Situating human generations in Big History

Peter D Nixon

Abstract

Big History provides the cosmology for the present work in which the disproportionate impact of inequality on today's young generation is contextualised by examination of three types of societies, past empires, present capitalism and one pre-colonisation indigenous society, over time periods of more than centuries. Generations are seen as demographically referenced social locations like gender and race and at any one time several interdependent generations exist. Other referents include the work of JS Mill, his controversial ethology project, the history of ideas, the non-identity problem and social anthropology. The article concludes by anticipating a tentative reconstruction of Mill's ethology based on advances in social science in the century and a half since his time.

Introduction

Big History looks at history from the Big Bang, which was, as far as we know, the beginning of our universe, to the present, placing humanity in this context without privileging humanity. Big History divides the past into manageable chunks which sometimes fit established fields of knowledge and sometimes do not. Books have been written about Big History (Christian, 2011; Spier, 2015) and other fields of scholarship referred to in what follows. It is claimed here that the links between these fields of knowledge establish the need for taking a very long term view of the past and future and the place of humanity in this view.

The key concepts in Big History which make it a suitable framing reference for the present work are those of complexity, energy, and the evolutionary process that has created our universe and us. After briefly describing Big History and the problem to be addressed here, an outline of the rest of the article is presented.

The principles of thermodynamics, literally, "the dynamics of heat", and the rate at which the universe has been expanding are said to be responsible for the complexity we see around us (Spier, 2015, 53-56). The first law of thermodynamics states that energy is always conserved, though it may change in form, e.g. from electricity to heat, or from heat to motion. The second law distinguishes energy which is available to do work, i.e. free energy, from that which can no longer be harnessed and states that in a closed system the amount of free energy decreases over time: it is the free energy which creates and sustains complex entities (Christian, 2011, 506-507). The rate at which the universe is expanding has led to a description of what has been called the Goldilocks Principle (Spier, 2015, 63-65). This principle states that for the bringing into being of complex entities the circumstances must be just right: the relevant circumstances relate to gravity, temperature, pressure, radiation and other forms of energy. The circumstances that brought the stars into being are quite different from those which evolved later around the stars and allowed

complex life to develop. As Hawking (1996, 164-173) explains, ordered, organized or complex states of inorganic or animate being are less likely to arise than disordered states. The development of complexity is an evolutionary process. Big History offers a view of the entire universe that is based on careful observation and contestability in various fields of science rather than the narratives about our origins that have been handed down through generations in many cultures around the world but which have been constrained by the circumstances and technologies available to those cultures. Big History gives us a new cosmology.

In lived human experience cosmology may reference various time scales and social practices. The worlds of work, family, school, domesticity, intergenerational relationships, governance, etc. can be described and analyzed as discrete, though in lived experience they intersect. The way these worlds can be understood in Big History is necessarily different from the ways they may be understood from traditional religious perspectives. This work assumes that the manner in which these worlds intersect in the lives of individuals may prove a fruitful focus for Big History consideration in the future.

Human history is a very compressed, short part of the big picture. But:

> *On the modern map of complexity, humans are as central as they were within most traditional cosmologies.* (Christian, 2003, 437-458).

Big History research projects span many disciplines. At Macquarie University Gillings, Paulson & Tetu (2015) and Gillings (2017) concern themselves with internal microbial human health and the impact of antibiotics in our environment respectively. The first Big History doctorate in the world was completed at Macquarie University by Dr David Baker (2015). His interests are complexity, Universal Darwinism and cultural evolution. The International Big History Association web page carries a passage more directly relevant to the present work:

> *Does Big History provide a narrative that can help nurture the development of the empathy and cooperation that are part of our social nature? Can humans form a more perfect human community as we continue to create a more complex society than has existed before? Or will our current levels of social complexity face inexorable demise?*

Before considering a modern social paradox relevant to this goal it is important to appreciate the relation between time and human Big History. Christian (2011, 3) links Hawking's ground-breaking view of time with Big History. For the purposes of the present work it is only necessary to acknowledge Hawking's account of the pre-human history of the universe and his multi-dimensional theories that may help us predict its post humanity future. The timescale that is relevant to the present problem is that of human generational transition. Focusing on this may produce outcomes relevant at other timescales, e.g. that of global warming, and be the subject of surrounding forces which operate on yet different timescales such as structures of social power. The generational transition timescale contains representations of the past and hopes for the future: it is part of the evolutionary process which started at the Big Bang and is embedded within the Big History of the earth and that of humanity.

Spier has recently described the attributes of academic research which are common across the fields of the natural sciences, humanities and social sciences. His background as a cultural anthropologist infuses his writing which speaks strongly to the present work:

> *… doing social science research,*

most notably longer term participatory observations within a cultural setting that is different from our own, places far greater demands on a wide variety of skills than any other form of science. (Spier, 2017).

The present work provides a theoretical background for social science research concerning Big History and human generations. This sets the work apart from much of the public commentary on generations and backgrounds research to be reported in a sequel article. The present work and its sequel will take account of the four basic requirements for academic research identified by Spier: logical consistency, explanation or structuring of empirical observations, openness to falsification and the sharing of findings. The sequel will also address his additional requirement in relation to social science arising out of the participatory action research tradition: it will locate the researcher in generational and institutional terms, in relation to the research process, participants and outcomes. Without specifying them in the same terms, these points were addressed by the author in an earlier publication (Nixon, 2009).

The paradox: Rising inequality in the presence of publicly declared 'poverty lines'

A current issue which focuses our attention on intergenerational relationships is the paradoxical co-existence over decades in developed countries of publicly set 'poverty lines' on the one hand and increasing pecuniary inequality on the other. Other issues could have been chosen, but this will suit the purpose of increasing our understanding of the relevance of human generational transition to Big History.

There are voluminous and separate literatures on poverty, poverty lines and inequality: some focus on subsistence, others on the debate about relative versus absolute poverty. A full appraisal of them is beyond the scope of the present work. The three key points to be demonstrated in what follows are that:

1. poverty lines have been publicly set by government in Australia and other developed countries for decades,

2. inequality has been steadily rising,

3. the disproportionate impacts of inequality on the young.

Firstly, poverty lines were first drawn in Australia based on a survey conducted by Prof. Ronald Henderson in Melbourne in 1966 (Kewley, 1973, 391-393; Henderson, Harcourt & Harper, 1970). This led to him being appointed by the Federal government to lead the National Commission of Inquiry into Poverty which updated these lines (Henderson, 1975, 14), guided Federal budget provisions in 1972-73 and featured in parliamentary debates at the time (Kewley, 1973, 400-401). Today those poverty lines are updated quarterly by the Melbourne Institute of Applied Economic and Social Research at Melbourne University.

Similar accounts can be given concerning other developed countries. For example, in United Kingdom it began with the Beveridge Report in the 1940's (Gordon & Townsend, 1990). In Canada, Germany, Great Britain and the United States, comparisons were not possible until the 1980's when comparable data first became available, implying that data had been gathered in those countries for some time prior to the 1980's: in the United States poverty thresholds had been set in the 1960's (Valletta, 2006). Other national governments that began around this time to systematically collect and publish population level data concerning the incidence of poverty were Canada in 1961, Germany in 1963, Finland in 1966 and Sweden in 1967 (Atkinson, 1991). Governments in developed countries have been

setting poverty lines for decades.

Secondly, reports prepared by the Organization for Economic Cooperation and Development (OECD) over recent years have shown increasing inequity within and between countries. The titles of the OECD reports convey concern about poverty in 2001 but increasingly *inequality* is the recurring theme (OECD, 2001; OECD, 2008; OECD, 2011; OECD, 2015). The most recent one begins by proclaiming:

> *The gap between rich and poor keeps widening.*

In keeping with the OECD report of 2001, Kanbur's (2001) focus is poverty in an international context and his work benchmarks the argument concerning inequality. He acknowledges wide areas of agreement between abstract entities he characterizes as the 'Finance Ministry' and 'Civil Society'. His Finance Ministry contains economists, government finances, banks, etc. His Civil Society contains human rights advocates, NGO's, the United Nations, etc. They are said to largely agree on the value of education and health, the role of international public goods, the relationship between market and state and the central importance of regulatory institutions over markets, governments and the household-market relationship. He then describes the following areas of disagreement. Aggregate statistics require careful explanation if they are to be accurately interpreted, e.g. the percentage of a population in poverty may fall, but if the population is increasing, the absolute number in poverty may be increasing; different poverty lines are drawn from mean compared to median income levels; and the value of public services is not always counted and varies according to whether they are working well or not. The duration being considered makes a difference to perceptions of poverty e.g. the:

> *... daily reality of poor people's lives*

> *... (ibid.)*

can be presented in the media with great immediacy; in the medium-term policy makers often refer to safety nets; and suggest that:

> *... technological change will come to the rescue as it always has in the past.* (ibid.)

The final area of disagreement concerns market structure and power. Kanbur asserts that the 'Finance Ministry' assumes that markets are competitive while in 'Civil Society' it is considered that markets are not competitive. He further asserts that when markets are distorted by either poor infrastructure or local monopoly, capital mobility will hurt labor in countries both sourcing and receiving the capital. Referring to international financial institutions Kanbur calls for a widening of debate on economic policy and agreement on definitions:

> *... 'growth' is used to mean both an increase in per capita income, and to refer to a policy package.* (ibid.)

Referring to a meeting of the Governors of the World Bank he concludes:

> *When the institution whose self-stated mission it is to eradicate poverty can only hold its Annual Meetings under siege from those who believe its mission is to further the cause of the rich and powerful, there is clearly a gap to be bridged.* (ibid.)

Based on the more recent OECD reports cited above it is clear Kanbur's call has gone unheeded: inequality has been rising for at least a decade and a half, if not more.

Finally, two recent Australian reports on inequality highlight its impacts on the young. The Grattan Institute report (Daley, Wood, Weidman & Harrison, 2014) examined the impact of inequity

across generations and found that:

> *Growing wealth has not benefitted the young.*

And

> *Spending policies increasingly benefit older Australians.*

These authors conclude that the financial policies of governments need to change to enable a fairer share of burdens and benefits between generations, but they note the more substantial voting power of the older generation based simply on its size, relative to the young, may be an impediment to this. Increasing longevity and the burden experienced by the young have combined to create the 'Sandwich generation' (Grundy & Henretta, 2006), those in middle age who find themselves caring for both younger and older generations simultaneously. While poverty remains a concern for the Australian Council for Social Service (ACOSS) their recent report of over 50 pages on inequality found that income inequality in Australia is higher than the OECD average and that wealth is even more unequally distributed (ACOSS, 2014; ACOSS, 2015).

In summary, despite the existence for decades of government declared poverty lines, inequality has been growing and is creating disproportionate burdens for the young. The question thus arises about whether governments have the capacity to play a role in addressing this inequality? The paradox arises because democratic governments put a lower limit on inequity through poverty lines but do not set limits on how rich it is possible to become.

It is argued below that by placing these observations about generations and inequality in the context of human Big History a new perspective on this paradox emerges.

Responding to the paradox

The rest of this article describes a theoretical approach which can be used to structure research processes which address intergenerational issues in the context of Big History.

The next section places the paradox in the human period of the earth's Big History by reference to two completely independent fields of scholarship, (Turchin, 2003; Turchin, 2006; Turchin & Nefedov, 2009; Figueroa, 2015) both of which consider various time periods in human civilisations up to and including centuries. These scholars show that there are circumstances in which some complex societies can be expected to become dangerously less egalitarian. The third section relates the classical writers on generations to Mill's notions and to unborn future generations. The fourth section considers further independent fields of scholarship and contains a sympathetic description of a non-literate civilisation, the Australian Indigenous peoples whose civilisation has lasted continuously for tens of thousands of years (Mulvaney & Kamminga, 1999). The ways Australian Indigenous peoples would have regarded the non-identity problem and handled knowledge are critical points in this section (Gammage, 2012; Kelly, 2016). The fifth section considers Steinbruner's (2011) sympathetic interpretation of Mill's controversial writings, and the ways in which the word "ethology" has been interpreted since Mill used it to describe a scholarly pursuit he considered to be highly important – the study of the formation of character.

Some scholars have suggested remedial actions aimed at problems very similar to the paradox addressed here (Figueroa, 2015, II, 189-201; James 2006, 292-314). Proposed remedies are outside the scope of the present work but worthy of consideration elsewhere. The following section discusses how the paradox identified arises at the confluence of several social patterns which occur over different time periods, from years to centuries. The central concern here is to create a

theoretical framework that will facilitate timely feedback as different remedies are tried.

Placing the problem in the human period of the earth's Big History.

The paradox concerning the coexistence of government set poverty lines and increasing inequality with disproportionate impacts on the young, can be better understood by reference to various timescales in the history of human civilisations. The scholarly fields of evolutionary biology and economics work with different kinds of evidence and methodologies but one author in each field has sought to explain changes in different types of civilisations. Each author builds concepts important to the other field into their analysis, so that, for example, the evolutionary biologist considers productivity of humans and land and the economist emphasises that 'history matters'. Both see humanity in the context of the natural world, hence an appropriate subject for rigorous scientific enquiry. The evolutionary biologist, Turchin (2003), presents theories which explain much of the rise and decline of agrarian empires, while the economist, Figueroa (2015), presents a unified theory of contemporary global capitalism. Both authors test their theories against appropriate available data. Their theories consist of mathematical models and while Turchin begins and ends with the timescale of the life of an empire and treats shorter timescales such as generational ones in the decline phase, Figueroa begins with a very short time scale, and concludes with timescales of decades and centuries, including reference to generational transitions in the longer timescales. In the present context the most important thing about their work is that they reach very similar conclusions about the decline of agrarian empires (Turchin) and the future of capitalism (Figueroa) and these conclusions have a direct bearing on the paradox identified above.

The rise and fall of agrarian empires

Mathematical models describing the rise and decline of agrarian empires are at the centre of Turchin's (2003) work. He defines empire as:

> *… a large multiethnic territorial state with complex power structure.* (Turchin, 2006, 338)

However, the political structures in the states which Turchin defines as empires are not only internally complex; they may be very different:

> *The political arrangements by which a state is governed are irrelevant to the definition of empire* (2006, 339).

In summary, Turchin tested his theories on complex societies of the past with diverse forms of government.

Turchin views empires as beginning in an ethnic group, or ethnie, which, unchecked, expands by natural increase until it encounters the territory of another ethnie which it then dominates: his meta-ethnic frontier theory models this expansionary phase. The ethnic core may be a coercive elite, an elite which cooperates with the population or a:

> *Lateral empire wide integration of elites … who rule over ethnically heterogeneous commoners.* (Turchin, 2003, 50).

Turchin's second model, Ethnokinetics, aims to explain the incorporation of weak ethnies in stronger ones, a process which defines an empire but is of less interest in the present context than his other models. His Demographic-Structural theory aims to explain the decline of empires. Finally, secular cycles in population size were predicted by Turchin on the basis of the Demographic-Structural modelling:

> *… population numbers in agrarian societies are expected to go through*

slow oscillations with a periodicity of approximately two or three centuries. (2003, 150).

or many human generations, and his analysis of empirical observations supported this.

In Turchin's 2003 publication he reports testing against two agrarian empires and in the later one, co-authored with Nefedov, mature models of empire formation and decline are tested against several more (Turchin & Nefedov, 2009). These authors gathered comparable demographic and archaeological data for all the agrarian empires they studied. They examined eight different empires, spread across England, France, Italy and Russia and spanning almost two millennia. In relation to a particular period in mediaeval England they state:

> *Nominal wages did not exhibit a cycle but grew fairly monotonically. Thus, a building craftsman's wage increased from 3 pennies (d.) per day in the late thirteenth century to 6 d. per day in the early sixteenth century (Phelps-Brown & Hopkins 1955). Real wages, by contrast, exhibited an oscillation, driven by the cycling movement of prices … .* (Turchin & Nefedov, 2009, 38).

This level of precision allows the authors to trace and analyze patterns discretely within different economic strata of their subject populations. The statistical methods employed by these authors allowed them to map the patterns observed among different strata of the population against aggregate indices of stability and growth or decline (Turchin & Nefedov, 2009, 310-311).

The secular cycles in agrarian societies described by Turchin & Nefedov (2009) involve alternating integrative and disintegrative phases. The integrative phase typically involves:

> *…a centralizing tendency, unified elites, and a strong state that maintains order and internal stability. Internal cohesion often results in the vigorous prosecution of external wars of conquest, which may result in the extension of the state territory.* (Turchin & Nefedov, 2009, 20)

The disintegrative phase typically involves:

> *a decentralizing tendency, divided elites, a weak state, and internal instability and political disorder that periodically flare up in civil war.* (ibid. 20)

In the disintegrative phase the population becomes more stratified and cooperation within and between social strata diminishes. The authors present different indices of social instability depending on what data was available. For the period between 1100 and 1500 in mediaeval England the evidence concerns rebellions and the finding of coin hoards (ibid. 31, 47) and for the Romanov cycle in Russia from 1795 till 1928 the evidence concerns peasant disturbances, crime incidence and named executions (ibid. 284-286).

In two cases out of the eight empires studied, Turchin & Nefedov found evidence of recurring generational cycles which had a very approximate periodicity of two generations or 40 to 60 years (ibid. 28, 79-80, 106, 203, 285): the authors called them *social-psychological* cycles. In the remaining six empires, no such evidence is presented by Turchin & Nefedov, so whether generational patterns existed in them is an open question.

The social-psychological cycles described by Turchin (2006, 243-244, 285-286, 295-298) became evident to him when studying the disintegrative phase of much longer secular cycles. Turchin argues that in these cycles men who return from war and know its cruel realities have the effect of 'immunizing' their sons against war,

and so what follows is a period of peace. These sons may have a slightly similar but modified reaction, but eventually a generation of men matures without experiencing war. At this point, if the demographic and other pressures that caused the conflict in the first instance are still in operation, the likelihood is that another war will break out, and so on until the pressures change. The term *generational* is used here to refer to these cycles.

Turchin's (2008) theory asserts that in agrarian empires social cohesion, synchronous equity and the state all decline together and the empirical work he refers to shows that in some cases generational cycles were associated with the decline of the empire.

Integrated economic theory of capitalism

In global capitalism nation/states cooperate to maintain global markets in which businesses compete. Using Popperian logic, Figueroa creates a theory which applies across all capitalist countries. In his view this is necessary because he sees conventional economic theories as being limited in their scope. He reviews Neoclassical, Keynesian and Classical economics and finds that none of them can account for the existence and persistence of unemployment in the first world: in addition he finds that Classical and Neoclassical economics cannot account for the short run correlation between nominal and real economic variables in the first and third worlds (Figueroa, 2015, 1, 27-39). Figueroa describes nominal variables as those under the control of government such as money supply, exchange rate and interest rate: he defines real variables as things like total output, real wages and employment (ibid, 34). The impact of changes in nominal variables are abstracted from individuals' experience through the machinery of government, where-as real variables have more tangible

impacts.

Communist or second world countries are excluded from Figueroa's work by definition and he divides third world countries into two groups having either weak or strong colonial legacies. He reviewed relevant economic data, from historical and recent international datasets. Eastern Europe was excluded because the introduction of market reforms since the 1990's meant that they were 'in transition' to capitalism (ibid. 28-30).

Using data from the individual countries he creates abstract models of capitalism as it operates in:

a) First world countries (Epsilon society)

b) Third World countries with weak colonial legacies (Omega society)

c) Third World countries with strong colonial legacies (Sigma society).

A key aspect of these models is the slightly different representations of excess labor in each model. In Epsilon it is represented as unemployment, in Omega as unemployment and under-employment with income gaps between ethnies and in Sigma it is like Omega with increased self-employment.

He defines three different timescales relevant to the development of his theory:

a) The short run which typically lasts less than half a year in which he posits a static economic model,

b) The long run which typically lasts a year or so in which he posits a dynamic economic model,

c) The very long run which can last over decades and may run to centuries in which he posits an evolutionary economic model.

Fewer economic variables need to be considered in the short-term but the longer the

timescale being considered, the more relevant variables there are that might change. From these models he creates a unified theory of capitalism which explains the representations of excess labor and the degradation of the biophysical environment that occurs in the very long run. His theory culminates in the presentation of a fourth model, to be described below.

Referring to the two shorter timescales Figueroa (2015, II, 93) concludes:

> *According to the theory of capitalism, the global inequality in the capitalist system (which comprises between-country inequality and within-country inequality) will persist as long as the distribution of economic and political assets at the national and international levels remains unchanged. ... According to the unified theory, therefore, there is path dependence in the process of capitalist economic growth, that is, history matters.*

It is in the very long run context that Figueroa introduces his concept of the intergenerational consumption frontier and the laws of thermodynamics:

> *In conclusion, ... when the stock of nonrenewable natural resources is included in the economic process, society is faced with an intergenerational consumption frontier. ... The average consumption level of future generations will necessarily be smaller than that of the current generation.* (ibid. 104)

> *We can then say that the production process only rearranges matter and energy, ... The economic process is not mechanical, but* entropic. (ibid. 108) [Emphasis original]

In his penultimate chapter Figueroa builds the laws of thermodynamics into his model, moving beyond the earlier static, dynamic and evolutionary theoretical models:

> *The final entropic model of the unified theory predicts that the economic growth process supplies society with increasing quantities of goods per person, which has a positive effect on quality of society, but it is subject to decreasing marginal gains. ... The model thus predicts a trajectory of an inverted-U shaped curve upon the quality of society in the economic growth process. ... The available facts tend to corroborate the predictions of the entropic model. ... This seems to indicate that we are entering into the downward sloping segment of the curve or maybe we are already there.* (ibid. 172)

Similarities between the conclusions of Turchin and Figueroa will now be explored.

Summary

With regard to both the quality of society and intergenerational transitions, there is agreement between Turchin and Figueroa based on the evidence they considered and the theories they generated. Their work took place in totally different fields of scholarship but both considered centuries of human existence and both portray human Big History. Though Turchin did not find generational patterns in every case, the ones he found were sufficiently well pronounced to enable him to build theories around them. However Turchin's empires and Figueroa's capitalist states

might be compared, it would seem that Turchin and Figueroa have independently provided demographic and economic explanations, respectively, for an underlying phenomenon. Are we witnessing a process of entropy or could this be a kind of group level evolutionary process; must we postulate that it is related to human agency or could there be some other explanation? This question is answered in part below. A civilization in decline is shown by these authors to have deleterious impacts on the young; it is the young who pay for the excesses of the old.

The length of the cycles and trends described here creates great difficulty for assessment of potential impacts of emerging cultural trends. The impact of changes made at one point in time may not become evident for decades. Timely assessment requires a synchronous method that can be repeated at intervals to build an historical record. The method needs to be informed by classical generational theorists and more recent generational scholarship.

Generations observed

The concept of *generation* is foregrounded by the paradox being addressed here. In 1987 the concept of generations entered international discourse on governance through the Brundtland Report, 'Our Common Future'. The brief of the World Commission on Environment and Development, of which Brundtland was the Chair, was concerned with sustainable development which was seen as a path to eradicating poverty (Brundtland, 1987, 24-25). Of the 22 principles emerging from the Commission's work only the first two related to social aspects, the first one related to human rights and the second related to generations (ibid. 339). The second principle expresses the desire of the Commission to establish norms about what different generations might expect of the state in relation to the natural environment:

> *States shall conserve and use the environment and natural resources for the benefit of present and future generations.* (ibid. 339).

But no way of balancing the needs of present and future generations is offered. Hence, in that significant international report concerning sustainability, both of the principles addressing social aspects related to social justice. The first addressed synchronous justice and the second hinted at diachronous justice. However, the underlying concept of sustainability is contested.

In a sociological account of the social sustainability and social resilience of an identified population in rural Argentina over the 19th and 20th centuries Adamo (2003) begins with a critique of the Brundtland report in which she addresses the justice element of the sustainable development concept:

> *Sustainable development is becoming a normative concept difficult to articulate and put into practice.*

She asks 'what is to be sustained' and by whom, etc. She treats social, environmental and economic sustainability as separate but interdependent. Adamo mentions the importance of space and time and an historical perspective as ways of contextualising sustainability, and this is also reflected in the work of Scott, Park & Cocklin (2000). Adamo designed her study to answer questions about what makes people remain in rural areas rather than what makes them leave. Adamo draws a connection between social sustainability and social resilience. Of particular relevance here is Adamo's definition of the 'community/culture attribute' of the connection and her reflection on its value for her research. In this attribute she incorporated 'intergenerational equity and cultural capital ... social institutions, formal and informal ... services and infrastructure.'

Reflecting on her own application of this definition, Adamo comments:

> *This (Community/Culture/ Institutions/Services) attribute is more difficult to address, given the imprecision of the elements involved.*

As much as she wants to escape from the dominant normative concept of sustainable development, Adamo concedes having difficulty when trying to articulate elements of social sustainability which stand beyond polity. In light of the discussion above concerning empires and capitalism, it might be said that the state (or polity) has a generational identity which may vary depending on whether the state is rising or falling. Adamo's difficulty is understandable when considered in light of the life cycles of empires and capitalism. Brundtland's principle concerning generations is inadequate because it ignores these time scales.

Theoretical developments in the social sustainability field are tentatively moving beyond the notion of sustainable development enshrined in the 1987 Brundtland Report. The need to do this has been recognised in a recent Australian study of public sector governance (Osborne, 2010). Based on the work of Figueroa it would seem that development has been emphasised at the expense of sustainability, however that term is interpreted.

Human Resource Management consultancies (McCrindle, 2009; McQueen, 2008; Lancaster & Stillman, 2005) often consider what are perceived as the competing interests of different generations (Rayner, 2016; Goertzel, 2006; Heath, 2006; Walsh & Black, 2011; Seedsman, 2006). Sociology can help us understand generations through less biased lenses.

Mannheim, known for his contribution to the sociology of knowledge, provides a summary of much of the scholarly thought about generations, as it stood in the middle of the twentieth century (1952, 276-322). Mannheim distinguishes two definitions of generations: one based on genealogy (kin) and the other on cohorts. The cohort definition of generations is the one used in this work and it groups everyone into generations according to the years in which they were born; people born in defined sets of consecutive years are said to be separate generations. Members of a generation have, at the same stages of their lives, shared the experience of significant public events. Generation is seen as a social location in the same way as gender and race (ibid, 291). With regard to the periodicity of generational cycles:

> *It is a complete misconception to suppose, as do most investigators, that a real problem of generations exists only in so far as a rhythm of generations, recurring at unchanging intervals, can be established.* (ibid, 286)

The length of a generational cycle is not fixed.

Different groups within the same generation may respond to their social and economic circumstances in different ways. If a minority within a generation tends to respond to their circumstances in a way that differs from the response of the majority they are called a generational unit (ibid, 304). The existence of generational units adds a layer of complexity to the analysis of intergenerational relationships:

> *... there exists a uniform generational context in the sense of a shared problem community, but not a generational unity whose members could offer uniform solutions to these problems.* (Jaeger, 1985).

In making this distinction, Jaeger raises questions about whether and how points of contention between and within generations are dealt with, and by whom; sharing a time in history does not necessarily lead to cooperation.

The notion of generational identity or personality goes back to Dilthey's notion (advanced in the late 1800s) of 'the intellectual culture of a generation' and referred to by Marias (1970, 52). Generations have been seen as vehicles for transmission of culture and viewed as recurring in cycles of either two or four types (ibid, 183-184; Turchin 2003). The common feature of both the two and four type models is that influential generations alternated with generations that appear to have had less influence on the course of history. The generation cohorts were variously estimated to be between fifteen (Marias, 1970, 185) and thirty (Mannheim, 1952, 310) years long, which allowed researchers much scope for blurring the boundary years. Marias (1970, 184-185) described a pattern of four different and succeeding generations living at the same time in history and described the tensions between them thus:

> *The year 1800 is not a single date; it is four different dates that exist simultaneously and are mutually involved in an active form. Strictly speaking what we find is not movement so much as it is that which shapes movement and makes it possible – a system of tensions and working forces ... This tension which is revealed in the multiplicity of generations, is the force behind historical movement.*

This point is a guiding principle for the discussion below.

John Stuart Mill on generations

Mill was a prominent politician in Britain in the middle of the 1800s whose thousands of pages of writing including letters to individuals and to the press were published, some posthumously, between 1823 and 1898. These were assembled into 33 volumes and have been made available digitally (Mill, 2016). Mill's writings have had a significant impact on much of the political life of the 20th century and they are relevant here for two reasons, his interest in generations and something he called ethology that will be discussed below. He was born in 1806 and died in 1873. For three years from 1865 to 1868 he followed in the footsteps of his father, James, becoming an elected member of the British Parliament. In phase two of the present work I searched digital copies of his publications and, in all, found 512 references to generations. It is evident that the frequency of those references increased significantly as his maturity as a writer progressed, peaking in publications between 1868 and 1872. Some of his references to generations are not made in the same sense in which generations are referred to above; he could have used other words to describe his meaning. Setting aside those references it is clear that Mill understood intergenerational phenomena in much the same way as the later scholars discussed above understood them.

Mill's commitment to intergenerational equity was very clear from early in his parliamentary term:

> *What are we, Sir - we of this generation, or of any other generation, that we should usurp, and expend upon our particular and exclusive uses, what was meant for mankind?* (28, 143)

and also expressed in his essays:

> *The owner of capital is by no means to consider himself it's absolute proprietor.* (10, 485)

Mill was ahead of his time in many respects and lamented the parlous state of what we would now call the social sciences and in particular, knowledge about psychology (8, 223-224). The neurologist and philosopher, Antonio Damasio

(2003, 15), acknowledges Mill's grasp of the:

> *… relation between personal and collective happiness, on the one hand, and human salvation and the structure of the state, on the other, …*

It might even be said that Mill foresaw the development of human Big History:

> *The facts of each generation are looked upon as one complex phenomenon, caused by those of the generation preceding, and causing, in its turn, those of the next in order. That these states must follow one another according to some law, is considered certain: how to read that law, is deemed the fundamental problem of the science of history.* (20, 345).

Approaching his maturity as a writer, Mill became aware of a set of circumstances in Britain at that time which are similar to aspects of the paradox addressed in the present work:

> *In fact, it has now come to this, that instead of being at liberty to suppose that future generations will be more capable than we are ourselves of paying off the national debt, it is probable that the present generation and the one or two which will follow, are the only ones which will have the smallest chance … .* (28, 141)

of being able to repay it. He later qualified this by citing circumstances which he felt justified obliging future generations to partially pay the cost of benefits they did not choose, but had left to them by previous generations (Political Economy, 613).

When economists, philosophers and demographers write about overlapping (Engineer, Roth, & Welling, 2005) or non-overlapping generations (Wolf, 2003), they are making the distinction between concern for the generations alive today (overlapping) and concern for unborn generations (non-overlapping). Mill seems to have been unable to resolve this problem involving overlapping and non-overlapping generations which had burdened him from very early in his career (6, 240, 252).

Mill sees the length of a generation being approximately 25 years (3, 483) and this is in close alignment with the classical generational theorists discussed above. In harmony with the later writing of Marias, Mill believed the character of a generation was formed by the circumstances in which they grew up (24, 264). Having suggested various measures by which the younger generation could mature in improved circumstances Mill (Political Economy, 270) notes that:

> *The benefit would however arise, not from what was given them, but from what they were stimulated to acquire.*

It is clear Mill sees improvement being negotiated between older and younger overlapping generations, but not necessarily as equal negotiating partners. His recognition of generations within occupations and occupations within generations is an indication that he would have understood the modern concept of generational units and the complexity of such negotiations. The variety of occupations that he referred to include 'Political Economists' (Political Economy, 543), 'Statesman' (6, 243), 'Labourers' (sic) (4, 435), 'Painters' (14, 360), 'Irish farmers' (6, 584), 'Grecian poets' (11, 416), and 'Philosophers' (7, 231). It's clear that in some cases Mill also understood the need to locate generational units within their national contexts. Mill understood that cultural meanings are generated within countries, occupations and generations (8, 230). At one point Mill (21, 241)

describes something like the generational cycles described by Turchin:

> *A new generation has grown up since the great victory of slavery abolition; composed of persons whose ardour in the cause has never been wrought upon and strung up by contest. The public of the present day think as their fathers did concerning slavery, but their feelings have not been in the same degree roused against its enormities.* (sic)

On these points Mill's thinking is in tune with that of 20th century sociology and early 21st century thinking about human Big History.

Identifying a generation

The task of identifying a generation is informed by contemporary demographic study. Not all authors agree on the boundary years between generations, but approximations are generally accepted if they fit within the descriptions above. Samples regarding Australian voting patterns and American Human Resource Management (HRM) are given for comparison with the Australian Bureau of Statistics and Australian demographers in Table 1. (ABS, 2009; Gray, Evans & Kippen, 2007; Zemke, Raines & Filipczak, 1999; Ruthven, 2004; Strauss & Howe, 1991, 84; Australian Bureau of Statistics, 2006).

In the Australian context this represents fertility cohort patterns similar to those described by

Australian Bureau of Statistics ABS	Gray, Evans & Kippen Australian Demography	Ruthven Australia Voting	Strauss & Howe USA	Zemke et al USA HRM
1891	1910	1901	1901	
1926	1925	1925	1925	1922
1946	1945	1943	1943	1943
1966	1965	1961	1961	1960
1986			1981	1980
2006				2000

Table 1 Generation boundaries of demographers and other authors.

Turchin (2003, 151-152).

The 'non-identity problem'

In the case of non-overlapping generations the 'non-identity problem' must be addressed (Page, 2006) because living generations can exploit their position (ibid.). Mill never reached a resolution of this problem and debate on it continues in fields concerned with social justice, the environment (Dobson, 1999; Woollard, 2012) and applications of technology to fertility (Weinberg, 2013; Gardner, 2015). It applies in societies where laws can only apply to people who can be clearly identified and this usually means the living. It is argued that if a law applied to the unborn, the problem thus created would be the need to determine exactly who among the people yet to be born would be harmed, and in what ways by the pursuit of the various alternatives now available to deal, for example, with climate change.

The non-identity problem was partially recognised in English law sometime prior to Mill's career:

> *It is now a considerable number of years since a London merchant having by testament directed that the bulk of his fortune should accumulate for two generations, and then devolve without restriction upon a person specified; this will, rare as such dispositions might be expected to be, excited so much disapprobation, that an Act of Parliament was passed, expressly to "enact" that nothing of the same sort should be done in future.* (Mill, 4, 259)

Some argue that because the rights of the unborn cannot be asserted in law, present generations need not concern themselves with their well-being (Gosseries, 2008; Weinberg, 2012). But examples have been given of 'historic injustice' to the descendants of slaves (Herstein, 2008) and the 'Stolen Generation' of original Australians (Dodson, 2007). In these cases governments have accepted responsibility for providing compensation many years after the original injustice. Part of the argument in favour of the historical injustice claim is that the original injustice is a separate issue from the continuation of a derivation of that injustice in the present. Therefore these instances are equivocal on the implications of the non-identity problem.

It has been argued that:

> *… we are right to keep our eye on how principles and practices affect individual persons and I will argue that, when we do, the non-identity problem does not arise.* (Weinberg, 2012)

The following section describes a civilisation in which this appears to have been done to good effect.

The pre-colonization society of the original Australians

This section considers the culture and civilisation of the original Australians, commonly called Aboriginals and Torres Strait Islanders. Based on archaeological evidence they are estimated to have settled in Australia at least 40,000 or 60,000 years ago or more (Mulvaney & Kamminga, 1999). During that time they have maintained a continuous, developing culture which would seem to have at least partially survived the devastating annexation of their lands by Europeans since 1788: this is evident in their public statements calling for a national treaty in which they have been encouraged by many, including the historian, Henry Reynolds

(Reynolds, 1996, 70, 114-116, 145, 151-153; Reynolds, 1989, 75, 87) the popularity of the music by Yothu Yindi (2016), announcements by two Australian state governments concerning treaty discussions (South Australian Treaty Discussions, 2017; Victorian Treaty Discussions, 2017) and the recent Uluru Statement from the Heart (2017).

It has been estimated that before 1788 the original Australians, in comparatively small social groups, occupied the whole continent of Australia including parts that would now be considered deserts and that there were literally hundreds of languages among them (Elkin, 1970, 17). The continuity in the civilisation of the original Australians has something to teach us in relation to the non-identity problem but it must first be distinguished from the empires studied by Turchin and Turchin & Nefedov and the capitalist economies studied by Figueroa.

The criteria Turchin used to define empires suitable for his analysis are that the society in question must be large, internally multiethnic, territorial and have a complex power structure and that a meta-ethnic frontier is present in the early stages (Turchin, 2006, 3). A meta-ethnic frontier is a place where an empire and foreign ethnie are geographic neighbours of a kind.

Figueroa defines capitalism as a set of social arrangements in which private property dominates over property held in common, the market is the dominant form of exchange and democracy, loosely defined, is the dominant form of governance (Figueroa, 2015, I, 27).

Our knowledge about the original Australians enables comparison with several defining aspects of empire and capitalism. Mulvaney tells us:

> *For longer than any other population of* Homo sapiens, *the ancestors of the Aborigines inhabiting Sahul, and later Australia, were genetically cocooned*

> *from the rest of humanity in Eurasia.* [Emphasis in original] (Mulvaney & Kamminga, 1999, 170)

Their closest neighbors were the Torres Strait Islanders to the north who:

> *resemble Papuans rather than Australian Aboriginals in physical features.* (ibid, 332)

There was trade, conflict and intermixing between the groups but the original Australians did not follow the agricultural practices of the Islanders (Gammage, 2012, 98) who may have adopted some of the original Australians' hunter-gathering practices (ibid, 300).

In relation to the power structures of original Australians Berndt & Berndt refer to them as 'stateless' (Berndt, & Berndt, 1981, 366) and Keen tells us that rules and norms were taken as given:

> *… because they were contained and transmitted in oral tradition and in the absence of centralised legislative and judicial institutions, the rules and principles of ancestral law had a large discretionary component.* (Keen, 2004, 244)

And that:

> *Networks of regional cooperation underpinned the sharing of ancestral law.* (ibid, 244)

Ancestral laws may have differed from community to community but all over Australia ancestral law was honoured. This law indicated that the original Australians belonged to the land rather than the land belonging to them (Berndt & Berndt, 1981, 135-149). The words "territory" and "property" had, therefore, a very different meaning for the original Australians than they do in empires or capitalist societies. The original Australians at the time of the early encounters

between them and Europeans had no experience of a meta-ethnic frontier, they were an ethnically homogeneous population whose understanding of territory and property was completely different to ours and they were 'stateless'.

Therefore we can conclude that the society of the original Australians at the time of its early encounters with Europeans was neither an empire as Turchin would see it, nor a capitalist society as Figueroa would see it: it existed outside the mathematical models of human Big History discussed above.

Gammage has painstakingly reviewed many of the earliest records made by Europeans about the original Australians and the way they related to their land-scapes. These records consist primarily of paintings and handwritten documents and he finds a substan-tial level of agreement between them regarding the lifestyle of the original Australians and the way they related to their landscapes. The original Australians controlled their lands and their populations so as to produce a surplus most of the time and enough to get them through the severest droughts (Gammage, 2012, 150-151). Most of his book concerns their land management practices: population management he mentions in passing indicating that a variety of laws were invoked and in extreme cases infanticide was practiced; something also noted by other authors (Marcus, 2015; Stormon, 1977, 136-137) and inter-preted in a broader context as being 'essential for the survival of society' (Davies, 1981, 193). Mill was also concerned about population size and it has rele-vance to Big History (Christian, 2011, 311-312, 630). Gammage concludes:

> *1788's plant patterns were unnatural*
> *but universal. How people did*
> *this varied from region to region,*
> *but everywhere they made similar*
> *templates for similar purposes.*
> *Different lives, from Spinifex to*
> *rainforest, the Wet to the snow,*
> *coast to desert, obeyed a strict*

> *inheritance, followed the same Law,*
> *allied with fire and worked locally to*
> *make plants and animals abundant,*
> *convenient and predictable. They*
> *made a continent a single estate.*
> (Gammage, 2011, 280).

Land management practices of the original Australians had two salient features. Firstly, they used very detailed knowledge of botany, the impact of fire on different plants in different weather conditions, animal husbandry and the fire technologies that were available to them to create landscapes that were compared by the early European visitors to the estates of landed European gentry (ibid. 5-17). Secondly, given the level of technology available, to establish the land templates portrayed by Gammage the knowledge required must have been applied consistently over centuries (ibid. 41) after which only maintenance activity was required. However, even the maintenance activity in some cases required observance of plant cycles with the periodicity of approximately half a century (ibid. 27, 52). Despite being a non-literate civilization, the original Australians must have conveyed knowledge from generation to generation in ways that ensured it would be passed on to future generations so that it could be used at the appropriate times in these plant cycles, even if it was not always going to be necessary to use that information in the lifetime of some human generations.

It is noteworthy at this point to briefly consider the differences between the left and right hemispheres of the human brain and McGilchrist's (2009) argument that in the contemporary western world the dominance of the left hemisphere is responsible for many of our problems. The left hemisphere's primary focus is said to be on all that is familiar and it deals in concepts it can 'grasp'. On the other hand the right hemisphere engages with the outside world more,

seeing everything in context. This is a gross over-simplification of McGilchrist's work but can serve the present purpose. Before analysing the cultural shifts in hemisphere dominance in the western world he describes the role of mimesis in cultural change and indicates that:

> *... we choose what we imitate.*
> (McGilchrist, 2009, 256)

McGilchrist describes writing as primarily a left hemisphere function (McGilchrist, 2009, 274-279): this implies that non-literate societies like that of the original Australians, compared to literate ones, lived with a different balance between the functioning of the left and right hemispheres of the brain.

Inspired by her understanding of how the original Australians handled knowledge, Kelly found she could apply their techniques profitably in her own life and that other ancient non-literate civilisations such as the Easter Islanders and the Stonehenge dwellers handled knowledge in similar ways (Kelly, 2016). Unlike the latter two which used large expensive man-made objects as their mnemonic props, the original Australians used features in the landscape. By these means they made the non-identity problem irrelevant. This kind of intergenerational relationship goes far beyond that mentioned in the Brundtland Report, discussed above, and challenges our current intergenerational practice.

A small international group from the academy and business are today concerning themselves with the well-being of future generations (Oxford Martin Commission for Future Generations, 2015). The way original Australians lived in 1788 is an example that makes it worthwhile for us to strive to meet the Big History challenge set by Spier:

> *... would we be able to tame both our biological instincts and social arrangements with the aid of culture?* (Spier 2015, 313)

Two additional fields of disciplined knowledge are relevant to this challenge and will be discussed in the following section.

Social Anthropology and Human Ethology.

The relationship between social anthropology and human ethology is complex. For historical reasons the field of human ethology will be discussed first.

An early 20th century dictionary (Porter & Harris, 1902, 513) definition of ethology indicates that the word is of Greek origin where it refers to character, custom and moral nature. It then provides two definitions:

> *1. A treatise on morality; ethics.*
>
> *2. The science of the formation of character, national and collective as well as individual.*

The source of the second definition is given as *J. S. Mill*.

An early 21st century definition given by the same authority (Websters, 2016) indicates French, Latin and Greek origins in which the relevant words are linked with character, speech and expression and provides the following two definitions:

> *1. The scientific study of animal behavior, especially as it occurs in a natural environment.*
>
> *2. The study of human ethos and its formation.*

No sources are given for these definitions.

It is evident that the link with Mill has been lost and the meaning of the word has been significantly broadened: the context of the early definition limits it only to humans while the recent one incudes the study of animals,

privileging the latter by listing it first. The latter definition reflects the current existence of separate international ethology associations, the International Society for Applied Ethology (2016) for the study of animal behavior and the International Society for Human Ethology (2016).

The present work stops short of defining ethology in the Millean sense which is still seen as a work in progress to which Steinbruner (2011) has made a major contribution. Using keyword searches Steinbruner has been able to draw together and interpret Mill's publications succinctly and in a way that demonstrates their relevance to the present day. Steinbruner asserts that Mill sees:

> *… political units, patterns of human behavior and forms of social organization.* (Steinbruner, 2011, iii)

as co-constitutive of each other. Steinbruner sees in Mill's thought

> *… a framework that relates individual utility to a distinct but not independent utility of the whole.* (ibid.)

Steinbruner observes that Mill proposes

> *… a method of investigating this relationship as reflected in characteristic patterns of thought and behavior, a method - political ethology… .* (ibid.)

The ambitions of the International Big History Association (2015) announced prominently on their website, i.e. to contribute to human well-being in the present and near future can arguably be well served by pursuing concerns that Mill hoped his ethology project would address. Steinbruner's interpretation of Mill's ethology project sees it as building on our knowledge of psychology:

> *… in order to make reasonable generalizations about how specific conditions external to the individual contribute to the acquisition of specific dispositions.* [or traits] (Steinbruner, 2011, iii)

Mill himself made little progress with his ethology project but it was taken up by others. Leary (1982) describes its slow development, its demise in UK and simultaneous advance in France, and its return to the English-speaking world through the social anthropology of Radcliffe-Brown and Malinowski.

In the final footnote to his article Leary also identifies the original application of the term 'ethology' to animal behavior in 1907 and suggests that at the time of his publication, 1982, animal and human ethologies might be in the process of converging. In the same year Hinde (1982) published his book which relied heavily on the work of animal ethologists in its approach to human ethology, without reference to Mill. Seven years later, as if in response to Hinde, Eibl-Eibesfeldt (1989) published his epic work on human ethology which was also much influenced by the work of animal ethologists *and* without reference to Mill.

Based on this author's keyword search and analysis of Mill's works it appears that Mill's thoughts about generations closely approximate the thoughts of the authors referred to in the 'Generations observed' section above. However, Mill's frequent expressions of concern regarding "posterity" suggest strongly that he would not regard the "non-identity" problem as a valid reason to ignore the interests of the, as yet, unborn.

Mill's work, and particularly his ethology proposal has been controversial, like many of the other works cited here. At the end of his book which is broadly sympathetic to Mill, Miller mockingly dismisses the ethology project:

> *Mill's unfinished project, the*
> *construction of the great science of*
> *ethology, has yet to be carried out.*
> (Miller, 2010, 211)

However, Leary traces an unbroken line of ethological thought from Mill to the field of social anthropology. If Leary's conclusion is accepted, then Miller's final word on Mill's ethology can only be seen as historically correct but not a fair assessment of Mill's contribution to social science.

A comparison between the central concepts which are now applied in both animal and human ethologies and the things which are of greatest concern to 21st century social anthropologists can serve to illustrate the divergence between the two that began in the early 20th century.

Human and animal ethology today examine behavior from causal, developmental, functional and evolutionary perspectives (Hinde, 1982, 128-131; Barrett & Stulp, 2013). Time is an essential dimension in all of these perspectives except the functional and even in that one time may be involved. In ethology sentiments and tendencies were early key concepts but Leary notes that social anthropologists refer instead to interests, values, needs and satisfaction. Though all of these can change with time, time is not an essential dimension of their definitions. At the same time as Eibl-Eibesfeldt was publishing his epic work concerns were being raised about the need to rethink human ethology (Betzig, 1989). Betzig places the focus in human ethology on understanding mechanisms (For detailed discussion of social mechanisms see Hedström & Swedberg 2005) so that predictions can be made. While ethology today is imbued with a concern about the continuity of time and the making of predictions, social anthropology is much more interested in understanding the present. This understanding is pursued for its own sake in the hope that it may inform our approach to the future.

Recent work in social anthropology draws together insights from several synchronous anthropological observations to make general statements about social practices in the economy (Gudeman, 2016,183-189). The limitations of the synchronic frame are lamented by one social anthropologist (Lewis, 1981, 11) and the source of challenge for others:

> *The challenge, then, is not to*
> *do away with the synchronic*
> *ethnographic frame, but to exploit*
> *fully the historical within it.*
> (Marcus, & Fischer, 1986, 96)

The sequel to this article responds to that challenge.

Conclusion

The primary purpose of this work has been to situate human generations in Big History and to do this in a way that may lead to a more harmonious humanity. To do this the work had to address a range of controversial issues and this is not unusual in the Big History field. But without the cosmology offered by Big History, the arguments presented here would have been difficult to support.

On their own, the life cycles of empires and capitalism might be seen as reflections of an underlying evolutionary group selection process. However, the complexity of that concept and the controversy surrounding it (Okasha, 2013, 173-202) make it an unattractive proposition. After considering the example of precolonial original Australians, Popperian logic came into play and the entropy and the levels of selection hypotheses were falsified. In the absence of any other explanation for the survival of the original Australians' civilisation, and the differences between that civilisation and empires and capitalism, human agency must be considered as a potential explanation, qualified by due

consideration of the balance between the left and right hemispheres of the brain. Current practice in human ethology is concerned more with behaviour than character. Bringing together the thoughts of Mill, Steinbruner and McGilchrist, one might ask: what might the young be 'stimulated to acquire' (Mill, Political Economy, 270) or disposed (Steinbruner, 2011, 144) to imitate (McGilchrist, 2012, 256)? The answer is to be found somewhere in inter-generational relationships.

Disciplined study of generations has been a comparatively narrow area relying on conventional social science disciplines. Informed by recent sympathetic scholarship on Mill and Mill's own writings this work has traced the ideas of Mill in general and his ideas concerning ethology in particular, through key moments down to the present field of social anthropology. After examining differences in emphasis with relation to time between social anthropology and the primary concepts in human and animal ethology, it may now become possible to tentatively reconstruct a model of Mill's ethology project focusing on the character of generations in a way that addresses the Big History goal of human harmony. I submit that we need to re-unite Mill's interest in the development of character with temporal references through the study of inter-generational relationships. With the benefit of advances in social science that have taken place in the century and a half since Mill, a completed attempt to do this in practice will be the subject of a sequel to this article.

It is to be hoped that this article will also lead to many other avenues of fruitful, intuitive speculation so that the best approach to the paradox which has focused this work can be found.

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