(COMMENTARY 46, OCTOBER 2017)

IS THE WORLD GETTING BETTER?

Draft of a chapter for *Values, World Society and Modelling Yearbook 2017*

> "Violence is not the only unpleasant thing that has changed: disease, poverty, illiteracy, premature death, and other scourges of the human condition have decreased as well."[1]

Population, technology, economy and social development
The world economy: the IMF Annual Report 2017
Health: *The global burden of disease* (Lancet)
The environment: revised estimates for global warming
Peace. *How peaceful is the world today – really?* (Sarkees)
Conceptualising conflict variables and their relationships
Human costs. *A new epistemology of war ... measuring the human costs of armed conflicts* (Tirman)
Threats in a system of relationships (Pew Center)
The liberal order. *The threat to the liberal world order and the future of war* (Cederman)
Dissatisfied democracy (Pew Center)
Dominant discourses. *Indexology, pseudo-science and human ranking: reducing peace into a quantifiable commodity* (Ratuva)
Ideas: objective or partisan?
Time: models of trajectories
Modelling. *Identifying Conflict Escalation Patterns using Bayesian Nonparametric Models* (Ali)
War death rates: a unit root model

Overview. Is the world becoming more peaceful? Is the world becoming a better place in general? Good things happen and bad things happen. Sometimes things improve and sometimes things get worse. So we are left with the question, are things getting better on average?

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[1] Pinker, Steven. "Response to the book review symposium: Steven Pinker, *The Better Angels of Our Nature*." *Sociology* 49, 4 (2015): 1224-1232.
Kenny, Charles. *Getting Better*. New York: Basic Books, 2011.

Human history thus far has been characterised by an increasing population, and technological, economic and social development. There is evidence that violence has decreased although this is contested. A separate point is that violence does not dominate the health statistics. There is inequality; and patterns of inequality change with differential growth. Associated with development are impacts on the environment, some of which are harmful. Change has accelerated at least since the industrial revolution in the nineteenth century. In this period world dominance has changed. Accounts can be partisan. Modelling provides insight into these phenomena.

These points are illuminated by a variety of recent reports: the IMF Annual Report for 2017; a report in Lancet on *The global burden of disease*; a report revising the global warming estimates used in the Paris 2015/2016 agreement; an international survey by the Pew Centre covering perceived threats by people in different countries, and also covering perceptions of democracy; and finally a selection of papers on peace and conflict presented at the recent CRS conference in Oxford – covering the decline of violence thesis, the human costs of war, the world liberal order, dominant discourses and the modelling of the conflict process.

Population, technology, economy and social development

Human history thus far has been characterised by an increasing population, and technological, economic and social development. In this sense the broad trend in human history suggests that, yes, the world has become a better place. But will this continue?

The simplest model of population growth is an exponential one. This model has been followed by the human population and the growth rates have themselves increased over time.[2] An alternative model of population growth looks beyond exponential growth and envisages a resource constraint with slowing growth up to the constraint and possibly subsequent population collapse. Following Malthus, some believe that this is the prospect facing humanity unless action is taken.[3] Other more complex models of population can exhibit more complex behaviour.[4]

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[2] Burt, Gordon. *Values, World Society and Modelling Yearbook 2015*. Newcastle: Cambridge Scholars, 2017, 133, 141-144.

[3] Engelman, Robert. "Population and sustainability: can we avoid limiting the number of people?" *Scientific American*, June 1 (2009). Accessed 11 October 2017. https://www.scientificamerican.com/article/population-and-sustainability/.

At the same time as population is growing, economic output (GDP) is also growing. Thanks to technological development the latter is growing faster than the former and so output per person (GDP per capita) is also growing. However alongside growth there is inequality – inequality of GDP per capita and inequality of growth in GDP per capita.[5] New growth theory treats technological progress as endogenous and some argue that technological progress is an increasing function of population size and that over almost all of human history until recently technological progress has led to increases in population rather than increases in output per person.[6]

Social value can be measured in aggregate or per capita. Arguably per capita value is more important than aggregate social value. A variety of (per capita) social value indicators correlate with GDP per capita and so, since GDP per capita is increasing, we might expect social value to increase and this is indeed the case. Taking social value as the inverse measure of structural violence, it has been argued that increasing social value implies decreasing structural violence.[7]

The world economy: the IMF Annual Report 2017

The IMF Annual Report of 2017 is entitled *Promoting Inclusive Growth*.[8] A chart shows how GDP has grown over the past 76 years. This growth has been uneven: GDP has grown fivefold in advanced economies and tenfold in emerging markets and developing countries. The differential growth has changed over time. Growth in advanced countries was greater than elsewhere in the period 1960-1970, but has been less than elsewhere

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Campbell-Lendrum, Diarmid and Manjula Lusti-Narasimhan. "Taking the heat out of the population and climate debate." *Bulletin of the World Health Organization* 87 (2009): 807-807.
Accessed 11 October 2017.
http://www.who.int/bulletin/volumes/87/11/09-072652/en/.
[4] Burt, Gordon. *Conflict, Complexity and Mathematical Social Science*. Bingley: Emerald Press, 2010, 223-224.
[5] Burt, Gordon. *Values, World Society and Modelling Yearbook 2014*. Newcastle: Cambridge Scholars, 2016, Chapter 11, 206-225.
[6] Burt, 2010, op. cit. 224-225.
[7] Burt, 2017, op. cit. 111-118, 133-136, 139-141.
[8] IMF. *IMF Annual Report 2017. Promoting Inclusive Growth*. IMF. 2017. Full paper:
http://www.imf.org/external/pubs/ft/ar/2017/eng/pdfs/IMF-AR17-English.pdf.
How to jump-start growth. Spotlights.
http://www.imf.org/external/pubs/ft/ar/2017/eng/spotlight.htm.
Accessed 11 October 2017.

since 1975, and substantially less since 1990. Because GDP was initially greater in advanced economies, the differential growth has reduced the gap between advanced and emerging/ developing countries.

We turn now from the aggregate measure of GDP to the per capita measure of labour productivity (output per worker) and the related measure, total factor productivity. Productivity growth is a key driver of growth in living standards. In advanced countries it was between 0.5% and 1% in the period 1990-2004. It then began to fall from 1%, falling rapidly during the 2008-2009 global financial crisis when it turned negative but has now risen slightly to 0.2% in 2016.[9] Other countries have exhibited cyclical patterns, between -1% and +1% for emerging market economies (now 0.2% in 2016), and between -2% and +2% for low-income developing countries (now -0.2% in 2015).

There is differential growth and productivity not only between countries but also between individuals. In advanced economies between 1980 and 2010, total population has increased by 55.5% but income for almost everybody has increased - rather less – by 43.8%. However the top 1% have seen their incomes rise by a dramatic 182.2%. In low-income developing countries between 1996 and 2013 GDP growth has reduced poverty but has left inequality unchanged. There is also differential participation in the labour force: increasing women's participation to match men's would boost GDP by 5% (USA), 9% (Japan), 12% (UAE) and 17% (India).

"Poverty in China has fallen from 60% to 5% in less than 30 years."[10]

One section of the IMF Annual Report focused on the impact of trade on growth and employment. Since 1960 world trade has grown at twice the rate of GDP. There have been reductions in trade costs, the formation of global supply chains and advances in manufacturing and productivity. More recently trade has slowed and at the same time there have been growing concerns particularly in advanced countries about the benefits of world trade.

"Between 1820 and 1990, the share of world income going to today's wealthy nations soared from twenty percent to almost seventy. Since then,

[9] Crafts, Nicholas. "Whither economic growth?" *Finance & Development*, 54, 1 (2017). Accessed 11 October 2017.
http://www.imf.org/external/ft/fandd/2017/03/crafts.htm.
[10] Conway, Ed. "Globalisation has shaken faith in free trade." *The Times*, 20 October 2017: 26.

that share has plummeted to where it was in 1900. As Richard Baldwin explains, this reversal of fortune reflects a new age of globalization that is drastically different from the old.

In the 1800s, globalization leaped forward when steam power and international peace lowered the costs of moving goods across borders. This triggered a self-fueling cycle of industrial agglomeration and growth that propelled today's rich nations to dominance. That was the Great Divergence. The new globalization is driven by information technology, which has radically reduced the cost of moving *ideas* across borders. This has made it practical for multinational firms to move labor-intensive work to developing nations. But to keep the whole manufacturing process in sync, the firms also shipped their marketing, managerial, and technical know-how abroad along with the offshored jobs. The new possibility of combining high tech with low wages propelled the rapid industrialization of a handful of developing nations, the simultaneous deindustrialization of developed nations, and a commodity supercycle that is only now petering out. The result is today's Great Convergence.

Because globalization is now driven by fast-paced technological change and the fragmentation of production, its impact is more sudden, more selective, more unpredictable, and more uncontrollable. As *The Great Convergence* shows, the new globalization presents rich and developing nations alike with unprecedented policy challenges in their efforts to maintain reliable growth and social cohesion."[11]

Over the decades there has been much discussion about the role of the international financial institutions (IFIs), such as the World Bank and the IMF. John Williamson has recently revisited his 1989 coinage of the term "Washington consensus". He discusses the original reference in 1989 to Washington's preference concerning policy reforms in Latin America; Washington's preferences in 1999 for developing countries in general; and the beliefs of critics such as Stiglitz about the set of policies that the IFIs are seeking to impose on their clients. Now in 2017 we see "nothing less than a revolution". Reversing its deregulation agenda the IMF advocates workers' rights and taxing the rich.[12]

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[11] Baldwin, Richard. *The Great Convergence. Information Technology and the New Globalization*. Boston: Harvard University Press, 2016.
Accesssed 20 October 2017.
http://www.hup.harvard.edu/catalog.php?isbn=9780674660489.
Conway, 2017, op. cit.
[12] Williamson, John. "The Washington Consensus as Policy Prescription for Development." Institute for International Economics. Presented at the World Bank, January 13, 2004.
Accessed 11 October 2017.
https://piie.com/publications/papers/williamson0204.pdf.

Health: *The global burden of disease*

Is the world becoming a better place? In the sense that mortality rates have decreased and life expectancy has increased (by 14 years) in the period 1970-2016 then the answer is yes. The rate of change has been fairly constant over the period. In the under-5 age group there were 16 million deaths in 1970 but just 4 million deaths in 2016.[13]

The completeness of statistical records varies across countries and over time.

The only decline observed was related to conflict in war-torn Syria. In many countries, major increases in mortality have been followed by faster rates of decline in subsequent years or decades,[17] leading to some degree of mortality rate catch-up declines for locations that had mortality increases.

Health indices are correlated with values of the Socio-Demographic Index (SDI) a summary indicator derived from measures of average income per capita, educational attainment, and total fertility. Across SDI groups, life expectancy ranges from 61.6 to 78.1 (males) and 64.1 to 83.4 (females). See Table 1.[14]

"The past 37 years have featured declining rates of communicable, maternal, neonatal, and nutritional diseases across all quintiles of SDI, with faster than expected gains for many locations relative to their SDI. A global shift toward deaths at older ages suggests success in reducing many causes of early death. Years of Life Lost (YLLs) have increased globally for causes such as diabetes mellitus or some neoplasms, and in some locations for causes such as drug use disorders, and conflict and terrorism. Increasing levels of YLLs might reflect outcomes from conditions that

Stiglitz, Joseph E. "More instruments and broader goals. Moving toward the Post-Washington Consensus." WIDER Annual Lecture 2. Helsinki, January 7, 1998. Accessed 11 October 2017.
https://www.wider.unu.edu/publication/more-instruments-and-broader-goals-0.
Aldrick, Philip. "IMF learns from history as it loses faith in the Washington consensus." *The Times*, October 14, 2017: 52.
Business leader. "Corbyn has a Washington ally over raising taxes on the rich. But no, it's not Trump." *The Observer*, October 15, 2017: 42.
[13] GBD 2016 Mortality Collaborators. "Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970–2016: a systematic analysis for the Global Burden of Disease Study 2016." *The Lancet*. 390, 10100 16 September (2017): 1084–1150. Accessed: 11 October 2017.
http://thelancet.com/journals/lancet/article/PIIS0140-6736(17)31833-0/fulltext.
[14] GBD 2016 Mortality Collaborators. Op. cit. Table 2.

required high levels of care but for which effective treatments remain elusive, potentially increasing costs to health systems."

Table 1 Life expectancy at birth and age-standardised death rate per 100,000; by Socio-Demographic Index (SDI)

SDI	life exp. at birth		age-standardised death rate per 100,000	
	male	female	male	female
Global	69.8	75.3	1002.4	690.5
High	78.1	83.4	636.0	400.0
High-middle	73.1	79.9	898.6	550.1
Middle	71.1	77.3	1013.2	653.6
Low-middle	66.2	70.3	1251.8	989.5
Low	61.6	64.1	1492.6	1380.5

Injuries are a small component, 8%, of overall death rates. Also most injuries, 72%, are transport or unintentional injuries. Next in frequency are self-harm with 17% of injuries, then interpersonal violence with 8% of injuries, conflict & terrorism with 3% of injuries, and finally executions & police conflict with 0.2% of injuries. See Table 2.[15]

Five broad points can be made about the statistics in Table 2. Firstly death does occur. Secondly the statistical reality may differ from our preconceptions – in particular things may not be as bad as we feared. Thirdly things have been getting better – despite events which have been causes of concern. Fourthly the statistics do not tell us about the future – will things stay the same, will progress continue or are there threats which might be realised, possibly at some delayed point in the future? Finally the table reports the global situation and specific locations may have different experiences.

Thinking ahead to our discussion of war, globally, wars have not been bad enough to prevent an exponential growth of population. Globally,

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[15] GBD 2016 Causes of Death Collaborators. "Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016." *The Lancet*. 390, 10100 16 September (2017): 1151–1210. 1152, Table 2. Accessed: 11 October 2017. http://thelancet.com/journals/lancet/article/PIIS0140-6736(17)32152-9/fulltext.

wars have not been bad enough to prevent an increase in life expectancy. Globally is war a decreasing proportion of causes of death?

Table 2 Age-standardised Years of Life Lost (per 100 000)

	2016	% ch. 2006-2016	
All causes	832.7	-16.8%	22562.3
Communicable, maternal, neonatal, and nutritional disorders			
.	154.1	-32.3	8021.0
Non-communicable diseases	614.1	-12.1	11850.1
Injuries	64.4	-14.4	2691.2
Injuries			
Transport injuries	19.6	-15.2	874.6
Unintentional injuries	26.3	-16.1	961.0
Self-harm	11.2	-18.0	458.4
Interpersonal violence	5.2	-13.3	266.1
Conflict and terrorism	2.0	122.4	123.4
Executions and police conflict	0.1	-26.5	3.0
Exposure to the forces of nature	0.1	-55.2	4.8

Consider first our preconceptions. Some of the things people worry about are quite rare. Indeed they may worry more about rare events than about common events. For example people may worry about terrorism more than interpersonal violence, may worry about threats from others rather than self-harm, and may worry about intentional harm rather than about accidents.

Looking to the future:

"The accelerated declines in cause-specific YLLs rates for nearly all causes is occurring despite threats to human health such as climate change, antimicrobial resistance, obesity, emerging infectious diseases, and conflict. The debate over whether progress in human health can continue through some combination of innovation and a societal focus on leading problems despite the advent of these risks in some ways parallels an

explanation for the well-known environmentalist's paradox in which human so-called well-being has continued to improve globally even as resources are depleted and many ecosystems show signs of degradation. An alternative explanation is that these threats have substantial time lags so that health consequences of climate change, for example, might be major in the future even if not notable to date. The continued global increase and expansion of dengue and its four serotypes is a potential indicator of the complex changes that are underway and might be partly related to changes in climate in addition to other factors. Other challenges, such as conflict and terrorism, are clearly causing reversals in some locations such as Syria and Yemen. The apparent reversal in progress in survival in the USA is a complex phenomenon whose causes and magnitude remain contested, but recent research has pointed to rising mortality among some groups, especially non-Hispanic whites, from increased deaths from drugs, alcohol, and suicide, coupled with slower progress in reducing deaths from cardiovascular disease and cancer, and rising levels of obesity and associated disease. These threats are substantial and deserving of policy attention and response. Given the gulf between a future driven by a continuation of the trends we have observed in the last 37 years and one dominated by emerging risks, close monitoring of patterns in health outcomes will be essential. Further work to identify specific health outcomes in particular locations might be sentinel markers of the effect of these threats might also improve our capability for early detection of changes in trends in certain locations."[16]

The environment: revised estimates of global warming

An Inconvenient Sequel: Truth to Power is a film documentary by former US Vice-President Al Gore.[17] The film starts with the melting of the polar ice cap and recounts Gore's involvement in the process that led to the Paris 2015/2016 agreement. World leaders agreed to take action to limit the further increase in global temperatures to just 1.5 degrees C. In 2017 an international survey of thirty-eight countries found that people saw climate change as one of the top two threats to their nation.[18] "As U.S. President Donald Trump continues to unravel legislation designed to fight climate change, Chinese President Xi Jinping is promoting his own country as a climate change leader."[19] Specific events were attributed to

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[16] GBD 2016 Causes of Death Collaborators. Op. cit. 1198-1199.

[17] Gore, Al. *An Inconvenient Sequel: Truth to Power*. Film documentary. 2017.

[18] Poushter, Jacob and Dorothy Manevich. *Globally, people point to ISIS and climate change as leading security threats.* Pew Research Center. August 1, 2017.

[19] Riley, Tess. "Chinese President Xi Jinping's climate change remarks sure seem to be aimed at Trump." *Huffington Post*, October 18, 2017. Accessed October 19,

global warming: hurricane Irma, the war in Syria, etc. *The Ice*, a novel by Laline Paull, was about "the day after tomorrow … the Arctic sea iced has melted … global business carves up the new frontier".[20]

Key questions are debated. What is global warming? Does global warming exist? Are specific extreme events caused by global warming? Is it caused by human society? Is it a serious threat? Can the threat be averted? Are the proposed actions sufficient to avert it?

Answering these questions briefly … Global warming refers to the phenomenon of increasing mean world surface temperatures in recent times. The evidence for its existence suggests that it started with the onset of the industrial revolution in the mid nineteenth century. Are specific events caused by global warming? Global warming involves a changing probability distribution of events and *every event* is a realisation of the changing probability distribution - and this statement can be applied to specific extreme events. Global warming has been caused by the increased emission of greenhouse gases in the period since the industrial revolution. The warming and increased omissions occurred during the same period of time.[21] Also climate science provides an explanation of the causal link (see below). Turning to the last three questions …

… in September 2017 a report presented a revision to the estimates for the Paris agreement. It prompted headlines that "the world is warming more slowly than predicted" and that "climate change disaster can be averted".[22] It is this report which forms the focus for this section. It is of interest in that it reveals scientists' current thinking about global warming and whether it can be averted; and provides insight into the status of their beliefs and the status of the models which they use.

Let us start by looking at the underlying science. *Global Warming, The Complete Briefing* by John Houghton provides an authoritative account of climate history, climate science and climate models.[23]

A simple example. Radiation affects temperature: when the sun shines we feel warm. A change in radiation leads to a change in temperature:

2017. https://www.huffingtonpost.com/entry/trump-china-climate-change-xi-jinping-paris-agreement-air-pollution-greenpeace_us_59e762c6e4b00905bdadf416.
[20] Paull, Laline. *The Ice*. London: Fourth Estate, 2017.
[21] Houghton, John. *Global Warming. The Complete Briefing*. Cambridge: Cambridge University Press, 2010, 2015. Figures 3.2, 29; 4.1, 71; and 4.5, 80.
[22] Webster, Ben. "Climate change disaster can be averted, say experts. Scientists admit that world is warming more slowly than predicted." *The Times*, September 19, 2017: 1, 2.
[23] Houghton, op. cit.

when the sun goes behind a cloud we feel cooler. However cloudiness can also have the opposite effect: cloudiness can make the night warmer whereas a cloudless winter's night can lead to frost. In general a change in cloudiness leads to a change in radiation leads to a change in temperature. Clouds have always been in the atmosphere but industrial greenhouse gases are new and have similar effects. Such a linkage between these variables is referred to as radiation forcing.

The flows of radiation between the earth and space, and between the earth's surface and the earth's atmosphere, are summarised in a figure in Houghton.[24] Although the figure provides a good intuitive understanding of the system, the equations involved are worth specifying in detail.

The equations apply to a stable situation, that is one where radiation flows in equal radiation flows out. Houghton gives illustrative numbers in units of Watts per square centimetre (MT^{-3}). (Energy is measured in joules (ML^2T^{-2}) and power in watts – joules per second (ML^2T^{-3})).

First consider the earth and space: radiation flows into (X) and out of (Y) the earth. The sun sends radiation X to the earth, and the earth sends radiation Y back out into space. The net retention of radiation by the earth is d=X-Y. On average, incoming radiation equals outgoing radiation and in this case d=0.

$$X = Y = 342 \qquad\qquad earth\underline{\quad\quad X=Y\quad\quad}sun/space$$

Radiation Y sent out by the earth is composed of reflected solar radiation Y1 and outgoing longwave radiation Y2.

$$Y = Y1 + Y2 = 107 + 235 = 342$$

Reflected solar radiation Y1 is composed of reflection by clouds, aerosol and atmospheric gases Y11, and reflection by the earth's surface Y12.

$$Y1 = Y11 + Y12 = 77 + 30 = 107$$

Outgoing longwave radiation Y2 is composed of emission by the atmosphere Y21, by clouds Y22 and by the atmospheric window from the earth's surface Y23.

$$Y2 = Y21 + Y22 + Y23 = 165 + 30 + 40 = 235$$

We now distinguish between the earth's surface and the earth's atmosphere. Consider radiation flows into (U) and out of (V) the *earth's surface*. The net retention of radiation by the earth's surface is d'=U-V. On average, incoming radiation equals outgoing radiation and in this case d'=0.

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[24] Houghton, op. cit., Figure 2.7, 26.

$U = V = 492$ *earth's surface*____U=V____atmosphere, sun/space

(The figure of 492 excludes 30 <u>in</u> from the sun, reflected by the surface back <u>out</u> into space.)

The earth's surface absorbs radiation U: U1 from the sun; and U2 back radiation from the atmosphere U2.

$U = U1 + U2 = 168 + 324 = 492$

The earth's surface emits radiation V comprising surface radiation V1, evaporation and transpiration into the atmosphere V2 and thermals V3.

$V = V1 + V2 + V3 = 390 + 78 + 24 = 492$

Finally consider radiation flows into (P) and out of (Q) the *earth's atmosphere*. The net retention of radiation by the earth's atmosphere is d"=P-Q. On average, incoming radiation equals outgoing radiation and in this case d"=0.

$P = Q = 519$ *earth's atmosphere*____P=Q____surface; sun/space

(The figure of 519 excludes 77 <u>in</u> from the sun, reflected by the atmosphere back <u>out</u> into space.)

The earth's atmosphere absorbs radiation P: P1 from the sun; and P2 from the earth's surface P2.

$P = P1 + P2 = 67 + 452 = 519$

(Note P2=V-40 where 40 is the 'atmospheric window'.)

The earth's atmosphere emits radiation Q: Q1 out to space; and Q2 to the earth's surface. Q1 comprises Q11=165 emission by the atmosphere; and Q12=30 emission by clouds.

$Q = Q1 + Q2 = 195 + 324 = 519$

(Note Q1=Y2-40 where 40 is the 'atmospheric window'.)

Global warming is associated with a change in Q1, the radiation emitted out to space. Increasing carbon dioxide reduces the emission of radiation and results in an increase in average surface temperature.

The four equations below give a simplified model based on a recent paper.[25] Changes over time t in the temperature T depend on radiation forcing F [1]; radiation forcing F depends on atmospheric concentrations of carbon dioxide C [2]; atmospheric concentrations of carbon dioxide C depend on the cumulative carbon concentration anomaly R [3]; and cumulative carbon concentration anomaly R depend on annual carbon dioxide emissions E [4]. Other variables are also involved. Here the temperature variable T is the 'global mean surface temperature anomalies'.

$dT/dt = c\,F - d\,T$

$F = a\,f(C) + b$

$C = C_0 + R$

$dR/dt = a\,E - R/b$

It was another paper by Millar and his colleagues which prompted the newspaper headlines:

"The Paris Agreement has opened debate on whether limiting warming to 1.5 °C is compatible with current emission pledges and warming of about 0.9 °C from the mid-nineteenth century to the present decade. We show that limiting cumulative post-2015 CO_2 emissions to about 200 GtC would limit post-2015 warming to less than 0.6 °C in 66% of Earth system model members of the CMIP5 ensemble with no mitigation of other climate drivers, increasing to 240 GtC with ambitious non-CO_2 mitigation. We combine a simple climate–carbon-cycle model with estimated ranges for key climate system properties from the IPCC Fifth Assessment Report. Assuming emissions peak and decline to below current levels by 2030, and continue thereafter on a much steeper decline, which would be historically unprecedented but consistent with a standard ambitious mitigation scenario (RCP2.6), results in a likely range of peak warming of 1.2–2.0 °C above the mid-nineteenth century. If CO_2 emissions are continuously adjusted over time to limit 2100 warming to 1.5 °C, with ambitious non-CO_2 mitigation, net future cumulative CO_2 emissions are unlikely to prove less than 250 GtC and unlikely greater than 540 GtC. Hence, limiting warming to 1.5 °C is not yet a geophysical impossibility, but is likely to

[25] Millar, Richard J., Zebedee R. Nicholls, Pierre Friedlingstein, and Myles R. Allen. "A modified impulse-response representation of the global near-surface air temperature and atmospheric concentration response to carbon dioxide emissions." *Atmos. Chem. Phys.*, 17, 7213–7228, 2017. See 7215. Accessed 11 October 2017. https://www.atmos-chem-phys.net/17/7213/2017/acp-17-7213-2017.pdf.

> require delivery on strengthened pledges for 2030 followed by challengingly deep and rapid mitigation. Strengthening near-term emissions reductions would hedge against a high climate response or subsequent reduction rates proving economically, technically or politically unfeasible."[26]

The related argument in *The Times* ran as follows.[27] Suppose that there is a target of keeping temperature below T* and that current temperature is T_0. In other words the temperature rise must be kept below dT=(T*-T_0). According to the model this is met by keeping emissions at E≤E*. Emissions are the number of years y times the emission rate v. So E=vy.

Suppose v is 20 billion tonnes of carbon. If E*=70 then y=3.5; and if E*=240 then y=12. In 2015 it was thought that E*=70 and now it is thought that E*=240 and so whereas it was thought that changes had to be accomplished in 3.5 years, it now appears that it is sufficient for changes to be accomplished in the longer time period of 12 years.

What has changed is that temperatures have risen more slowly than predicted by the models. This is partly because emissions have been reduced, partly by China cutting emissions and partly by the introduction of renewable energy. Also the Pacific Decadal Oscillation has resulted in recent years in lower temperatures (it does this cyclically).

Consider now what this tells us about the status of the scientists' beliefs and the status of the models which they use. The above quotation shows how beliefs are highly qualified, envisaging a variety of possible futures each with a certain probability of occurring and dependent on certain assumptions being met, and liable to subsequent modification as new information is gathered.

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[26] Millar, Richard J., Jan S. Fugelstvedt, Pierre Friedlingstein, Joeri Rogelj, Michael J. Grubb, H. Damond Matthews, Ragnhild B. Skelie, Piers M. forster, David j. Frame and Myles r. Alaln. "Emission budgets and pathways consistent with limniting warming to 1.5 degrees C." *Nature Geoscience*. 10, 741-747 18 September 2017. Accessed 11 October 2017.
http://www.nature.com/ngeo/journal/v10/n10/full/ngeo3031.html?foxtrotcallback=true.

[27] Webster, op. cit.

Peace. *How peaceful is the world today – really?*[28]
(Meredith Reid Sarkees)

The aim of Sarkees's paper is to evaluate the 'declinist argument'. Some scholars claim that there has been a decline of war - however they disagree about why this has happened, citing variously: the UN system, UN peacekeeping, the spreading norms against war, the spread of capitalism, increased prosperity and better living conditions, greater democracy and Pinker's six general trends and his five historical forces. Others have challenged the declinist argument: some in the US military see the world as being more dangerous than ever before. Still others note the promiscuous intervention by, the permanent engagement of and the expansionism by the USA; and they see the declinist view as apologetics for Western-imperial violence. The claimed causal mechanisms have also been challenged.

Some of the evidence which has been used to support the declinist argument relates to the post-1945 period, drawing on UCDP/PRIO data. Sarkees argues that this is too short a period to discern a historical pattern. She cites the COW data which covers the period from 1816 to the present day and also refers to a study of great power wars between 1550 and 1900.

There are important definitional differences between the UCDP/PRIO data and the COW data. Nevertheless the UCDP/PRIO data and the COW data yield a relatively similar picture for the number of ongoing wars for the period 1946 to 2015. Inter-state, extra-state and non-state wars are few. Predominant are intra-state wars (internal and internationalised internal state wars). These exhibit: a slight decrease in the period 1946-1958; a large increase in the period 1958-1992; a large decline in the period 1992-2012; and some increase in the period 2012-2015.

Sarkees notes the argument in favour of looking at a longer time span and focuses on the COW data which covers 1816 to 2015. She considers four measures: total ongoing wars, total war onsets, total nation-months of war per decade and also the duration of wars. Onsets have fluctuated about a constant level and durations have increased. These two trends in combination logically mean an increase in ongoing wars. Both ongoing wars and war onsets show significant polynomial trends and these are different for different types of wars.

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[28] Sarkees, Meredith Reid. *How peaceful is the world today – really?* . Presented at the annual conference of the Conflict Research Society Conference. Pembroke College, University of Oxford. 2017.
Sarkees, Meredith Reid and Jeffrey S. Dixon. Forthcoming 2017. "The Waning of Intra-state War? The "Decline of War" Thesis Revisited"

Conceptualising conflict variables and their relationships

I now reflect on Sarkees's paper and more generally the declinist debate. The 2015 Yearbook provides an extended discussion of Pinker's Chapter 5 on the Long Peace.[29] In Pinker's chapter there are a lot of variables and a lot of graphs and some are going up and some are going down! A mapping out of how all the variables are related is helpful.[30] Certain basic variables provide a conceptual foundation. Derived variables can then be defined in relation to the basic variables. Finally we can infer relationships between the variables. These are logically necessary relationships as distinct from observed empirical relationships.

The first set of basic variables refers to time and various measures of what might be thought of as the social weight which might be brought to bear on conflicts: people, states, economic power and technological power.

> Time, t
> Population, N
> Number of states, S
> Economic power, E
> Technological power, U

The second set of basic variables refers to conflict. Each conflict is characterised by the time of onset and the duration, the number of participating states and the number of deaths. The set of conflicts can be characterised by the totals of these measures. From the totals one can calculate means in reference to a number of variables, for example per conflict, per state or per capita of population.

> Number of conflicts, C
> Number of conflict deaths, total D
> The quantity of conflict harms, total H
> The set of conflict durations, mean T
> The set of conflict state-participations, mean z states per conflict

From these we can obtain a set of derived variables:

> N individuals   S states
> Individual conflict rate, $c_I = C/N$ State conflict rate, $c_S = C/S$

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[29] Pinker's Chapter 5 on the Long Peace. 189-231.
Burt, 2017, op. cit. 144-147.
[30] Burt, 2017, op. cit. 147.

Death rate, $x = D/N$

$$\text{Conflict deadliness, } d = D/C$$

Deadliness rate, $d/N = D/CN$

Mean state population, $m = N/S$

We can now deduce a number of relationships between these variables. For example the death rate x can be expressed as conflict deadliness times the individual conflict rate c_I:

$$x = D/N = (D/C)\,(C/N) = d\,c_I \qquad\qquad [1]$$

The individual conflict rate can be expressed as the state conflict rate divided by the mean state population:

$$c_I = C/N = (C/S)\,(S/N) = c_S\,/\,m \qquad\qquad [2]$$

Combining [1] and [2] we have:

$$x = d\,c_I = d\,c_S\,/\,m \qquad\qquad [3]$$

We now introduce a probabilistic perspective. Observed variables are realisations of probabilistic variables. The observed value equals the expected value plus a random error: $O = E + \varepsilon$. In particular rates are associated with expected values which might be referred to as propensities. The death rate with a death propensity and the conflict rate (individual or state) with a conflict propensity.

Taking expectations in the above equation we have Equation [4]. This might be interpreted as follows. The causal variable is the state propensity for conflict. Mean state population and conflict deadliness are constant or separately determined. These variables determine the outcome propensity, the death propensity. We might refer to Equations [3] and[4] as *The Fundamental Equations of Deadly Quarrels*.

$$E(x) = d\,c_I = d\,E(c_S)\,/\,m \qquad\qquad [4]$$

In some situations constant propensity is a natural null hypothesis. Here the null hypothesis would be that state propensity for conflict was constant. An alternative hypothesis about states would be that state-dyads had constant conflict propensity. The number of conflicts should then increase with the square of the number of states - because N states have

N(N-1)/2 dyadic relations. Against this idea is that the number of adjacent states each state has is independent of the number of states.

Somewhat related null hypotheses might be generated for economic and military power. The null hypotheses might be that conflicts get worse as economic and military power become greater.

Another key relationship is invoked by Sarkees: there is a relationship between onsets C, ongoings C_t and durations T - where t is the number of time points. (Note that the number of onsets equals the number of conflicts C.) The mean onsets times the mean duration equals the mean ongoings.

number of onsets = C

$$\Sigma_C \, T = \Sigma_t \, C_t = C \, m(T) = t \, m(C_t) \qquad\qquad [5]$$
$$\text{where } \Sigma = \text{sum}; \, m() = \text{mean of}$$

$$m(C) \, m(T) = m(C_t) \qquad\qquad\qquad\qquad [6]$$

This entire conceptual framework can be interpreted more generally. It can refer to any system of groups of individuals participating in a class of events occurring in time with a binary outcome for individuals.

Human costs. *A new epistemology of war … measuring the human costs of armed conflicts*[31](John Tirman)

John Tirman addresses two key points. In addition to looking at the deaths caused by war we need to consider the other harms caused by war. Secondly whereas data sets such as the COW data set look at the deaths experienced by *all nations*, national media tend to focus on the deaths experienced by *that particular nation* – there appears to be an indifference to the suffering of others. Tirman proposes research on the human costs of war.

"The goal is to design a system for capturing data and narratives about how armed conflict affects particular societies, enriching our understanding of the phenomenon of war and raising the visibility of its consequences …

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[31] Tirman, John. *A new epistemology of war … measuring the human costs of armed conflicts*. Presented at the annual conference of the Conflict Research Society Conference. Pembroke College, University of Oxford. 2017.
Tirman, John. *The Deaths of Others: The Fate of Civilians in America's Wars*. Oxford: Oxford University Press, 2011.

To do so effectively requires three major tasks.
(1) Identify social indicators of war, namely, develop a set of measurements to gauge the conditions of a society under the stress of war.
(2) Apply existing techniques of measurement, and design and adapt new technologies as needed, to gather data and inform those indicators.
(3) Utilize this information to establish a system of conflict assessment that can readily share data, information, and analysis with field practitioners, policy makers, scholars, journalists, and others."

Tirman's introduction provides the background to his project:
"In the early stages of the Iraq War in 2003, a question began to gain currency among a few analysts: What was happening to Iraqi civilians as the U.S. military moved into Baghdad and deposed Saddam Hussein? How many were dying? An armed resistance quickly rose, and in the coming weeks and months the fighting grew to include much of the country. Clearly, many people were suffering, but virtually no one in the U.S. government, the news media, or American society generally showed concern for the people the United States was liberating from Saddam's rule.

In autumn 2004, a mortality survey conducted by epidemiologists at Johns Hopkins, with Iraqi colleagues, estimated mortality in the first 17 months of the war to be 98,000.[i] The reaction to this estimate, published in the British medical journal, *The Lancet*, was widely dismissive, but it was the first serious attempt to gauge the war's damage. In 2006, I organized another mortality survey jointly with the Johns Hopkins team, with a larger sample. The results of that survey were startling, and very controversial: the 1800-household survey yielded a midpoint estimate of 655,000 Iraqi deaths from the beginning of the war to June 2006, and included—as with the first survey—all Iraqi deaths, civilians and combatants.[ii] It was also published in *The Lancet*, and, like the 2004 article, peer reviewed. It was so explosive politically that President Bush explicitly rejected it during a press conference two days after its release, claiming the method was not credible. The survey continued to roil the debate about the war for years afterwards …"

Threats in a system of relationships

A variety of threats have been mentioned in our discussion so far: threats to the global economy, threats to health, the threat of global warming, and the threat of war. We now consider the evidence about people's perceptions of these threats.

A survey conducted by the Pew Center asked people in 38 countries about eight possible threats to national security ("to our country").[32] Threats varied in their strength. Climate change was identified as a major threat by 61% of the respondents; the condition of the global economy was identified by 50%; cyberattacks from other countries was identified by 53%; and large numbers of refugees leaving countries such as Iraq and Syria was identified by 42%. Three of the threats concerned the power and influence of the three dominant powers: the US (by 38%), Russia (by 33%) and China (by 34%). Finally the top threat was said to be from the Islamic militant group known as ISIS (by 63%). Note that this is a short-term threat in contrast with the long-term threat posed by global warming. See Table 3.

Note that we are dealing here with subjective perceptions of threats rather than objective threats – and that subjective perceptions may to varying degrees be related to the objective situation. Note too that the location of the Pew Center in the USA is likely to affect the countries involved and also the questions asked.

Country percentages varied greatly. Table 3 gives the standard deviation, minimum and maximum and range. The least variation was for cyberattacks ranging from 34% of the people on one country, to 77% of the people on another country, a range of 43. The greatest variation was about the threat from China ranging from 10% for one country to 83% for another country, a range of 73.

(For each of the eight threats the range in country percentages was roughly equal to four times the standard deviation, consistent with a notion of a normal distribution with 95% of the countries being plus or minus two standard deviations from the mean.)

A priori, there are two possibilities: some countries feel very threatened about everything and other countries do not; or countries feel threatened by some things but not others. Adding up all the threats the most threatened country is twice as threatened as the least threatened country. See final row of Table 3.

As well as the variation between countries, individuals within a country also varied in their perception of threat. For example in Peru, 50% saw the condition of the global economy as a major threat, 26% saw it as a minor threat, 17% saw it as no threat and 7% didn't know or refused to answer.

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[32] Poushter and Manevich. Op. cit.

Table 3 Percentage of people in a country perceiving a factor to be a major threat. Mean and variation between countries[33]

	mean	std dev	min	max	range
climate change	61	13	35	89	54
global economy	50	17	20	88	68
cyberattacks	53	11	34	77	43
refugees	42	14	21	67	46
US	38	15	15	72	57
Russia	33	12	11	65	54
China	34	16	10	83	73
ISIS	63	16	30	97	67
all threats	47	8	35	66	31

Different continents perceive different threats. Distance is a factor: near neighbours pose greater threats. In particular the major powers are seen as the major threats in their own continent: the US in Latin America (47%) and in Canada (38%); Russia in Europe (41%); China in Asia-Pacific (47%). However all the major powers pose threats in all the continents outside their own (20% to 37%; and 50% for the US in the Middle East). The US was the major threat in the Middle East. In Africa, the major powers are of roughly equal threat level. See Table 4.

The USA saw Russia as slightly more of a threat than China (47% v 41%); whereas Russia saw the USA as more of a threat than China (37% v 19%).

ISIS and refugees are seen as the major threat in the Middle East and Africa.

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[33] Note: Figures represent global means across 38 countries. ISIS not asked in Turkey; U.S. power and influence not asked in U.S; and Russia's power and influence not asked in Russia.   Source: Spring 2017 Global Attitudes Survey. Q17a-h.
Q17d. I'd like your opinion about some possible international concerns for (survey country). Do you think that _____ is a major threat, a minor threat or not a threat to (survey country)? d. global climate change

The USA, Canada and Europe felt less threatened by the global economy than other regions (the percentages were: 36, 25, 35 v. 46, 51, 59 and 61).

Cyberattacks are not included in the table. The percentages did not vary much: 54, 54, 52 and 53 with 40 in the Middle East.

Table 4 Percentage of people in each region perceiving a factor to be a major threat. (Canada).

.	US	Russia	China	ISIS	refugees	economy	cli
Latin America	**47 (38)**	23 (30)	25 (25)	40 (55)	31 (33)	61(25)	74(60)
Europe	31	**41**	30	**74**	41	35	64
Asia-Pacific	35	29	**47**	**62**	35	46	61
Middle East	**50**	35	20	**[63-97]**	48	59	44
Africa	37	31	32	**54**	**55**	51	44

There were significant correlations between the threat variables. See Table 5. A cluster analysis allows us to put the eight variables into two groups in the following way.

The highest correlation was 0.65 between the US as a threat and the global economy as a threat. Next highest were between Russia and ISIS (0.56); climate change and cyberattacks (0.54); US and cyberattacks (0.53); China and cyberattacks (0.53); and IS and refugees (0.50). These links give two clusters, cluster A - US, global economy, climate, cyberattacks and China; and cluster B - Russia, IS and refugees.

Other links in cluster A are: global economy and climate change (0.48); and US and climate change (0.42). Links between clusters are: Russia and cyberattacks (0.39); and refugees and the global economy (0.31). A principal component analysis also identified the same two clusters. The cluster sums correlate highly, at least 0.7, with each of the individual variables in their cluster.

Note that a correlation means that countries tend to experience both or neither threats – not necessarily that there is a causal correlation between them.

Table 5 Correlations between threat variables (country percentages)

.	economy	US	climate	cyber	China	Russia	ISIS	ref
economy	1	.65	.48	.19	.24	-.07	.13	.31
US		1	.42	.53	.30	.23	.16	.03
climate			1	.54	.32	-.06	-.06	-.17
cyberattacks				1	.53	.39	.20	-.11
China					1	.05	-.04	-.11
Russia						1	.56	.24
ISIS							1	.50
refugees								1

Finally we reflect on the notion of threat. The world consists of a complex system of relationships. Relationships can be in a variety of spheres: environmental, technological, economic, social, cultural, political and militaristic. Different locations in the system have different relationships and different roles in their relationships and so have or perceive different threats. These relationships involve power and value, cooperation and conflict, promises and threats. These aspects change over time, and there is a variety of types of response to change – accommodation, heightening of tension, etc. There may be a tension between the old and the new and there is a danger of this tension escalating in an action-reaction process.

Tables 4 and 5 exhibit a number of interesting features relating to the threats from the power and influence of US, Russia and China. The rivalry between these powers relates to the recent debate about the Thucydides Trap in relation to the rising power of China relative to the USA. (Incidentally USA-China relations were the subject of Walter Isard's talk at the Peace Science Society International Conference in Columbia, South Carolina, in 2008.)[34]

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[34] McKinney, Jared. "Putting Thucydides into the "Thucydides Trap"." China-US Focus. October 8, 2015. Accessed 5 October 2017.
https://www.chinausfocus.com/foreign-policy/putting-thucydides-back-into-the-thucydides-trap.

The liberal order. *The threat to the liberal world order and the future of war*[35] **(Lars-Erik Cederman)**

Threats to the economy, to health, to the environment and to peace might be considered generic threats, potentially affecting all. There are also threats to specific institutions. In this section we consider Cederman's arguments about the threat to the liberal world order.[36] Cederman started by discussing his recent article in the Journal of Peace Research:

> "Abstract. Many scholars have detected a decrease of political violence, but the causes of this decline remain unclear. As a contribution to this debate, we revisit the controversy over trends in conflict after the end of the Cold War. While many made ominous predictions of surging ethnic warfare, Gurr presented evidence of a pacifying trend since the mid-1990s and predicted a further decline in ethnic conflict in an article on 'the waning of ethnic war'. Leveraging more recent data on ethnic groups and their participation in ethnic civil wars, this study evaluates if Gurr was right about the decline of ethnic conflict, and if he was right for the right reasons. We assess whether an increase in governments' accommodative policies toward ethnic groups can plausibly account for a decline in ethnic civil war. Our findings lend considerable support to an account of the pacifying trend that stresses the granting of group rights, regional autonomy, and inclusion in power-sharing, as well as democratization and peacekeeping."

Cederman then looked at UCDP data for the period 1946-2015 which shows a substantial increase in the number of minor armed conflicts in the period 1946-1991/1994, a decline in the period 1994-2004 and flat thereafter with an increase in the last few years. Cederman reported on the diffusion of ethnic inclusion. The size of the discriminated population has declined almost everywhere except for the Arab world where it has increased. The democracy index has increased over the period 1970-2015,

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[35] Cederman, Lars-Erik. *The threat to the liberal world order and the future of war*. Presented at the annual conference of the Conflict Research Society Conference. Pembroke College, University of Oxford. 2017.
Cederman, Lars-Erik, Kristian Skrede Gleditsch, and Julian Wucherpfennig. "Predicting the Decline of Ethnic Conflict: Was Gurr Right and For the Right Reasons?" *Journal of Peace Research*. 54(2): 262-274, 2017.
[36] See also Rennger, Nicholas. *After Liberalism?: The future of Liberalism in International relations.* Friedman, R., Oskanian, K. & Pacheco Pardo, R. (eds.). Palgrave Macmillan, 2013. p. 51-66.

although there has been a recent slight decline due to a number of backsliders.

Turning to the liberal world order, three components are noted: domestic liberal order, the liberal community of states and global liberal norms. Domestic liberal order is threatened by rising inequality and populism, refugee flows and terrorism, and globalisation. The liberal community of states is threatened by an unwilling hegemon, the weakening of NATO and EU, and the diffusion of illiberalism with populist victories in Eastern Europe. Global liberal norms are threatened by the attack on the UN, the undermining of human rights and international law and Western support for illiberal leaders.

One threat posed to the liberal world order, particularly to the liberal community of states, by the unwillingness of the hegemon to perform that role. An example cited was Donald Trump's slogan, "America first!"

The future of war in an illiberal world is seen as follows. Nuclear crisis instability is characterised by military rather than negotiated solutions, the weakening of multilateral institutions and diversionary war. The 'democratic peace' is eroded by fewer democracy-democracy relations, weakening defence of the West and irredentism. An increase in civil war is driven by more discrimination and exclusion and more state-led repression.

In order to defend the liberal world order, there must be no tolerance of intolerance. Complacency must be challenged through education. Liberalism needs to be embedded and multi-ethnic integration promoted. There is a need for militant liberalism at home to keep populists from power, to protect free press and academia and to block violent extremist organizations. There is a need for militant liberalism abroad with EU as the last bastion, isolating right-wing populists in Eastern Europe and defending against external enemies, especially Russia.

Dissatisfied democracy

"The great democracies face new and serious threats ..."[37]

There have been recent concerns about the future of democracy with references to 'democratic recession' and 'democratic deconsolidation'.[38]

[37] George W. Bush, quoted in Blakely, Rhys. "America is losing its confidence." *The Times*, 20 October 2017: 34.

[38] Diamond, Larry. "Facing up to the democratic recession." *Journal of Democracy*, 26, 1 (2015): 141-155.

In his talk (see above) Cederman noted the increase in the number of democracies in past decades with a more recent slight reversal and he also noted the rise of populism. A

The 2015 Yearbook devoted a chapter to *Democracy: Satisfaction? … Dissatisfaction? … Value Space*[39], noting in particular that people's differing values inevitably resulted in a certain amount of dissatisfaction. So it is not too surprising to learn that people are split on how well democracy is working in their country. According to a recent survey of people in 38 countries, 46% are satisfied and 52% are dissatisfied with the way democracy is working.[40] As noted below, it is the effect of one's party being in power that most strongly affects satisfaction with the way democracy is working.

Asked about different ways of governing a country, the net positive percentages (good% - bad%) were encouraging for democracy:

Table 6 Net percentage support for different ways of governing a country

representative democracy	+61%
direct democracy	+36%
rule by experts	+ 3%
rule by a strong leader	-45%
rule by the military	-49%

The Editors. "Online exchange on 'democratic deconsolidation'." *Journal of Democracy*, 26 June 2017.
Accessed 19 October 2017.
https://www.journalofdemocracy.org/online-exchange-%E2%80%9Cdemocratic-deconsolidation%E2%80%9D.
[39] Burt, 2017, op. cit., 219-243.
[40] Wike, Richard, Katie Simmons, Bruce Stokes and Janell Fetterolf. "Globally, broad support for representative and direct democracy." Pew Research Center, October 16 2017.
Accessed 19 October 2017.
http://www.pewglobal.org/2017/10/16/globally-broad-support-for-representative-and-direct-democracy/.
Aaronovitch, David. "Referendums are great … if you're a dictator. Direct democracy is growing in popularity but there is no substitute for well-informed decisions made by parliaments." *The Times*, 19 October 2017: 27.

However using a derived measure the authors suggest though that there is a shallow commitment to representative democracy. (I am uneasy about the derived measure.)

"Countries with more democratic systems show more widespread commitment to representative democracy. Correlation = 0.63." However the graph does not exhibit a straight line relationships and maybe is even U-shaped.[41]

"Even in rich, well-established democracies, nondemocratic models find some support."

"People with less education are more likely to support military government." However for most countries the difference is not large.

"The ideological right is more supportive of a strong leader ruling without constraints." However for most countries the difference is not large.

"Those upbeat on the economy are more likely to be satisfied with democracy." In contrast to the previous results, the difference is marked.

"Those who support the party in power are more likely to be satisfied with democracy."

Of these last four points, it is the effect of one's party being in power that most strongly affects satisfaction with the way democracy is working, as the following figures for the US suggest.

Table 7 Percentage X(Y) support for different ways of governing a country

neg. or pos. on:	favouring	negative	positive	difference
party in power	democracy	31	68	37
economy	democracy	37	54	17
education	military	24	7	17
right	leader	14	27	13

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[41] Burt, 2017, op. cit., 118-120.

Dominant discourses. *Indexology, pseudo-science and human ranking: reducing peace into a quantifiable commodity*[42] (Steven Ratuva)

Some studies may consider all parties but yet may frame the situation in a partial way. Steven Ratuva noted that a variety of indices yielded world maps which frame the West in a positive light and the rest of the world in a negative light.

"Abstract. Mainstream 'Western' discourses on security often located the Western world at the centre of analysis, and the global south societies were seen as full of rogue states and potential sources of threat to liberal democracy, global capitalist interests and Western values. A critical factor was the way in which some of the underlying assumptions were used to justify division of the world into the 'west versus the rest' and intervention in various forms. The article does a critique of some of the dominant security discourses in the context of their significance to the global south. The political, cultural and economic transformations in the global south societies and their subaltern position within global power configuration were shaped by their colonial experiences, and these in turn reflected their security situations and these factors are often ignored in mainstream security thinking. This poses serious questions about the relevance of Western notions of security and implications on world peace."[43]

Ideas: objective or partisan?

The ideas which we have been discussing are intended to address the objective question of whether or not things in world society are getting better. However controversy is present in discussion of all the above issues. This is not just about having different views but also about having self-serving views, possibly deliberately self-serving views. The 2014 Yearbook devotes a chapter to *'Our Values': Unanimous? Universal? Exceptional? Good? Safe?* which discusses self-serving national exceptionalisms including the debate in the UK as to whether or not Britain was a Christian country.[44]

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[42] Ratuva, Steven. *Indexology, pseudo-science and human ranking: reducing peace into a quantifiable commodity*. Presented at the annual conference of the Conflict Research Society Conference. Pembroke College, University of Oxford. 2017.

[43] Ratuva, Steven. "Subalternization of the Global South: Critique of Mainstream 'Western' Security Discourses." *Cultural Dynamics*, 28(2), 1-18: 2016.

[44] Burt, op. cit., 2016, 86-108.

A common criticism has been that the dominant ideas are the ideas of the dominant powers and that these ideas serve the interests of the dominant powers. The dominant power is seen variously as the West, the USA, the liberal order, democracy, the rich, global capital, etc.

The 'Washington Consensus' espoused by the IMF and World Bank has been seen as serving the interests of the US while harming client nations. Discussions leading to the Paris agreement on climate change also noted conflicts of interest between the West and others, with India initially a reluctant signatory - roles have now reversed with Donald Trump's threat to withdraw and India's allegiance to the agreement.[45] Sarkees notes that some critics of the declinist argument point to the promiscuous intervention by, the permanent engagement of and the expansionism by the USA; and they see the declinist view as apologetics for Western-imperial violence. Tirman points to the indifference, the lack of awareness and the lack of concern of the liberal hegemon for the human costs inflicted on others by its exercise of what it sees as its hegemonic role. Within his talk Cederman expressed qualms about how the USA had exercised its role as hegemon and referred particularly to the Vietnam War. In his question from the floor Jake Lynch mused ironically whether Donald Trump's threat to totally destroy North Korea would be a gain for the liberal world order. Ratuva argues that mainstream 'Western' discourses on security often located the Western world at the centre of analysis, and the global south societies were seen as … potential sources of threat to liberal democracy, global capitalist interests and Western values.

Time: models of trajectories

In this chapter we have been considering how the values relating to world society changes over time. The 2015 Yearbook had two chapter about how things change over time. Chapter 7 looked at the trajectories of social value, violence and population; and Chapter 12 discussed the history of party fortunes in UK general elections. A section of Chapter 13 discussed various models of trajectories including linear, exponential, autoregressive and complexity theory models.[46]

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[45] Westcott, Ben. "Reluctant signatory India takes moral high-ground on Paris climate deal." *CNN*, June 2, 2017.
Accessed: 14 October 2017.
http://edition.cnn.com/2017/06/02/asia/india-paris-agreement-trump/index.html.
[46] Burt, 2017, op. cit., 133-151, 244-265, 274-278.

A typical study involves a theoretical model and a set of empirical data. The process of model estimation involves using the data to estimate the parameters of the model and judging how well the model fits the data. For example in her paper Sarkees identifies both linear models and polynomial models for conflict data sets and finds the polynomial models give a significantly better fit to the data.

A more complex study may involve a set of theoretical models and a number of sets of data. Each model is estimated and the model are compared in terms of their fit to the data. One approach is to use one data set to estimate the model and to use another data set to test the estimated model.

In this chapter also we have considered a variety of models of trajectories. The least sophisticated approach has been to look at charts and make an intuitive judgment about the trends exhibited. The most sophisticated approach is exemplified by the set of computer models of global warming.

Modelling. *Identifying Conflict Escalation Patterns using Bayesian Nonparametric Models*[47] (Altaf Ali)

Ali's paper is a highly sophisticated statistical treatment of conflict processes. It is in two parts. The first part discusses conflict research; and the second part is about mathematical models of process. models.[48]

Much research has been done on the causes of conflict but less is known about the process of conflict ... about its evolution. What are the stages of the process – what states might the process be in? As well as the observable aspects of the process, there may be latent aspects, manifested through the observed data. How can we find out about the latent states, in particular which stages/states are conducive to escalation? As well as retrospective studies can prospective forecasts be made? As well as long-term factors and root causes can we identify immediate triggers? As well as identifying the ingredients can we find the recipe? Various stage models of conflict have been proposed – with different numbers of stages. The study of temporal factors requires disaggregated datasets and models capable of learning temporal patterns. Reference is made to Markov

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[47] Ali, Altaf. *Identifying Conflict Escalation Patterns using Bayesian Nonparametric Models*. Presented at the annual conference of the Conflict Research Society Conference. Pembroke College, University of Oxford. 2017.
[48] Burt, 2017, op. cit., 133-151, 244-265, 274-278.

regime-switching … extracting events from news sources … the economics literature and the efficient market hypothesis.

The mathematical model section looks at a variety of models in the literature and then selects one – Emily Fox's joint algorithm Hidden Markov Model - which is then used in a simulation.

War death rates … a unit root model

The 2015 Yearbook looked at war death rates for the period 1946-2014. Inspection of the graph suggested a downward trend.[49] An autoregressive model for the death rates suggested a 'random equilibrium' death rate of 28.7 per million people per year. An autoregressive model for successive death rate ratios suggested a 'random equilibrium' ratio of 1.02. This latter approximates a unit root model.

Paradoxically this is consistent with a high likelihood of a downward trend. Although the mean is 1, the distribution contains values above and below 1. The combination of these values over time allows a downward trend. For example a successive pair of ratios 0.5 and 1.5 give a combined ratio of 0.75.

Consider the process $x(t)$ where x is in $(0,\infty)$ with $x(0)=u$, and time t takes integer values in $(0,\infty)$. Let $r(t)=x(t+1)/x(t)$.

Suppose the process is deterministic with the recurrence relation, $x(t+1)=x(t)$. In other words $r(t)=x(t+1)/x(t)=1$. The process is constant: $x(t)=u$ and $r(t)=1$ for all t.

Now consider a related random process. Suppose:

$x(t+1) = x(t) + \varepsilon$ where ε is a random variable, values in $(-x(t),\infty)$

$r(t) = x(t+1) / x(t) = 1 + \varepsilon^*$ where $\varepsilon^*=\varepsilon/x(t)$, ε^* is in $(-1,\infty)$

If $E(\varepsilon^*)=0$ then $E(r(t))=E(x(t+1)/x(t))=1$.

The process is a particular case of a time series with a unit root. It is tempting to conclude that the expectation of the process is the same as the simple deterministic case discussed above, namely the constant process $x(t)=u$ and $r(t)=1$ for all t.

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[49] Burt, 2017, op. cit., 144-151.

Example

Suppose that the distribution for ε^* is: (A) ε^*=-0.5 with p=0.5; and (B) ε^*=0.5 with p=0.5. Then $E(\varepsilon^*)$=0. Note that case (A) gives r(t+1)=0.5; and case (B) gives r(t+1)=1.5. Note that 0.5x1.5=0.75<1 – in other words successive alternation of (A) and (B) results in decreasing x.

The set of all possible sequences for r(t) corresponds to the set of all equally likely sequences involving As and Bs. In particular if there are n As and n Bs then:

$$r(t+2n) = (0.5)^n (1.5)^n = 0.75^n < 1$$

So

$$\log(r(t+2n)) = n \log(0.75) = -kn \text{ where } k = -\log(0.75) > 0$$

Because of the binomial distribution this corresponds to the <u>most likely outcome</u> at each stage. In other words a declining trend is the most likely outcome.

The two <u>least likely outcomes</u> are the minimum and maximum:

$$r(t+2n)=0.5^{2n}$$

$$r(t+2n)=1.5^{2n}$$

Recall that the <u>expected value (mean)</u> of r(t)=1. However this is not the most likely course of events. The most likely trajectory is one of declining r. (The distinction here corresponds to that between mean and mode.) And what we are most likely to observe is the most likely trajectory. According to the model it is not the lowest possible trajectory – nor is it the highest possible trajectory. It sounds rather strange – but the general logic is well explained in Renshaw's book.[50]

Because it has randomness the model generating the history says many things are possible. Here the most likely path is downwards but the expectation is that things stay the same and there is a certain probability that things will get worse.

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[50] Renshaw, Eric. *Modelling Biological Populations in Space and Time*. Cambridge, Cambridge University Press: 1991.

Figure 1 Unit root model trajectories: mean, most likely, highest lowest (simple example)

the ratio r
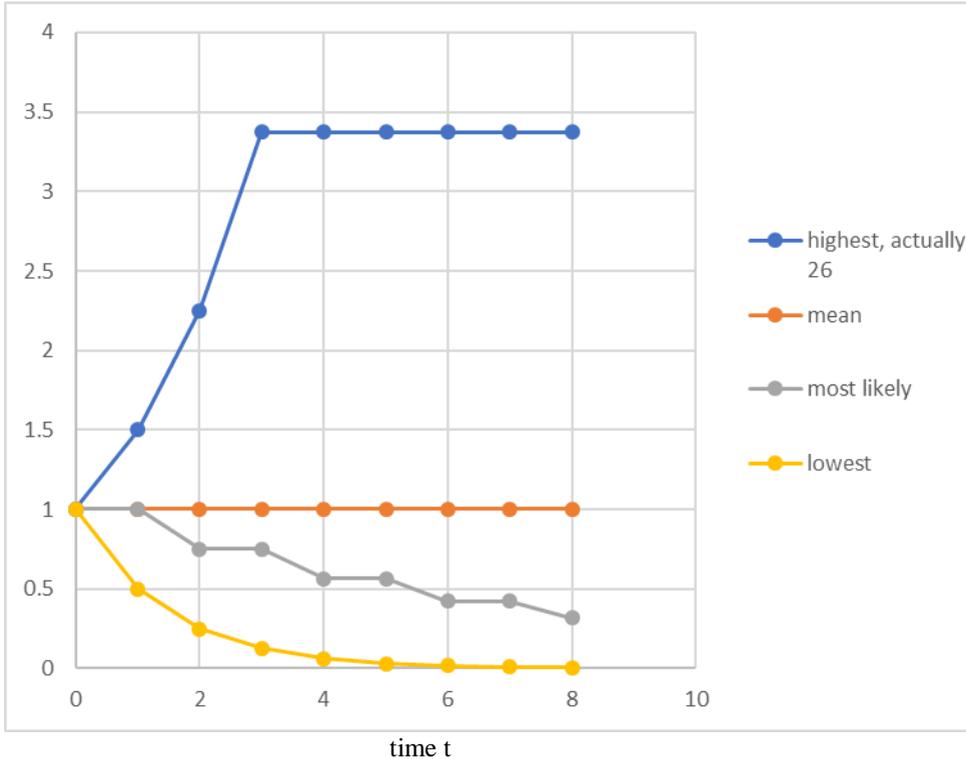
time t

Conclusion

Is the world becoming a better place in general? Care is needed when answering this question. *Time*. Which time period are we referring to? The past or the future? … immediate, short-term or distant time? *The world*. The world overall, or all parts of the world? All the world, or just certain parts of the world? *Values*. All values, or just certain values? Everyone's values, or just the values of certain actors? Just our own values? *Evidence and concepts*. What empirical evidence do we have? How do we conceptualise the situation? What biases do we need to be alert to? There is a difference between history and the model which generates the history.