Behaviour* (1964).

33 Group selection theory states that natural selection can act on competing groups of individuals, not just competing individuals within a group.

34 Although natural selection acts on phenotypes, there are four levels of biological organization through which it can operate: gene, individual, kin/family, and group/species.

we must examine current scientific theory to determine to what extent behaviours such as altruism and cooperation are accurate indicators of what is meant by “mature conscience.” To do this, it is important to highlight the state of current scientific evidence of how natural selection could produce conscious behaviours.

Modern Science and Evolutionary Theory

In order to understand the evolutionary origins versus learned origins of social behaviours, we must discuss the biological levels upon which natural selection acts. Although Darwin’s theory of evolution emphasized the role of selection acting on individuals of varying fitness, group-oriented altruistic behaviours were seemingly inconsistent with his model. Consider, for example, a shared resource within a tribe of Paleolithic humans. Carefully managing this shared resource benefits all members of the group, especially those individuals who “cheat” by consuming more than others. However, this selfish cheating behaviour, Darwin predicted, is problematic to the survival of the group because “social instincts [such as altruism] never extend to all the individuals or the same species.”³⁵ It seems obvious that individuals who are selfish will attain a greater level of fitness at the expense of other altruistic members of the tribe. Over time, genes associated with this so-called cheating would spread throughout the tribe, and the tendency for cooperative management of resources would collapse, thereby leading to group extinction. In this case, altruism explained by group selection is undermined by selection of individuals within the group. Thus, altruistic behaviours pose a challenge to evolutionary biologists because natural selection in its simplest form favours selfish individual behaviours over altru-

istic ones. Why, then, have behaviours with public benefits and private costs still evolved in the population?

In the 1960s, scientists began to explain selection that acts on levels of biological organization greater than the individual. William Hamilton proposed a theory of kin selection³⁶ of inclusive fitness, in order to explain how some behaviours can increase the fitness of an individual’s relatives, even if the trait is disadvantageous to the individual. Hamilton’s theory was that animals might cooperate because they have genes in common or because of the likelihood of reciprocal aid in the future. Some forms of altruistic behaviour such as parental care can be explained by kin selection, where the parent spends energy caring for offspring because it increases the indirect reproductive success of the parent’s genes. In kin selection theory, fitness is composed of direct and indirect fitness, defined as inclusive fitness, and takes into consideration the direct benefits of individual reproduction and survival as well as the indirect fitness of kin. This inclusive fitness is what Hamilton suggested could evolve altruistic behaviour. In the Paleolithic age, humans were confined to small groups of closely related kin, and their altruistic instincts benefitted not only each other but also the whole tribe, which would have been composed of kin, suggesting that evolution of a moral sense might have its origins from kin selection. Nevertheless, altruism still exists in groups of unrelated individuals, which arguably requires an additional model of group selection.

Group selection implies behaviour that is evolved for the good of the group. Indeed, natural selection is based on relative fitness; it only matters how fit you are relative to other individuals. Similarly, a group’s fitness is measured relative to another

36 Kin selection is an evolutionary strategy that favours the reproductive success of an organism’s relatives, even at a cost to the organism’s own survival and reproduction. In kin selection, fitness is measured not only by direct individual reproduction, but also by including indirect fitness effects such as the reproductive success of close relatives.

35 Darwin, *The Descent of Man*, 85.

group. Consider once again the shared resources among a tribe of Paleolithic humans. Selection between individuals within the tribe favours cheating behaviour, but selection between tribes within the population favours altruistic behaviours that increase the relative fitness of the whole group. In the case of moral sense, Darwin suggested that altruistic individuals do not have an obvious advantage over cheaters within their own tribe, but whole tribes of individuals with a moral conscience who exhibit altruistic behaviours would out-compete other tribes. This does not necessarily mean that all tribes will evolve a high moral standard or that every individual in the tribe will not cheat, but as the evolutionary biologist Edward Wilson posited³⁷, the final outcome depends on the relative strength of within-group selection opposed to between-group selection. Nevertheless, critics of group selection argue that this theory is simply an extrapolation of kin selection, where the degree of relatedness is low, creating confusion over the definition of what constitutes a group. In principle, group selection can occur; the question is whether it amounts to a significant evolutionary force.

The ongoing dispute between theories of natural selection at the group or individual level has led evolutionary biologists to investigate how selective forces can act at multiple levels of biological organization, resulting in the possibility of multiple interactions between groups, individuals, and genes. One such theory is the multi-level selection theory (MLS), which states that adaptation at one level of biological organization requires a corresponding process of selection at the same level. Furthermore, the strength of selection is predicted to decrease at higher levels of biological organization such that adaptation at any level tends to be undermined by selection at lower levels. Applying this theory, for instance, in the case of Paleolithic humans possessing a highly developed moral sense might benefit the group as a whole, which

37 See Wilson, David. "A Theory of Group Selection." *Proceedings from the National Academy of Science* 72, no. 1 (1975): 143–146.

might evolve over time, but only if group level selection is strong enough to overcome selection of individuals who cheat within the group. That is, moral sense could have been more adaptive at the group level than the individual fitness advantages associated with amoral behaviour.

Following group and kin selection is the gene-centered view of evolution³⁸, which MSL theory also acknowledges. Gene selection theory postulates that evolutionary changes are adaptive at the gene level, regardless of where the fitness differences are located in the biological hierarchy. Some manifestations of this theory can be observed in the process of meiosis, in which cells necessary for sexual reproduction are divided. Normally, natural selection is suppressed among genes being separated during meiosis, with genes having an equal chance of being represented in the next generation. However, some genes within meiosis gain an individual advantage through the process of meiotic drive, which involves unequal gene segregation during cell division. As a result, some genes become more numerous relative to others. This is advantageous to the gene but not to the individuals, as these changes can often lead to fatal mutations or infertility, thereby reducing an individual's fitness. Therefore, meiotic drive is an example in which a "selfish" gene³⁹ propagates itself for the good of the gene, but not necessarily for the good of the individual or group. This gene selection theory has also attempted to explain the origins of moral sense, or conscience.

According to Richard Dawkins, who expressed this view of the "selfish" gene, natural selection favours rules that promote the genes that built them. In the Paleolithic age, when humans lived in small groups mainly of close kin and potential reciproc-

38 Gene selection theory holds the view that evolution occurs through the differential survival of competing genes, increasing the frequency of those genes whose traits promote their own spread. The gene is the unit of selection.

39 Dawkins, Richard. *The God Delusion*. London: Transworld Publishers, 2006.

cators, altruistic behaviours were programmed into our brain from this genetic basis. He explains, however, that these rules of gene selection sometimes misfire. For example, in modern times, humans live in large groups, composed of mainly unrelated individuals, yet our altruistic behaviour persists. Dawkins argues that altruism exists as a Darwinian byproduct independent of its original purpose.⁴⁰ That is, despite not fulfilling its ultimate cause of helping close kin individuals, the proximate behaviour, altruism, still exists. This misfiring, Dawkins contends, is purely from a Darwinian position and is not pejorative in reducing altruism or other “conscious” behaviours to some biological necessity. Dawkins’s theory suggests that a moral sense, including conscious behaviours, might be a product of evolution by natural selection, whose proximate characteristics still act, independent of the ultimate genetic cause that shaped them. Likewise, Rubinoff posits that conscience is an internal sense that humans possess, separate from socially taught values, and that carries a strong genetic component. This gene-centered view of selection suggests that, to some degree, there is a genetic basis for a moral sense, or conscience.

In light of these evolutionary theories, we have now considered the main point upon which, for Darwin, the question of the moral sense hinges: “[W]hy should a man feel he ought to obey one instinctive desire rather than another?”⁴¹ Darwin himself, though he was normally a staunch advocate of selection at the individual level, proposed group selection when discussing human tribes, through which individuals would act altruistically “for the good of the group.” Collectively, moral sense would have

40 Dawkins, 255. In the Darwinian sense, the units in the hierarchy of life that survive will be the ones that survive at the expense of their rivals at the level of their hierarchy. The selfish gene suggests that the unit of natural selection is the gene, and the effects of this selection can be described as selfish. It does not imply a gene’s cognitive awareness.

41 Darwin, *The Descent of Man*, 87.

been more important among competing whole tribes than within-group selection pressures of non-altruistic individuals. While modern scientific theories of selection have since expanded to include kin and gene selection, these theories, in my view, recognize the multilevel nature of selection. Regardless of the debate, these conscious social behaviours have a genetic component, and in most cases, natural selection likely operates at different levels of biological organization, with increasing selection pressure from the group to the genetic level. Furthermore, the current state of the scientific theory suggests that behaviours that are empirical indicators of conscience, such as altruism and cooperation, can occur in different degrees. However, I argue that these differences in degree of conscience can be explained, in part, by natural selection acting at different levels of biological organization and with varying strength. As a result, we see a “maturity of conscience” in the differences of certain conscious behaviours, such as altruism, within and among species. In the case of human evolution, it is possible that our social instincts created the conditions necessary for selection to act at multiple levels and produce a highly developed moral sense or “mature conscience.”

The evolutionary arguments outlined above present a clearer frame of reference when discussing social behaviours such as altruism and cooperation, which Darwin believed were behaviours associated with moral sense or conscience. The purpose of discussing these theories is to emphasize that current scientific evidence and literature have developed Darwin’s original logic into a modern understanding of moral sense, as well as the social instincts, such as altruism, that shape it. While there is no scientific consensus about the level at which natural selection acts to form these conscious behaviours, it is highly probable, in my estimation, that selection acts on different levels of biological organization, from genes to groups, with varying strength. For example, current evolutionary theory understands that kin selection and group selection are not completely distinct processes and

that the traditional concepts of group and individual selection are seen as two extremes of a continuum. Nevertheless, no matter which level of biological organization selection acts on, social behaviours, which can indicate conscience or moral sense, have evolved through the process of natural selection.

On Art and our Darwinian Nature

From the evidence presented above, we can begin to understand the evolutionary basis of moral sense in the context of Rubinoff's definition of art and address the central question, "Can art become the fulcrum for the reconciliation of science with history to lever the value of conscience beyond the plasticity of morality?"⁴² If one accepts the definition of "art as an act of will in accord with a mature conscience," and a mature conscience or moral sense as evolutionarily derived, then art is a force, equally credible as science, in the further evolution of human consciousness. According to Darwin, the moral sense, or conscience, was a positive force that told individuals what was right to do as opposed to what was purely wrong. Likewise, Rubinoff agrees that an artist's existential commitment to conscience is also a positive force. As modern evolutionary theory postulates, humans must have evolved their group consciousness and morals in order to survive, and as Rubinoff argues, this evolution of conscience can be achieved through art.

The Chauvet cave, depicting the earliest known cave paintings in the world, is a prime example of this evolution of conscience, in which abilities such as heightened spiritual sense and art perception were highly developed. In addition to moral sense, spirituality and art perception are also products of evolutionary

42 See Rubinoff, 4. Plasticity of morality is about rationalisation—how individuals form their reality around the rationalisations that exist.

forces.⁴³ Approaching the end of the Paleolithic period, the cave paintings of Altamira and Lascaux display art that many judge to be equal in quality to that of the high renaissance, in terms of technique, ability, and perceptions of spirituality.⁴⁴ However, Rubinoff contends that spirituality in the Neolithic age, in the form of religion, rationalized war and evolved human consciousness such that during this period, an artist's existential commitment was to a rationalized conscience.⁴⁵

If artists constitute a force to further evolve human consciousness, then the concept of moral sense, Rubinoff posits, is a way of moving beyond the Neolithic period and the age of agriculture that was defined by perpetual states of war.⁴⁶ Nevertheless, it is impossible to advance past that age unless there is a vision beyond it, and moral sense provides this base since it is ultimately about rationality of conscience, in Darwinian evolution, as opposed to rationalization of conscience.

43 See Lawless, 91.

44 See Janson, 18–21; Koernig, 97; and Herzog.

45 Rationalization concerns the attempt to explain or justify with falsely assumed logical reasons. Rubinoff argued that the age of agriculture was about the rationalization of conscience, rather than the rationality of conscience. The rationality of moral sense or conscience is based on sound scientific reason and logic.

46 It is unclear whether agriculture created warfare or if warfare created agriculture.

The Future of Humanity: Implications for Transgenic Engineering

As the evolutionary origins of moral sense are uncovered, we begin to understand its implications for existential realities of the artist. According to Rubinoff, one such existential reality is transgenic engineering.⁴⁷ In the age of post-agriculture,⁴⁸ the artist must ask what it means to be human. With the prospect of transgenic engineering, our humanness cannot be assumed, and a conversation in defence of the genome must take place at the first stage.

Fundamentally, transgenic engineering is a massive experiment. We have no idea what the long-term consequences of these genetic manipulations will be for each genetic combination and permutation. Nevertheless, there is growing evidence to suggest that there may be significant threats from transgenic organisms. For example, the genetically modified “AquAdvantage” salmon, which combines genes from Atlantic and Pacific Chinook salmon with those of an eel, has been engineered such that its hormones allow it to grow year-round, thereby increasing fish stock yields and producing more food.⁴⁹ However, there have been many significant concerns about this transgenic organism, including its entirely different feeding behaviour, ability to survive in new habitats (making it a likely invasive species), and its loss of prey instincts. As a result, this transgenic fish has been restricted to live only in controlled fish tanks because of the high risk of it out-competing wild salmon and hybridizing with other salmon species, both effects resulting in a loss of species genetic diversity. This reduction in diversity and variation has already been observed in genetically modified plants, creating further concern

47 Transgenic engineering refers to an organism that contains genetic material into which DNA from an unrelated organism has been artificially introduced.

48 Rubinoff argued that one characteristic of the age of post-agriculture is the reality of transgenic engineering.

49 See Smith et al., 2010.

that genetically engineering humans will also lead to lower genetic variation.

While it has taken 3.5 billion years to create the genetic diversity to which humans now bear witness, the biggest danger of transgenic engineering, in the case of humans, is the elimination of diversity. In essence, Darwinism is the protection of diversity because evolutionary potential is stronger with greater variation upon which natural selection can act. This is also the case for moral sense, which is evolutionarily derived. However, with a possible reduction in diversity, there will be a significantly smaller variation in the human gene pool upon which selection can act, which may also reduce the variation of behaviours considered part of a moral sense. As curator Karun Koernig argues, “art done with the highest evolutionary potential is done with the most mature conscience.”⁵⁰ What follows is that a reduction in diversity may have significant impacts not only on what constitutes “humanness” but also on what constitutes a “mature conscience” in art.

From a scientific perspective, genetics follows the inheritance of genes in a vertical fashion, from parent to offspring of the same species. However, transgenic engineering and biotechnology allow genes to be moved from one organism horizontally into a totally unrelated species, without regard to the biological constraint that would normally be present in nature. Moving a gene from one organism to another species completely changes its evolutionary context and history. In effect, the logic supporting transgenic engineering is flawed science since we assume that the principles governing the inheritance of genes vertically within species apply when genes are moved horizontally between different species. However, there is no evidence to make this conclusion, and the evidence required to do so would have to be collected over hundreds, if not thousands of years, since evolution occurs

50 Koernig, 15.

over such long time periods. As a result, it is infeasible for health authorities, courts, and scientists to test all possible permutations of transgenic alterations over a large enough population over time to say with assurance that transgenic species are harmless, in spite of any ethical questions of what is human what is not. Currently, these ethical considerations of transgenic engineering are largely based on the technology and not based on the science.⁵¹ Rubinoff argues that as a result, by the time ethics of transgenic engineering are based on science—in this case, Darwinian evolution—there will be little effect because industry and governments have already invested heavily in the technology, making it increasingly difficult to control.⁵²

Nevertheless, as transgenic engineering technology develops, there is the possibility that it will eliminate parts of the gene pool that are absolutely necessary for adapting to changing environments. From a Darwinian perspective, we do not want to alter the genome in such a way that results in the elimination of the diversity, or the degree of conscience in humans that has already taken 2.5 million years to produce. In the case of transgenic food, we were never given the choice as the ethics were based on the technology and not the science. However, with transgenic engineering of humans, we have the opportunity to at least act, which is where Rubinoff suggests that art can play a vital role in evolving this human consciousness.

If the reduction of diversity and variation of traits such as moral sense is a possible unintended consequence of transgenic engineering in humans, then what might the intended consequences be if scientists actively modify genes responsible for social behaviours? Will transgenic humans lose certain instincts?

51 See Sheila Jasanoff, *Reframing Rights: Bioconstitutionalism in the Genetic Age* (2011).

52 In this case, Rubinoff argued, there is nothing more rationalized than progressing with a technology before examining or anticipating the consequences of it.

Which ones? How will this affect our moral sense or conscience? What will be the divisions of our humanity? Questions such as these are most difficult to answer, but Rubinoff argues that first, a strong ethical code must address the lag between the science and technology. As a consequence, art can be the fulcrum to evolve human consciousness beyond the “plasticity of morality” and the inherent rationalizations of transgenic engineering.

Conclusion

Humans are bound far more by natural history than by our cultural history. As a result, the perception of art as “an act of will in accord with a mature conscience” must integrate natural history into its definition to further understand the existential commitment of the artist to “mature conscience.” Darwin suggests that this conscience or moral sense has been shaped by evolutionary forces, and argues that individual acts of conscience, such as altruism and cooperation, are highly valuable to social groups, especially during periods of transformation in which individuals have to articulate new sets of human values, or new configurations of existing human values. From the scientific evidence presented, I also argue that individuals who can perceive and act in accord with this sense of conscience are of great adaptive value. While evolutionary theorists still debate the principal mechanism through which natural selection acts to produce conscious behaviours, it is clear that a moral sense, or “mature conscience,” has its roots in evolutionary science. Therefore, moral sense is a necessary condition of a mature conscience, as evidenced by social behaviours that indicate a level or maturity of conscience. However, the recognition of natural history as history itself does not reduce conscience or artistic expression to biological determinism. It simply illustrates that conscience is present in all societies and that it has some genetic basis. Indeed,

maturity of conscience is more than a purely biological explanation, and it remains unclear what percentage of conscience is genetically or culturally derived. The fact that science on its own cannot answer questions of human soul and spirituality impels art to become the fulcrum that evolves human consciousness. Consequently, artists' commitment to mature conscience, if they make it, compels them to address existential realities of our time, such as transgenic engineering, with the aim of evolving human consciousness in favour of the protection of diversity. Ultimately, by placing these evolutionary narratives alongside the insights of Jeffrey Rubinoff, we begin to see that Darwin's concept of moral sense or conscience has considerable weight in reframing the role of the artist in society and reaffirming the value of art.

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DIALOGUE ON DAVID LAWLESS'S 2013 PRESENTATION

Jeffrey Rubinoff: I think that this is a really excellent paper, David. Thank you. I hope that it really creates some discussion around the table. So I would like to turn this over to the group.

Sergei Petrov: Cutting short the technical explanations, suffice it to say that it is impossible with complex systems such as a human being to, for example, tweak genes and predict what they result in.

And, more importantly, you cannot pick a trait of an organism that you find interesting and important and trace it back to what kind of genes are responsible for it. The reason why it is so impossible is because it would be in violation of the second law of thermodynamics, the simple explanation of which is that we live in a universe that has an arrow of time. Time past and future are not reversible.

For exactly the same reason, when you look into these complex systems, you can start with genetic code and build the complex organism, but you cannot wind it back in time. You cannot start with an organism and trace all the characteristics back to a very specific genetic material.

Therefore, when we talk about genetics and natural selection, the timescale has to be thousands and thousands of years. So I totally agree with David when genetics are responsible for devel-

oping faculties of human beings which make it possible for our consciousness to reach such a level that we can acquire language, abstract thinking, and arts. However, after that point, for the last 200,000 years, what I personally believe comes to play is our ability to create a civilization which becomes a much larger part of our environment.

So it is not the genetic material that gets changed; it is the environment which changes. And that is a selective process.

That, in my view, makes art even more important an element in advancing human conscience, because if it is the civilization which keeps us in check, if it is this deliberate process of selection which determines which direction we go, it means conscience is more fragile than we think.

If we perceive it to be based on genetics, we can all sit back and relax; it will take care of itself. But if it is really our civilization, we have to be extra careful to make sure with every passing generation we don't lose what we only recently acquired.

And that is what Jeffrey implies by the mature conscience. In this case, I personally profited not only from what I biologically inherited as a human being but also what I inherited culturally from my upbringing — in other words, from human history.

By going into human history and bringing it back, the artist reminds society what is important.

Peter Clarke: While Sergei Petrov's remarks are still fresh in our minds, I would appreciate David Lawless's response on this, especially on the reading on what is essential to Darwinian natural selection.

David Lawless: Darwin's idea is about the inputs and not predicting the outcomes, and it seems consistent with that notion of the arrow of time. In terms of what you were saying about Darwin's anachronistic views about genetics, he had several outdated ideas of racial constructions, which reflected the British Imperial mindset at that time. But I think the idea behind his theory of moral sense has been taken up by current scientists who are looking for empirical evidence.

In terms of the empirical evidence, I would just caution that the theory of moral sense is not a prescriptive meta-narrative or a completely new narrative. It is a progressive development from Paleolithic to present. While there may be strong correlations that would suggest the development of traits considered to be a part of a moral sense, it doesn't necessarily mean there is causation.

Arther Ferrill: I thought that this was a wonderful paper. I don't know a great deal about science or genetics, and I am little confused by some of the things that I have heard, and you will have to excuse my ignorance.

I don't understand this idea of genetic changes taking thousands of years to occur. The English bulldog today is vastly different the English bulldog 150 years ago. The ancestor of the English bulldog was a very large dog, and it had a very vicious temperament. It was deliberately changed by breeders to be what it is today, quite a different kind of dog. That didn't take very long.

David Lawless: It didn't take that long because humans intervened. There are three components that are required for natural selection to act: variation among individuals in a popula-

tion, you need the traits to be inherited genetically, and then that trait needs to have a differential survival or reproductive success so that there is different chance or probability among individuals.

With respect to changes, say, in the bulldog, when you look at, say, mutation to create variation, there are millions of mutations in your genes every day. But a lot of them are benign, so there is genetic change, but that genetic change is corrected in a certain sense by different mechanisms in place in the cell. So at the level of the gene, there is a lot of change; the frequency of those changes isn't registered. So going back to your point about change within domesticated animals, such as the bulldog, that is because humans have accelerated that change.

Arther Ferrill: Wouldn't humans be accelerating change with genetic engineering?

David Lawless: It depends on what they do with genetic engineering and transgenic engineering. It depends on what genes you select for and how you combine different genes. This adds intentionality to the selection.

Arther Ferrill: Not exactly natural selection.

James Fox: I want to pick up on something that Sergei raised, which is this tension between nature and nurture. And a slight worry that I have about this approach is that we risk

submerging human history beneath natural history, submerging culture beneath nature.

One could argue that culture could be just as important a factor in shaping our behaviour as our genetic programming, and can actually often work against our natural origins. So that is my worry, and I wondered what other people think about this. Don't we risk losing human history and our cultural environment from this equation? Doesn't this in some way downplay and overlay art as a result?

Jeffrey Rubinoff: I would like to comment on both of these things. I know that this is going to be a terrible analogy, but if we can, for the purpose of the discussion, look at the genome and the development of evolution as our operating system.

We can then overlay that operating system, which has a very complex 3.5-billion-year history, with very complex software that can operate within that operating system.

Then what you can see by this analogy is the outcome of what you write on Microsoft Word can be very different than what I write. But if we consider the complexity of the operating system, what brings it forward to both our writing outcomes, then the variation between what it is that you and I are doing is very small. So the genome of the bulldog is very similar to the genome of the wolf. The variations in information that you are looking for are very small compared to the overall information that is contained within the genome.

Then I wanted to bring up Thomas Huxley's warning, which is especially important in terms of transgenic engineering.

What he worried about was that when human beings intervene in natural selection, such as with domestication, they lose the variation that evolution itself has built in. So now we have this wonderful rose which has no chance of surviving in nature whatsoever. You have removed its chance of survival past a generation or five generations. The same goes for the bulldog. It is almost guaranteed that the wolf, if not all murdered by human beings, will still be around in 1000 years, even though the bulldog may have disappeared in the next 40 years.

So looking at that terrible analogy once more, what we are looking at is very complex software, but the creativity belongs to the individuals. And so the system is not the predetermining factor, unless what you want to say is, "here is a copy of Word," you are going to say predictable things because you are using Word. And in some ways, that does happen if you use their spell check, or their syntax constructs, but in fact, if you are going to write something, you are going to write something just as creatively in Word as you would on paper or anything else.

But you are using this very complex mutual system which allows you to communicate once you do something in Word. It does not limit your creative ability within your own evolutionary statement.

James Fox: But isn't, in some way, the more interesting question the fact that everyone who has the same software, if we have all the same software, will write extremely different things? Isn't that more interesting than the fact that we maybe have the same software?

Jeffrey Rubinoff: Yes, that isn't the disagreement out here. The relevance for my work is that so much of my thinking evolved as an alternative to the idea that war is natural to human beings, as is often assumed. And now through the art of the Paleolithic age, we can look at the possibility that war is not natural to human beings, that war is not a prescription. And if there is an alternative to that particular prescription, then that gives us a chance of survival in a time when nuclear holocaust is the obvious result.

Tom Stammers: David, this category of moral sense itself, if we interrogate it, is an 18th-century British term. I am troubled by the analogy between conscience and consciousness; it seems to me they are different things. The moral compass is the sense of dos and don'ts, and that is being equated with an idea of intellectual ability, with which we end up with a very oppressive narrative where the growth of the human mind is mapped onto moral abilities, and it all sounds like a terribly Victorian progressive liberal Darwinianism.

So I am just worried about the conflation of conscience and consciousness. Because it suggests that the growth of consciousness maps unproblematically onto a deepening sense of our moral ends and group sensitivity.

And the second point is that I question how we can deal with the question of maturity in a way that isn't elitist, both in terms of a comparison between societies and a comparison between individuals. Because that is where the tension between conscience and consciousness comes out.

David Lawless: First, on your point about the highly Victorian prejudice in the concept of moral sense. Wasn't it Kant who said that empirical evidence doesn't tell you anything about morality? I think to a large extent Kant's assessment might be true. But Darwin's views, while they certainly seem to have that notion of 19th-century prejudice to them, are more about the inputs. There was a famous quote by Robert Richards, the evolutionary ethicist, who said that evolutionary biology may not be able to tell us about differences in behaviours because the problem is that behaviour doesn't fossilize. And so we can't look at behaviours in the same way we look at other fossilized traits that are frozen in time. It is very difficult to test these theories beyond what Darwin hypothesizes himself.

Second, I think that the term "maturity of conscience" is not necessarily hierarchical. I think it is more of the degree of the behaviours, not to suggest that certain behaviours are more effective than others, or more beneficial than others, just that there is a range of behaviours that can be expressed. This is not necessarily to suggest that a mature conscience concerns a higher quality of behaviour. Likewise, this biological variation responsible for different behaviours does not fully explain the continuum of maturity of conscience. I would argue that a mature conscience has both a genetic and cultural component, yet it's unclear what percentage of each component explains this maturity of conscience.

And just responding to James's point that this kind of thinking risks underplaying cultural evolution, I believe that maturity of conscience is beyond a purely biological explanation. In fact, there are actually a lot of scientists who have acknowledged the extremely important role of cultural evolution; that is how societies and cultures change over time. You can look at people like Dawkins, who talk about the meme and that being highly influential in humans, not from a genetic standpoint but from a cultural

evolution perspective. That sentiment has been shared by many others, such as Adam Smith and David Hume.

Peter Clarke: I am very glad that we have got onto this track of distinguishing between different sorts of things that we might mean by the term evolution itself. Part of the difficulty is that Darwin is such a big name that just the indication of Darwin's name blocks out so much else in the surrounding landscape here. Historians have been aware of this problem, acutely aware of it, for some decades now. In the 1960s, John Burrow published a wonderful book called *The Evolution of Society*, about Victorian England. Of course, one's natural reaction would be to think Darwin must be at the center of this book, but he was dealing with ideas of social evolution, cultural evolution, and progress and morality in terms of a wholly different set of figures.

Charles Darwin's grandfather, Erasmus Darwin, figured somewhere in the beginning of the book, and other figures such as Sir Henry May who were talking about highly moralized concepts of evolution and progress. And really this was the debate into which Darwin then fed, so that our modern knee-jerk reaction is to think, "Evolution, that must mean Darwin," is completely the wrong way around.

After all, look at the title of Darwin's great book; the term evolution doesn't appear in it: *On the Origins of Species By Means of Natural Selection*.

His key intellectual breakthrough was the whole mechanism of natural selection as you have explained. And in that sense, we are within the realm of natural history. When Darwin then goes to talk, as David illustrates in his paper, about moral issues as well, actually this isn't necessarily the intellectual giant Darwin, this is

another Victorian preaching at us. Or, at least, we ought to hold out that possibility. If we look at late-19th-century intellectual history, what happens is that, particularly after the influence of Herbert Spencer, there was for a time a very close assimilation of the Darwinian model for explaining issues of social and political theory and to enforce particular views of social progress.

In *The Descent of Man*, you point to a passage where Darwin himself is using Spencer's term "survival of the fittest," that great Victorian mantra to explain what is going on here. But this is an importation back from Victorian sociology into what Darwin is later writing about biology.

What we have got to do is recover this sense that these are two related but, in the end, separate discourses, and really what happens in the 20th century is the remaking of sociology away from what Herbert Spencer so confidently proclaimed for his Anglo-American audience in the 19th century.

Spencer's idea fed into a unilinear theory of progress and normal progress to which all societies will approximate, and luckily enough, Britain and the United States in this model are somewhere near the top of course. And then there is a descending order on the ladder of progress, and the lower ranks are somewhere near the bottom, and in time, of course, they climb the rungs of this ladder and become like us. That is the model that, of course, sociology and social anthropology abandon in the 20th century.

Talcott Parsons, the great American sociologist, is writing in the 1930s when he produces his magnum opus, *The Structure of Social Action*. He begins by saying, "Who now reads Spencer?" in a dismissive way.

He says that what we ought to be listening to here are the voices of Durkheim and of Max Weber. He is really creating a sociological canon that explains social ideas in terms of the evolution of society.

So getting back the main point that I am trying to make, when we talk about issues of morality, I think we are not necessarily on the Darwinian side of this model at all. We are on the side of understanding society, which would apply ordinary moral and historical categories in order to explain what is going on.

Which doesn't mean that Darwin is unimportant from here. There are echoes of the debate which the three of us had a year ago, when I think we all agreed that Darwin is not in this sense predictive, that we are talking about permissive conditions.

To quote Jeffrey: "What we are talking about here is not predicting the outcomes, only the inputs. The whole concept of Darwin is that you don't predict the outcome of the situation."

And I said: "Would it be possible to say that our genetic endowment is a necessary but not sufficient condition?"

And after hearing what David has to say this year, I am not persuaded that I want to move any further from that position.

David Lawless: I think that it is important not to mistake the reach of natural selection. So Darwin would be the first to admit that his thinking provides no absolute standard for moral behaviour. However, that fair admission on his part doesn't mean that there is no foundation at all for moral behaviour in his explanation of life.

Aaron Rosen: Thank you for a really good paper. I thought it was really lucid, and I felt myself actually, despite my inherent anxieties about some of what you are saying, caught up in it, which is a testimony to you.

I share some of the reservations that James Fox, Peter Clarke, and Tom Stammers have mentioned, of course. Let me add another permutation to that on a similar theme. I was more with your argument until you turned to your highly essentialist reading of art history and the notion that art is a statement of conscience. I think that it is a wonderful reminder, in an era with some middling artistic productions which often don't consider these important questions. So I think that there is a poetic truth to that statement.

But I worry about that as an essentialist definition of what art is doing. So when you made that turn, then it seemed rather a quick pivot. You quickly showed us some pictures of buffalo that you claimed were demonstrative of a moral aptitude, which I simply didn't follow. And art historically, I didn't follow the connection with the Renaissance. Although those are better buffalo than I would personally draw, I didn't think that they were necessarily the products of Michelangelo.

So I just would want to probe a little bit more that idea of an inherent link between art and morality, because I simply think art is a mode of discourse which can equally shade in either direction. It is important to hope that it shades in the direction of moral conscience, but that it would inherently do so seems more dubious to me.

Jeffrey Rubinoff: The definition of art as an act of will in accord with a mature conscience has a specific source, first of all. Secondly, what it implies, and which is elaborated in the material

I am going to present a little bit later, is the essential necessity to peel the plasticity of morality away from conscience.

Conscience itself arguably appears to have a value in every society we've ever heard of. So we probably could consider it part of a cluster of genes in the genome.

Thomas Huxley warned that if the object is the survival of the species, it has to have the utmost amount of variation. Keeping that in mind, we are not talking about predictability. We are talking about potentials.

Now, if you look at the potential of conscience, then what we are talking about are clusters of genes, clusters of genes on a continuum. We are not talking about predictability in any absolute way. We are talking about the predictability of how society itself might choose its leaders.

So if it chooses as its leaders, by whatever means, from among people with a lower-medium conscience, you can expect a certain outcome. It is not likely they are going to choose the people with no conscience, the psychopaths, or the sociopaths. That point could be argued about the period from 1933 to 1945, but it is generally not likely.

So I will give you the route, once more, as to why I arrived at that particular definition. When I was 19, I was reading an article by Simone de Beauvoir on the question of the given morality of the mechanics of the trains going to Auschwitz, the mechanics of murder, and how the engineers and the entire infrastructure of this mechanism of murder were the trains to Auschwitz.

So the issue here was the plasticity of the morality of these people who went to church on Sunday and looked upon themselves as extremely moral people. But they kept the trains oiled, and they

kept the trains moving. And they moved them all the way from France to Auschwitz.

She also looked at it another way, at the people who actually resisted the trains and argued very clearly that their existence depended on acts of individual conscience.

This struck me at the time as an extraordinary statement. So when I wanted to talk about art, I felt this was something that expanded the idea of individual conscience into a means of moving forward an entire aspect of knowledge itself.

So in marrying the concepts of conscience and knowledge, I felt that art's contribution to knowledge could be an act of will in accord with a mature conscience.

And so the mature conscience played an extraordinary role in that definition. In fact, it is a necessity now in this particular period of time that I call post-agriculture to create an approach and a language that allows us to get beyond rationalization. The way that I look at morality is as rationalization, whether religions do it or whoever does it, and usually the rationalization is for war.

In the post-agricultural period, we need a language beyond rationalization in order to get to a statement of neutrality towards transgenic engineering, in a similar way that Herman Kahn did about nuclear war. Kahn's method of nuclear deterrence is essentially morally neutral. It doesn't have to do with conscience. But it was conscience itself that brought about the ability to have this mechanism that was rationalization neutral.

And my argument is that you can't get past the rationalization of morality unless you move to individual conscience.

Moreover, since we are talking about the future of the genome, individual conscience is likely the only thing that can raise our consciousness to the level of neutrality of non-rationalization that the post-agriculture period requires.

So as horrible as Kahn describes the least worst of options for nuclear deterrence, so too we are going to have to come to the least worst options about the question of transgenic engineering.

And we will not be able to do it arguing the plasticity of morality. We are going to have to come from another place.

I am pointing towards conscience as such a place.

Karun Koernig: I have a question. It seems to me that David has opened a theoretical door to the idea of group selection theory through which we entered the possibility of the human-environment shaping part of the selection process, albeit at a perhaps weaker level.

Sergei argued that civilization has become the environment in which selection operates. I am wondering whether this dichotomy that Peter Clarke is seeing, and the resistance that perhaps James Fox has, is a result of not fully recognizing the action of group selection.

David, you can perhaps speak a little bit more about that; I thought that was quite interesting. My question for David is whether we are talking about cultural history — the history of civilization — actually becoming an environment in which different selection pressures then become important.

As I think Peter Clarke has rightly stated, and as Jeffrey Rubinoff has agreed, the indicators you present of basic capacities for something we might call conscience cannot predict the content of moral codes. But what can we then say about those basic capacities that you argue we have all inherited? Are they acting in a group such that they get more or less expressed? Is there evidence that they lead to better survival outcomes, either as defined by that cultural context or by the prevalence of that group?

What level of selection pressure do you see?

Or can we now just disregard the indicators of a trait such as conscience as simply a necessary condition for us to be present-day humans?

David Lawless: I don't want to fall into the trap of predicting an outcome, but in terms of the significance of group selection, I think cultural selection, unlike natural selection, has an almost a predetermined progress of the accumulation of knowledge.

Some scientists have argued that for the past 200,000 years there hasn't really been a lot of what we would consider evolution in the genetic sense, whereas culturally there has been a lot of change. The knowledge that has accumulated during that period isn't necessarily genetically linked, but it is still an important factor in our cultural evolution.

Evolution doesn't stop; adaptation never stops, it's just that we have been able to control the environment in a way that has limited or reduced the magnitude of the change that we would be expecting.

Sergei Petrov: If you look at all the possibilities that you can make out of our DNA, it is a phenomenally large number. But then if you look how many organisms can actually survive out of these combinations, they are a fraction of that.

So what Darwin didn't realize is that a lot of combinations of genes kill the organism. You know there are genetic diseases that make people severely dysfunctional. But many simply die. So in the process of evolution, there is a hypothetical space of all possible combinations of genes, and what the physical environment does is select only those who actually live.

But within the group who can live, there is no survival of the fittest. So the evolution doesn't select the better ones, it only kills the ones who cannot make it. But within the group who made it, it is somewhat random.

So now fast-forward this biological evolution to where the human species started to develop civilization; from that moment on, our genome started to change, not because of mutations, but because we started to change the environment.

Human history has examples when there were attempts, likely unsuccessful, to fundamentally change the human race, by genocide, by killing people with specific colour, or a race. The genome of Russians changed within five years, which seems impossible, but how did it happen? Ninety percent of Russian nobility was killed within a period of 5 years, and the Russian nobility had a sufficiently different genetic pool from the Russian peasants. So right now, it is really important to understand that evolution of the human species is in our hands. And it is not through random mutations, not through a natural process. It is through how we handle what we have. That is why I agree with Jeffrey completely about the transgenic mutations. We have to be careful to preserve

what we have, and preserve our diversity, because we may never get more diversity, ever.

If you look at how evolution works, you have species which remain the same for millions of years; why? Because they got it right. There was absolutely no need for them to change. So it is quite possible, as biological organisms, we will never change unless the atmosphere changes fundamentally, or gravity changes fundamentally. It is quite possible that the humans now may continue to exist for an unlimited period of time without changing fundamentally on a biological level. So the only changes will come in how we think, how we work, how we live. Obviously, we cannot make humans smarter by killing the stupid ones. But we can make ourselves smarter. It is up to our civilization, how we educate ourselves.

David Lawless: Just one final question to James, who mentioned that he fears that ultimately this explanation really reduces aesthetic expression to some predictive outcome. Is that fair to say? Or is it that evolutionary psychology has a way of explaining away everything? Is that your fear?

James Fox: It is the fact that any kind of behaviour that any one of us displays can be explained away by something that is in some ways so abstract and so distant from our everyday lives.

And I think that in some ways that just reduces the diversity and the interest of people in the decisions they make, what they think, and what they produce.

So yes, it is about this tendency to explain everything away.

Aaron Rosen: And why this is such a potent descriptive model at this time, is that it is not only about the technologies and advances in scientific understanding of evolution. There is a particular cultural relevance as well. This explanation is striking a chord with the tremendous appeal that one sees Dawkins has in ethical debates, which I think is frankly poisonous. But why this is so appealing would be an interesting question as well. We need to talk about the cultural situatedness of the scientific explanations that you are offering.

Tom Stammers: The difficulty I have is the key question of how big the group is. If we are talking about a kin group here, we can't assume kin is in any way a stable, fixed-type reality. If we believe what anthropology has told us throughout the 20th century, kin itself is an immensely mediated construct. The moral sense is absolute and maybe is innate, but the boundaries of whom we feel a moral obligation to seem to fluctuate enormously across different societies across different moments in time. And the explanations of where morality kicks in must lie in the cultural and symbolic realm rather than in the natural.

Karun Koernig: I would agree that morality does do that. But I think that what we are talking about is something completely different. And I want to make sure that we all are looking at the same interpretation of moral sense.

Moral sense does not predict the specific rules of behaviour towards our kin, but a continuum of behaviours that have been postulated to have increased our fitness.

I don't think this means that when we are looking at early Paleolithic humans we can know whether they loved their children or their cousins. It just means that people with moral sense had a greater likelihood to evolve what we might recognize as moral behaviours, which increased the likelihood of their survival versus people who didn't.

As Sergei said, those people who just killed their kin or were disinterested likely didn't survive as well as those who did. This allows for a narrative of human origins based on mutual aid, not mutual antagonism. This narrative, if it is true, points to something profound, and for many something counterintuitive, that we actually do share on a very deep level.

David Lawless: That is the way Darwin saw it. He would argue it was like a sixth sense.

Peter Clarke: Can I come in there? If we are talking about natural selection and promoting the possibility and applying it to groups as well as individuals, it does seem that you have to be very careful here.

We are talking about the survival of the fittest, and as David has fully acknowledged, that is a very circular concept in itself because we often end up just saying that those who survive must be the fittest.

But actually, if we are talking about survival under modern conditions, we are not really in the realm of Darwinian natural history anymore; we are in a political, social, economic environment

where we say that those who have survived are those who have the most money.

Let's compare all the statistics on survival rates across the planet, and you know the richest countries generally come out somewhere near the top. Except it is not just economic; it is also about political and social provision, especially for medical services. So that however inconvenient it may be for Americans to observe the fact that Cuba actually comes up with a higher survival rate than much richer countries do, it is because of the way that they have organized their social system.

I am not making polemic political points. I am just pointing to the importance of the economic, the political, the social constraints which are, in this sense, great inhibitors to any Darwinian model that is based centrally on the idea of natural selection. This is unnatural selection because it has such a heavy social and political infusion.

Aaron Rosen: I think another question is the utility of this as a descriptor anyway. So I think that you are right; you are not falling prey to a facile notion of determinism.

One of the things I wonder about is who we bring in as dance partners, and it seems to me that one of the things that is very latent in the terminology that Darwin uses — and some of the ways Peter has demonstrated the social situatedness of these arguments in the Victorian period — is theology.

And it is interesting to me that we are looking at these biological explanations, presuming that they would be extremely useful for talking about our current moral state.

And yet it seems to me that a discourse that would be very productive here would be theology. And its accounts of origins (in the shared, albeit different, types of mythological constructions we use to talk about witness) still might be productive, provided we use them with a certain amount of probity. So it struck me in the last couple days that theology is perhaps regarded with a tremendous amount of suspicion. But I would like to offer that as a necessary counterpoint, especially to dialogue partners like Dawkins.

David Lawless: Interestingly, I think that a lot of theology relies on the idea of a moral sense. Again, it is about taking possession of Darwin's terminology, rather than his leading ideas.

Karun Koernig: So you are saying that theology takes possession of Darwin's ideas?

David Lawless: Some religious groups have used the theory of moral sense as a way of supporting their ideas about human beings being inherently moral creatures.

Aaron Rosen: Yes, the intelligent design movement.

Jeffrey Rubinoff: The first thing I want to say is that I am really glad that we have gotten the arts to come into this discussion, as we will see in what I am about to propose.

How we come into the discussion is less important than that we get into the discussion. The arts, and especially the humanities, are currently not, and what I mean by the humanities are cultural history and social history.

I would like to go back to what I said yesterday because there was a very direct purpose in what I said:

“Knowledge is information that changes our perception. Art can provide changes in perspective that change perception itself. This transformation of perspective to perception is how art creates knowledge.”

The way that we look at discovery in science is that we uncover what is. As we look at life, and even the genome itself, we look at what is.

When David refers to Darwin and the arts, he is referring to the ability that human beings have, through technology, to actually change their destiny.

This is really critical to what I meant last year when I was leading to the concept of how I thought the German idealists foresee art could be used in balance with what they perceived science to already have evolved to, which was technology itself.

Natural science was under the purview of philosophy, but technology was under the purview of the dominant social reality.

So, I am raising this because there is a level of consciousness here that I think we all need to rise to. I raised it last year in the way that I looked at the three existential realities beyond the Age of Agriculture, or post-agriculture.

As I said, I believe we have to reach a point of rationalization neutrality on the subject of transgenic engineering that is very similar to the nuclear deterrence that Herman Kahn brought us to.

His 1960 book *On Thermonuclear War* was read both by the Soviets and the Americans, and it led to *Thinking the Unthinkable*, which was his following book.

And then came *Thinking the Unthinkable in the 1980s* as we approached the end of the Cold War. And what he came to in the horror of transactional mega-death was what needed to be faced at that particular time. There was no place for religion because the mythologies of religion would simply lead to more war; that was their history.

Conversely, there is no history to his concept of deterrence. I have discussed this with historians; history never, ever allowed for any existence of weapons build-up beyond going to war.

So we have been very lucky to have this model of deterrence. History doesn't really tell us how to deal with it. But I understood that back in the 1980s, and even in the late 1970s, that the universities were becoming the repositories of technology. That is the reason I included Eisenhower's speech in last year's paper, because he predicted it. But by the 1970s, the pretence was gone. The universities were seeking technology in order to keep the universities funded. Now, along with trend, came the issues of genetic engineering. Paul Berg, the scientist who first brought about recombinant DNA, which is now what we call transgenic engineering, was really opposed to a lot of experimentation in this area.

The human genome, or in a sense the text of who we are, has only been available for a relatively short period of time. Last year,

when Jeremy Kessler, a PhD student of history and law at Yale, was here, we had a discussion about how much law exists about human transgenic engineering in the United States. He said there was none.

Why is the United States legal system so important in this? As we have learned, the United States moves directly from science to technology to the marketplace. They protect the marketplace and protect their companies' abilities to move to market. So therefore, in looking at a technology that is going to be globally marketed, you might as well look to the United States.

There is no point looking to the United Nations; whoever puts this stuff up in the market will do it first. The example I will use is genetically modified food. Monsanto, world famous for its Agent Orange and its participation in the Vietnam War and the military industrial complex, became a producer and grower of genetically modified seed.

And as we know, they own the patents on genetically modified soybeans, genetically modified corn, and genetically modified canola, which used to be called rape. These are all essentials in the food chain.

What genetically modified means is that they are Roundup resistant. Roundup is the patented herbicide of Monsanto. And so they not only sell the farmers the seed, but they also sell them Roundup. This is a closed system. It is absolutely perfect.

With all the warnings that went on about the issues of transgenic engineering, especially by Paul Berg in the 1970s, while all of us were turned the other way or half asleep, genetically modified food came on the market.

In my paper last year, I showed charts on the growth of the genetically modified crops and how really significant they are.

It was 95% of the US soybean crop a few years ago, which is probably 50% of the world's soybeans. And the other 30% or 40% of that is Brazil. As of a few years ago, they are up to 50% genetically modified soybeans.

So what we are talking about is how something sweeps the world very quickly.

So after last year's Forum, I searched the Internet for bioethics and law pertaining to genetic engineering itself.

The result was this small book, *Redefining Rights: Bioconstitutionalism in the Genetic Age*, edited by Sheila Jasanoff, who teaches science and technology studies at Harvard University. This, apparently, was all the discussions on law that have been written.

What I concluded after reading this book is what happens when scientists deal with these particular subjects alone —the discussion revolves around technology. Moreover, as they are sitting around talking about ethics, the technology just keeps moving ahead.

My concern is that academics, and especially scientific academics, have the tendency to simply talk these things away until the technology makes it a fait accompli. At the 1975 *Asilomar Conference on Recombinant DNA* when scientists met over the issues of what the future of genetic engineering and recombinant DNA would be, they actually concluded that there was nothing profitable on the horizon. Well, by 1994, we have the introduction of genetically modified soybeans. So in the window from 1975 to 1994, the scientists had talked away their opportunity to do anything with these things.

So the most important thing that I think should happen is the creation of a legal-ethical code in the period of time between when science can conceive of a change and when technology produces that change.

What I am hoping is that we could set up a series of forums that would bring the arts into this process because this is the one thing that is lacking in Jasanoff's book. The humanities are not involved in this conversation. This is a conversation, generally speaking, amongst scientists themselves.

So my concept is that if we are going to have a legal-ethical code, it must begin in the United States, and it must begin at Harvard or Yale. At this particular time, except for Ruth Bader Ginsberg, the other eight Supreme Court justices are from either Harvard or Yale.

If this doesn't happen and a code isn't developed for which there is support by that particular body, then this will simply move ahead no matter what happens.

The way that I conceive of this is not some quick quixotic statement in opposition to this, but rather to seek out enough strength in a legal-ethical code that it threatens the possibility of massive class-action lawsuits when things go wrong.

And so the possibility of massive class-action suits would result in a code that the industries themselves would need to consult.

Now, perhaps, none of this can happen. So now I go back to what I originally said, on how I evolved that concept of mature conscience that started with Simon de Beauvoir.

In my mind, the trains have already started to move; they have laid out the tracks. They have laid out the whole concept of the

infrastructure. We already know what is there; the only thing that is missing is the trains actually rolling.

And maybe they have started rolling and we don't even know it.

So the window is right at this particular time. And I would hope that all of us would give some consideration to where this is going. And I would definitely hope that young people, and the historians themselves, are prepared to act.

If you pick it up and run with it, it is yours to shape.

But you can't say you weren't told, and you can't say you weren't warned.

EDITOR'S NOTE REGARDING THE FORUM DIALOGUES

The dialogues following Arther Ferrill and David Lawless's presentations were recorded and transcribed in their entirety.

The editing process consisted of selecting those comments most relevant to each presentation or to Rubinoff's work. In a small number of cases, the order of the comments was rearranged to emphasize a continuing line of inquiry.

Editorial interventions in the text consisted of changing punctuation, changing word order, adding words, and removing unnecessary parenthetical phrases to make each speaker's intent clear. Colloquialisms and filler phrases were removed; however, spoken contractions were left unchanged as transcribed. Quotations and titles of written works and names of authors were checked and corrected where necessary.

To maintain clarity and narrative flow, no typographical indications of these edits were used in the dialogues.

Full transcripts can be made available upon request.

All errors in interpretation remain the responsibility of the editor.

Subsequent editions may include changes and corrections requested by dialogue participants.